

SCHOOL LAUNCH · EXPLORE TRACKS

EXPLORE HORSES AND PONIES · EXPERT

Track 4 of the Explore Tracks, Expert level: four trails for students who love horses. They cover breeds and bloodlines, care and horsemanship, famous horses of history, and great horse stories, with primary sources, real numbers and a reading list at every stop.

First edition

A righteous man regardeth the life of his beast: but the tender mercies of the wicked are cruel.
Proverbs 12:10 (KJV)

COURSE GUIDE

Explore Tracks are for students who want more of what they love. Each track is a set of short, stand-alone stops. At the Expert level, every stop has a true story told in more depth and a primary source to read closely, such as a letter, a passage from an old book, a race chart or a museum record. It also has a picture study, a hands-on task with real numbers, a Scripture from the King James Version, a game and a page for the Field Notebook. A “Go deeper” list points to books, museum pages and a second video.

The Horses track has four trails of eight stops each. Trail A studies the breeds: their bloodlines, how they are measured and how each was shaped for its work, from the desert Arabian to the wild ponies of Assateague. Trail B covers care and horsemanship, with the anatomy, feed rations and farrier work needed to keep a horse sound, and what it all costs. Trail C weighs the evidence behind famous horses of history, from Bucephalus to Secretariat, and separates record from legend. Trail D reads great horse stories, from *Black Beauty* to *The Black Stallion*, asks why the authors wrote them, and ends with the student’s own illustrated horse story.

Each stop links to the full lesson it grows from. These are Life Science (mammals), Gardening & Animals (animal care), History, Geography, Small Business & Economics, Arithmetic, Art and Literature, so time spent on the track also feeds the School Launch courses.

WHO IT IS FOR

Written for students about ages 14 and up who read on their own and can keep a notebook without help. Younger brothers and sisters working at the  Scout or  Ranger level can share the same stops: the whole family can hear the story and look at the picture together, and then each child works at his own depth. No horse is needed. Nothing earlier is required.

HOW TO USE THIS COURSE

1. **One stop at a time.** An Expert stop takes 25–40 minutes. Read the story and the primary source, study the picture, do the hands-on task, and write the notebook entry. Two or three stops a week works well.
2. **Any order.** The four trails are independent, and each stop stands on its own.
3. **Read the sources.** Most stops include a short primary source. Read it twice, then answer the questions under it: who wrote it, when, what the writer saw for himself, and what he only heard from others.
4. **Work the numbers.** Many stops ask for a calculation, such as converting hands to inches, working out a feed ration from body weight, timing a gallop, or costing a year of hay and farrier visits. Show the work in the notebook.
5. **Field Notebook.** Every stop ends with a notebook entry. Each trail builds something: a breed file with trading cards, a costed horse-care manual, an annotated timeline, or a finished story book. A parent signs each trail certificate.

6. **Go deeper.** The list at the end of each stop is optional. Choose one item a week, if any, and note it in the notebook.
7. **Badge quizzes.** Each trail has a short, optional badge quiz, written or oral. They are for practice, not grades.

SCOPE AND SEQUENCE

Trail 1: Horses 🐾 Trail A: Meet the Breeds (Self-paced)

Trail 2: Horses 🐾 Trail B: Riding and Care (Self-paced)

Trail 3: Horses 🐾 Trail C: Famous Horses in History (Self-paced)

Trail 4: Horses 🐾 Trail D: Horses in Great Stories (Self-paced)

MATERIALS

- **Field Notebook (a sketchbook or composition book)** One for the whole track.
- **Colored pencils, a ruler, a tape measure, scissors, glue and index cards** For diagrams, maps, trading cards and the parts-of-the-horse poster.
- **A calculator** For height conversions, feed rations, speeds and the cost-of-a-horse chart.
- **A library card** For the copyrighted horse books, which are summarized here and not quoted.
- **Internet access, with a parent nearby** For museum collection pages and the second videos in “Go deeper”.
- **A Bible (KJV)** For the Scripture at each stop.

GRADING

Explore Tracks are not graded. A stop is done when the student has read the story and the source, done the hands-on task and written the notebook entry.

Badges and trail certificates are earned by finishing the stops.

- If you want to record the track as elective credit, the Field Notebook and the trail projects serve as the portfolio.

A NOTE TO PARENTS

You do not need to be a horseman. Ask your student to tell you the story, show you the source and explain the numbers. Each stop has a short *For families* note with sources and any facts that are uncertain or disputed.

Safety: no stop requires a real horse. If you visit a stable, an experienced adult should be present for all handling, and riders should wear a helmet. The practical stops (grooming, hooves, feeding, leading) each carry a safety line. If a project involves selling anything, such as trading cards or a stable-chore service, it needs a parent’s sign-off first.

Books: *Black Beauty* (1877) is in the public domain and is quoted. *Misty of Chincoteague*, *King of the Wind* and *The Black Stallion* are still under copyright, so they are summarized. Borrow them from the library.

Pictures are public-domain fine art and historic photographs, among them works by Rosa Bonheur, George Stubbs, Théodore Géricault, Eadweard Muybridge and Frederic Remington.

War horses (the Bible's chariots, Waterloo, the Civil War and Korea) are told plainly, with no graphic detail. People of the past are judged by the standards of their own day, and real wrongs, such as cruelty to working horses, are named plainly. Racing stops cover breeding, training and the record books and do not mention betting.

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- 1.5 The American Quarter Horse and the Cowboy
- 1.6 Shetland and Welsh Ponies
- 1.7 The Chincoteague Pony and the Assateague Herd
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- 2.1 Parts of the Horse
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Trail 3: Horses 🐾 Trail C: Famous Horses in History

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- 4.5 Pony Penning Day and the Real Misty
- 4.6 King of the Wind and the Godolphin Arabian
- 4.7 Walter Farley’s The Black Stallion (1941)
- 4.8 Write and Illustrate Your Own Horse Story

Trails may be done in any order.

HORSES TRAIL A: MEET THE BREEDS

The first trail of the Horses track meets the horse family through eight breeds and ideas. Students learn how horsemen measure in hands and why the 14.2-hand line has exceptions. They meet the Arabian of the Bedouin, the Thoroughbred and its three foundation sires, and the great draft breeds with James Watt's horsepower. Then come the cowboy's Quarter Horse and the trail drives, the Shetland and Welsh ponies of islands, hills and coal pits, and the feral herds of Assateague. The trail ends with the genetics of coat color and the exact language of markings.

This is the  **Expert** level, for students about 14 and up. Each stop takes 35 to 50 minutes and is read independently. It has high-school-level reading, real numbers to work, and, where one exists, a public-domain primary source copied from Project Gutenberg, from Lady Anne Blunt in Arabia (1881) to Andy Adams on the cattle trail (1903). Every stop includes a written narration paragraph for the parent to keep, six practice problems with at least two challenge problems, and a "Go deeper" list. Each stop adds a card to the student's **breed trading-card set** in the Field Notebook. Stops stand alone and may be done in any order.

Five stops earn the **Horse Expert badge, part 1**; eight stops earn part 2 and the **Trail A certificate**. The badge quizzes below are optional review. Badges are earned by doing the stops.

BEFORE YOU BEGIN

- Read a two-page nonfiction passage independently and summarize it in a paragraph.
- Work with fractions, percentages, unit conversion and simple formulas (a calculator is allowed).

MASTERY CHECKLIST

- ☐ I can convert heights between hands, inches and centimeters and explain why the 14.2-hand rule has exceptions.
- ☐ I can describe the origin, build and historic work of the Arabian, Thoroughbred, the three draft breeds, the Quarter Horse, and the Shetland and Welsh ponies.
- ☐ I can read a primary source about horses, say what it proves and what it does not, and separate legend from evidence.
- ☐ I can predict foal colors with Punnett squares and record a horse's markings exactly.
- ☐ I have written eight narration paragraphs and made eight breed cards.

GO DEEPER: BOOKS, MUSEUM PAGES AND RESOURCES

- **International Museum of the Horse, Kentucky Horse Park** (<https://www.imh.org>): Online exhibits on breeds, the horse in history and the horse in sport; useful for every stop.

- **Project Gutenberg** (<https://www.gutenberg.org>): Free full texts of the trail's primary sources: Lady Anne Blunt, *A Pilgrimage to Nejd* (#42217); Du Hays, *The Percheron Horse* (#71972); Andy Adams, *The Log of a Cowboy* (#12797); Douglas, *The Shetland Pony* (#59957).
- **Assateague Island National Seashore (National Park Service)** (<https://www.nps.gov/asis>): Herd history, fertility-control program and visitor safety rules for Stop A7.
- **Chincoteague National Wildlife Refuge (U.S. Fish and Wildlife Service)** (<https://www.fws.gov/refuge/chincoteague>): The Virginia herd, the refuge and its birds, for Stop A7.
- **The Livestock Conservancy** (<https://livestockconservancy.org>): Breed pages and conservation status for draft and pony breeds (Stops A4 and A6).
- **UC Davis Veterinary Genetics Laboratory** (<https://vgl.ucdavis.edu>): Clear explanations of horse coat-color genes, for Stop A8.

1.1 HORSE OR PONY? HANDS, HEIGHT AND TYPE

OBJECTIVES

- Convert horse heights between hands, inches and centimeters, using the horseman's base-4 notation correctly.
- Explain why horses are measured at the withers, with a standing stick, on level ground and unshod.
- Weigh height against type: explain why the 14.2-hand line is a useful rule with honest exceptions.

Warm-up. Write down 14.5. Now explain why no horseman would ever write that height. (Hint: the number after the point is not a decimal.) Then guess: how many centimeters is 14.2 hands? Keep your guess and check it later in the stop.

Video slot. Video coming. How to measure a horse in hands with a measuring stick; horse versus pony; pony height classes. Search approved channels (Kentucky Horse Park, The Pony Club, a 4-H or university extension equine channel); preview first.

KEY TERMS

hand

The horseman's unit of height, fixed at exactly 4 inches (10.16 cm). Abbreviated "h" or "hh" (hands high).

withers

The highest point of the back, just behind the neck, formed by the long upward spines of the vertebrae between the shoulder blades. It stays fixed when the head moves, so height is measured there.

base-4 notation

The way heights are written: hands, a point, then spare inches (0 to 3). 15.2 means 15 hands and 2 inches, or 62 inches; after 15.3 comes 16.0.

pony

By the most common rule, a mature equine under 14.2 hands (58 inches, about 147 cm); in international competition, under 148 cm without shoes.

type

The overall build and character of an animal: proportions of leg to body, bone, head, coat and temperament. A breed may be called a horse or a pony by type even when its height says otherwise.

measuring stick

An upright rule with a sliding level arm laid across the withers. It gives a true vertical height; a tape laid over the shoulder follows the curve and reads too high.

CORE IDEAS

Before standard rulers, traders measured horses with what every man carried: his hand, laid sideways, palm to the horse, one hand stacked above another from the ground up. A hand varies from man to man, so the unit had to be fixed. In England it was settled at **4 inches**. An Act of Parliament under Henry VIII in 1540, which ordered that stallions turned out on common land stand at least fifteen “handfuls,” is often cited as fixing the four-inch hand. The old unit survived the metric age: Britain, Ireland, North America, Australia and much of the horse world still speak in hands, though many breed societies and the international federation now record centimeters too.

Height is taken at the **withers**, not the head. A horse lifts and drops its head all day, but the withers are bone: the tall spines of the vertebrae just behind the neck. A fair measurement follows rules. The horse stands square on hard, level ground, head relaxed and roughly level with its back. The measurer uses an upright **measuring stick** with a spirit level on its arm, not a cloth tape, because a tape bends over the curve of the shoulder and adds an inch or more. Shoes matter too. A set of shoes can add about a centimeter, so competition rules state whether the horse is measured shod or unshod.

The notation trips up beginners. In **15.2 hh** the point is not a decimal point. It separates whole hands from spare inches, and because a hand has only four inches, the figure after the point runs 0, 1, 2, 3 and then rolls over: 15.3 is followed by 16.0. To convert, multiply the hands by 4 and add the spare inches: 15.2 hh is $15 \times 4 + 2 = 62$ inches. To reach centimeters, multiply inches by 2.54: $62 \times 2.54 \approx 157.5$ cm. Going the other way, divide inches by 4; the whole number is the hands and the remainder is the inches. A horseman who writes “15.5” has made a mistake.

Where does a pony end and a horse begin? The common line is **14.2 hands**, which is 58 inches or about 147 cm. The Fédération Équestre Internationale (FEI), which governs Olympic riding sports, defines a competition pony as measuring no more than 148 cm without shoes (149 cm with shoes). Pony shows divide classes at 12.2, 13.2 and 14.2 hands, so a measuring certificate can decide which ring a child may ride in. That is why measuring is done carefully, sometimes by official measurers, and why owners of ponies near a limit care about every half-inch.

Here is the honest complexity: height is a rule, not a definition of nature. The Arabian often stands 14.1 to 15.1 hands, yet every Arabian society calls it a horse because of its build and fine bone. The Icelandic horse is usually 13 to 14 hands and is always called a horse. The tiny Caspian, around 10 to 12 hands, is called a horse by its breeders because its proportions are those of a scaled-down horse. Meanwhile the Welsh Cob, Section D of the Welsh Pony and Cob Society, often stands over 14.2 and is still registered in a pony stud book. Horsemen therefore speak of **type**: ponies tend to have shorter legs in proportion to the depth of the body, thicker manes and coats, small ears, broad foreheads, hard hooves, and a thrifty ability to live on poor grazing.

Why are ponies small? Most native pony breeds come from islands, moors and hills with harsh weather and thin grass: Shetland, Exmoor, Dartmoor, the Welsh mountains, Iceland. A smaller frame needs less total food, and animals that could winter on what the land offered survived to breed. Geneticists have since found that a few genes, including variants of *HMGA2* and *LCORL*, account for a good share of the height differences between breeds. Environment matters as well: poor feeding while young can stunt an animal, and a foal from a small herd raised on rich pasture may finish taller than its parents. Grown height is usually reached by about five or six years old, so only mature animals are measured for horse-or-pony purposes.

Measuring is a small daily practice of honesty. A buyer trusts the seller's figure; a show trusts the certificate; a child's safety depends on a pony fit for the rider. Scripture asks for "a perfect and just measure," and the horseman's hand stick is one place to practice it.

PICTURE STUDY



The Small Horse, Albrecht Dürer, 1505 · Engraving · Impressions in many collections, including the Metropolitan Museum of Art, New York, and the National Gallery of Art, Washington
Wikimedia Commons · CC0

Albrecht Dürer of Nuremberg was the greatest printmaker of the German Renaissance. In 1505 he made two engravings of horses, *The Small Horse* and *The Large Horse*, while he was studying the rules of proportion: how the parts of a body relate to each other in size. Nobody knows the horse's real height. Dürer's title describes the size of the print and the compact, rounded build of the animal, not a measurement in hands.

Look closely

- Find the withers. Using the soldier as a scale, estimate the horse's height in hands. Assume a grown man's shoulder is about 14 to 15 hands from the ground.

- Compare the length of the legs with the depth of the body, from withers to belly. Does the horse look leggy or deep and compact?
- Look at the neck and head. Which features would a horseman call “type” rather than height?

Talk about it

1. Dürer called this a “small horse,” not a pony. From the picture alone, could you prove it was either? What would you need?
2. Why might an artist studying proportion choose a horse as his subject?

Safety first. Measure a real horse only with its owner or an experienced adult holding it on a lead rope. Stand beside the shoulder, never behind; move slowly and speak before you touch; keep your feet clear of hooves. If the horse fidgets, stop and try another day.

HANDS-ON: BUILD A MEASURING STICK AND A CONVERSION TABLE

Make a true horseman’s measuring stick with a level arm, then build a conversion table you can keep in your Field Notebook for the whole track.

You will need

- A straight board, yardstick or broom handle at least 6 feet long
- A ruler or tape measure, a fine marker
- A short flat strip of wood or stiff cardboard for the arm, and a small level (or a level app on a phone)
- Masking tape or a rubber band to let the arm slide
- Graph paper and a calculator

Steps

1. Mark the stick every 4 inches from the bottom and number the hands. Mark the single inches between them in a lighter line. Add a centimeter scale on the other side if you can.
2. Fix the arm so it can slide up and down but stay at a right angle to the stick. Tape the level to the arm.
3. Practice on a table and a doorway: stand the stick upright, slide the arm down until it rests level on the top, read the height, and write it in hands, inches and centimeters.
4. Measure each person in your family at the “withers” (the top of the shoulders) standing on a hard floor without shoes. Measure again with shoes and record the difference.
5. Now measure the same shoulder with a cloth tape laid over the curve of the shoulder. Record how much higher the tape reads, and explain why judges use a stick.
6. On graph paper, make a table from 10.0 to 18.0 hands in steps of one inch: hands, inches, centimeters. Highlight 14.2 hh (58 in, 147.3 cm) and 148 cm.
7. If you can visit a horse with its owner, measure it with the stick and decide horse or pony by height. Then list two features of its type.

Check your work

- My stick reads true vertical height with a level arm.
- My table uses base-4 notation correctly (no “.4” or higher).
- I can explain the tape-versus-stick difference with my own numbers.
- I can give one example where height and type disagree.

FIELD NOTEBOOK

1. **Breed card 1: Horse or pony?** Draw a side view of a horse beside a measuring stick, with the arm resting on the withers. Label hands, inches and centimeters for 14.2 hh.
2. Tape your conversion table into the Field Notebook.
3. **Narration.** Write one paragraph, in your own words, explaining to a younger child how a horseman decides whether an animal is a horse or a pony, including one exception to the 14.2 rule. A parent keeps this paragraph.

Did you know? The biggest and smallest horses differ in height by roughly three times. The tallest horse on record, the Shire Sampson (later renamed Mammoth), foaled in 1846, is said to have stood 21.2½ hands, over 7 feet at the withers. Some miniature horses stand under 7 hands. Both are the same species, *Equus caballus*.

Go deeper.

- The Pony Club, *The Manual of Horsemanship* (many editions): the standard handbook for young riders, including handling and measuring.
- Elwyn Hartley Edwards, *The Encyclopedia of the Horse* (DK): breed by breed, with heights and type.
- Second video topic: “how ponies are officially measured for showing” (preview first).

Goes deeper in. Life Science, “Mammals” (heredity and growth), and Arithmetic, “Measurement and Units” (coming soon).

For families. Sources: FEI pony definition (148 cm unshod, 149 cm shod); Welsh Pony and Cob Society section rules; breed society descriptions of the Arabian, Icelandic and Caspian. The 1540 statute (32 Hen. VIII c. 13) is widely cited as fixing the four-inch hand; we have not quoted it because we could not check an exact public-domain text, so it is stated with “often cited.” Sampson’s height is the figure given by Guinness and the Shire Horse Society and cannot now be checked. The genes named (HMGA2, LCORL) come from published equine genetics studies and are given only as examples. No primary source excerpt is used in this stop.

PRACTICE

1. **EASY** Convert 16.1 hh to inches and to centimeters.

2. **EASY** A sale advertisement lists a mare at “14.5 hands.” What is wrong, and what did the writer probably mean?
3. **MEDIUM** A pony is measured at 152 cm. Express this in hands and inches. Would it qualify for an FEI pony class?
4. **MEDIUM** Give two reasons a cloth tape measure and a measuring stick give different heights for the same horse.
5. **CHALLENGE** The Shetland Pony Stud-Book Society sets a top height of 42 inches. Write that in hands, in centimeters, and say how many hands shorter it is than the 14.2 line.
6. **CHALLENGE** A grown Arabian mare measures 14.1 hh. A friend says, “Then she is a pony.” Write a short, fair reply that uses both height and type.

Make it a game • Base-4 Relay. One player calls a height in inches between 40 and 76. The other must answer in hands as fast as possible (for example, 61 → 15.1). Then switch: call a height in hands and answer in centimeters to the nearest whole number. Three correct in a row earns a “certified measurer” mark in the notebook. A wrong “.4” or higher loses the turn.

Scripture. “But thou shalt have a perfect and just weight, a perfect and just measure shalt thou have: that thy days may be lengthened in the land which the LORD thy God giveth thee.” (Deuteronomy 25:15, KJV)

God commanded Israel to use honest weights and measures in buying and selling. The horse trade was famous for tricks; a true measuring stick, read honestly, obeys this command in a small and practical way.

Practice: answers

1. $16 \times 4 + 1 = 65$ inches; $65 \times 2.54 \approx 165.1$ cm.
2. The figure after the point counts inches and only runs 0–3, so 14.5 is impossible. The writer probably meant 14 hands and 5 inches, which is 15.1 hh, or else confused the point with a decimal ($14\frac{1}{2}$ hands = 14.2 hh).
3. $152 \div 2.54 \approx 59.8$ inches; $59.8 \div 4 = 14$ hands with about 3.8 inches left, so about $14.3\frac{3}{4}$ hh. It is over 148 cm, so it would not qualify as a pony.
4. The tape follows the curve of the shoulder instead of a straight vertical line, so it reads high; and a tape is hard to hold exactly level at the top of the withers. A stick with a level arm gives true vertical height.
5. $42 \div 4 = 10$ remainder 2, so 10.2 hh; $42 \times 2.54 \approx 106.7$ cm. $58 - 42 = 16$ inches = exactly 4 hands shorter.
6. By the height rule alone she falls under 14.2 hh (57 in, about 145 cm), so a show that sorts classes only by height would place her in the pony range. But the Arabian breed is a horse by type: fine bone, horse proportions, a horse’s gaits and build, and every Arabian society registers it as a horse. Height is a rule for convenience; type describes the animal.

1.2 THE ARABIAN, HORSE OF THE DESERT

OBJECTIVES

- Explain how desert life and Bedouin breeding practice shaped the Arabian's body and temperament.
- Read a nineteenth-century eyewitness account (Lady Anne Blunt, 1881) and test its claims against the breed today.
- Trace how Arabian blood spread into other breeds, and separate well-supported history from legend.

Warm-up. List three problems a horse would face in a hot, dry desert with little grass and long distances between wells. Next to each, guess one feature of body or behavior that would help. Check your list at the end of the stop.

Video slot. Video coming. The Arabian horse: Bedouin history, conformation (dished face, high tail carriage), and modern endurance riding such as the Tevis Cup. Search approved channels (Kentucky Horse Park, Arabian Horse Association, Smithsonian); preview first.

KEY TERMS

Bedouin

The nomadic Arab tribes of the deserts of Arabia and Syria, who lived by camels, goats and horses and moved between wells and seasonal grazing.

asil

An Arabic word meaning “pure” or “of noble origin,” used by the Bedouin for a horse whose descent, through the mother's line, was known and trusted.

strain

A family line of Arabian horses named for a foundation mare or a famous owner, such as Kuhaylan (Kehilan), Saqlawi or Abeyan. The Bedouin traced strain through the dam.

jibbah

The gently bulging forehead of the Arabian, set above a concave or “dished” profile and a small muzzle.

tail carriage

The way a horse holds its tail. The Arabian carries its tail high, especially in motion, partly because of the shape and angle of the bones where the tail joins the croup.

endurance riding

A sport of long-distance races, commonly 50 or 100 miles in a day, with veterinary checks along the way. Arabians and Arabian crosses dominate it.

CORE IDEAS

The Arabian is among the oldest horse breeds in the world, but its exact age is not known. Bedouin tradition traces it back thousands of years, and there is old rock art of horses in Arabia. Written records and modern DNA studies paint a more modest and more interesting picture: horses came into Arabia from the north, and the breed was shaped over many centuries by people who could not afford to keep a useless animal. When you read that the Arabian is “the pure, unchanged horse of antiquity,” treat it as a cherished tradition rather than proven history.

Desert life explains much of the breed. Grass and water were scarce, so a family could feed only a few horses, and only the best were kept. The Bedouin valued their mares above all. Mares were quieter on raids, where a whinny could give away an ambush, and a good mare passed on her qualities to every foal. So pedigree was traced through the mother. A horse of known, trusted descent was **asil**, and families of horses were grouped into **strains** named after a foundation mare. These pedigrees were kept by memory and spoken testimony, not written books. In hard seasons horses were given camel’s milk and dates, and a treasured mare might shelter near the family tent.

The result is an animal built for heat, distance and partnership. A typical Arabian stands about 14.1 to 15.1 hands and weighs 800 to 1,000 pounds. It has a short back, dense bone and hard feet. Many, though not all, Arabians have 17 pairs of ribs, 5 lumbar vertebrae and 16 tail vertebrae, where most horses have 18, 6 and 18. The head shows a bulging forehead (**jibbah**), a dished profile, large dark eyes, wide nostrils and a small muzzle. The skin under the coat is black, which protects against the sun. The tail is carried high, like a banner, especially in motion.

In 1878–1879 an Englishwoman, Lady Anne Blunt, and her husband, the poet Wilfrid Scawen Blunt, crossed the Nafud desert to Haïl, the capital of the emir Muhammad ibn Rashid in the Nejd, the high central plateau of Arabia. They were among the first Europeans to see the horses of Nejd and write about them carefully. In *A Pilgrimage to Nejd* (1881) Lady Anne recorded what the Arabs themselves looked for. Read her account in the primary source below. Notice how she corrects earlier European writers who had described the tail as “thrown out in a perfect arch.” She is testing other people’s claims against what she saw. With horses they bought in the desert and in Egypt, the Blunts founded the Crabbet Arabian Stud in Sussex in 1878, and Crabbet horses later went to studs around the world.

Arabian blood spread far beyond Arabia long before the Blunts. Arab armies of the seventh and eighth centuries carried horses across North Africa into Spain. Ottoman officers, merchants and diplomats sold and gave Eastern horses to European princes. In England three imported Eastern stallions, the Byerley Turk, the Darley Arabian and the Godolphin Arabian, became the foundation sires of the Thoroughbred. Poland’s state stud at Janów Podlaski, founded in 1817, became one of the world’s great Arabian breeding centers. Today Arabian ancestry runs through most light horse breeds.

The modern Arabian's great sport is **endurance riding**. The best-known race, the Tevis Cup in California, first ridden in 1955, covers 100 miles of mountain trail in one day, with veterinarians checking each horse's pulse, breathing and soundness at stops along the way. A horse that does not recover fast enough is withdrawn. The Arabian's lean build sheds heat well, its heart rate recovers quickly, and its feet are hard; Arabians and part-Arabians win most such races. The honest complexity is that the breed has also been bred for the show ring, where some lines have been pushed toward extreme dished heads and nervous animation. Horsemen still argue about whether that serves the horse.

God's questions to Job describe a horse with a neck "clothed with thunder" and nostrils full of glory. Few breeds fit those words better than the Arabian in motion, with arched neck, flaring nostrils and tail held high. The Bedouin bred well because they watched carefully and kept honest memory of each line. The same habits make a good student of history.

PICTURE STUDY



Arab Horses Fighting in a Stable, Eugène Delacroix, 1860 · Oil on canvas · Musée du Louvre, Paris
Wikimedia Commons · Public domain

Eugène Delacroix, the leader of French Romantic painting, traveled to Morocco in 1832 with a French diplomatic mission and filled notebooks with sketches of horses and riders. He painted North African horses for the rest of his life, often from memory and notes. This late painting shows two stallions fighting in a stable. Delacroix cared more about energy and color than measured accuracy.

Look closely

- Find the tails. Are they carried high, as Lady Anne Blunt describes?
- Look at the heads and nostrils. Which features match the description of the Arabian in this stop?

- Find the man. How does the painter show the danger of horses fighting?

Talk about it

1. Delacroix painted this nearly thirty years after his trip. How might painting from memory change accuracy? How is that like the Bedouin keeping pedigrees by memory?
2. Compare Lady Anne Blunt's careful description with Delacroix's dramatic painting. Which is better evidence for what Arabian horses looked like, and why?

Safety first. Stallions can fight, as in the painting, and any horse may bite or kick when startled. If you visit an Arabian farm, stay with the owner, stand at the shoulder, never walk behind a horse, and never step between two horses.

HANDS-ON: JUDGE AN ARABIAN THE BEDOUIN WAY

Use Lady Anne Blunt's 1881 description as a judging card. Test it against modern photographs of Arabians, and record where the old account still fits and where it does not.

You will need

- The primary source excerpt in this stop
- Three or more photographs of Arabians, at least one standing and one in motion, from the Arabian Horse Association, a museum or a library book
- Paper, pencil and a ruler

Steps

1. Read the primary source aloud. Underline every feature Lady Anne says the Arabs looked at.
2. Make a judging card with three rows (head, tail at rest, tail in motion) and a column for each photograph.
3. Score each photograph 1 to 3 on each row, with a short note giving your reason.
4. Measure on one standing photograph: the distance from eye to muzzle and from eye to ear. Is the face short below the eyes, as the old judges preferred?
5. Write three sentences: one place where the 1881 account matches your photographs, one place it does not, and one question you would ask a breeder today.

Check your work

- My card uses the exact features named in the source.
- Every score has a written reason.
- My three sentences compare the source with evidence, not opinion only.

FIELD NOTEBOOK

1. **Breed card 2: Arabian.** Draw an Arabian in motion with the tail high. On the back: home, height (14.1–15.1 hh), three conformation marks, and one fact from Lady Anne

Blunt.

2. Sketch a map of Arabia marking the Nafud desert, Haïl and the Nejd.
3. **Narration.** Write one paragraph explaining why the Bedouin traced a horse's descent through its mother, and how desert life shaped the Arabian. A parent keeps this paragraph.

Did you know? Many Arabians are gray. A gray foal is born bay, chestnut or black and whitens year by year, while the black skin underneath stays dark. Arabians of every color may be called "white" by admirers, but most white-looking Arabians are aged grays.

Primary source. *Lady Anne Blunt, A Pilgrimage to Nejd, the Cradle of the Arab Race, vol. 2 (1881), chapter XII (Project Gutenberg #42217), describing the horses she saw at Haïl:*

It must be remarked that the head and the tail are the two points especially regarded by Arabs in judging of a horse, as in them they think they can discover the surest signs of his breeding. The tails of the Nejd horses are as peculiar as their heads, and are as essential to their beauty. However other points might differ, every horse at Haïl had its tail set on in the same fashion, in repose something like the tail of a rocking horse, and not as has been described, "thrown out in a perfect arch." ... In motion the tail was held high in the air, and looked as if it could not under any circumstances be carried low.

Go deeper.

- Lady Anne Blunt, *A Pilgrimage to Nejd* (1881), both volumes free on Project Gutenberg; chapter XII is on the horses.
- Lady Anne Blunt, *Bedouin Tribes of the Euphrates* (1879): her first desert journey.
- Arabian Horse Association, breed history pages (arabianhorses.org).
- Second video topic: "Tevis Cup 100-mile endurance ride" (preview first).

Goes deeper in. Geography, "The Middle East," and History, "The Spread of Islam and the Ottoman Empire" (coming soon).

For families. Sources: Lady Anne Blunt, *A Pilgrimage to Nejd* (1881), copied from Project Gutenberg #42217 (spelling as printed; the ellipsis marks omitted text); Arabian Horse Association; Britannica. The age of the breed is disputed, so no ancient date is given. The skeletal counts apply to many, not all, Arabians. The Blunts founded Crabbet in 1878, before their Nejd journey, and added desert-bred horses afterward. The Tevis Cup began in 1955. The stop mentions Bedouin raiding only as the setting for why mares were valued.

PRACTICE

1. **EASY** Why did the Bedouin prize mares above stallions?

2. **EASY** Name four physical marks of the Arabian.
3. **MEDIUM** According to Lady Anne Blunt, which two points did Arabs look at most when judging a horse, and why?
4. **MEDIUM** A typical horse has 18 ribs and 6 lumbar vertebrae; many Arabians have 17 and 5. How does this help explain the Arabian's short, strong back?
5. **CHALLENGE** In the primary source, Lady Anne Blunt corrects an earlier description of the tail as "thrown out in a perfect arch." What does this show about her as a witness, and what limits should a careful reader still keep in mind?
6. **CHALLENGE** A website says, "The Arabian has been bred pure and unchanged in the desert for 5,000 years." Write a careful response of three or four sentences.

Make it a game · Strain Keepers. Players sit in a circle. The first says, "My mare is Kuhaylan, daughter of Sabha." Each next player repeats the whole line and adds a generation through the mother ("... whose daughter was Hamra"). Anyone who drops a name is out. Afterward, discuss: how reliable can a pedigree kept by memory be, and what helped the Bedouin keep it honest?

Scripture. "Hast thou given the horse strength? hast thou clothed his neck with thunder? Canst thou make him afraid as a grasshopper? the glory of his nostrils is terrible." (Job 39:19-20, KJV)

God answers Job out of the whirlwind by pointing to creatures only He could design. The arched neck and flaring nostrils the Bedouin bred for were first His gifts; good breeders only select among what God has given.

Practice: answers

1. Mares were quieter on raids and in camp (a stallion might call out and give away an ambush), and a good mare passed her qualities to her foals; pedigree was traced through the dam.
2. Any four: dished profile, jibbah (bulging forehead), large dark eyes, wide nostrils, small muzzle, arched neck, short back, high tail carriage, black skin, dense bone.
3. The head and the tail, because in them they thought they could discover the surest signs of the horse's breeding.
4. One fewer rib and one fewer lumbar vertebra make the trunk and loin shorter, so the back between withers and croup is shorter and better able to carry weight over distance.
5. It shows she compared other writers' claims with what she saw herself and was willing to correct them, which makes her more trustworthy. But she saw horses at one court in one season, through European eyes and with help from interpreters, so her account describes the horses of Hail in 1879, not every Arabian everywhere.
6. The Arabian is certainly an old breed, and Bedouin tradition holds that it is very ancient. But no written records support an exact figure like 5,000 years, and DNA studies suggest horses came into Arabia from elsewhere and the breed took shape over many centuries. Pedigrees were kept by memory, which was careful but not perfectly checkable. A fair statement is that the Arabian is one of the oldest breeds, shaped by long selection in the desert, with its earliest history uncertain.

1.3 THE THOROUGHBRED

OBJECTIVES

- Explain how the Thoroughbred was made in England from native mares and three imported Eastern stallions, and what a closed stud book is.
- Trace a tail-male line from the Darley Arabian to Eclipse and explain what genetic studies say about it.
- Describe the Thoroughbred's body built for speed and weigh honestly the costs that come with breeding for speed.

Warm-up. A furlong is one-eighth of a mile. How many furlongs is the Kentucky Derby, run at $1\frac{1}{4}$ miles? If a horse runs it in exactly 2 minutes, what is its average speed in miles per hour? Work it out before you read on.

Video slot. Video coming. History of the Thoroughbred: the Byerley Turk, Darley Arabian and Godolphin Arabian; Eclipse; how a racehorse's body works. Search approved channels (National Museum of Racing and Hall of Fame, Kentucky Derby Museum, Kentucky Horse Park); preview first.

KEY TERMS

Thoroughbred

A breed of light horse developed in England in the late 1600s and 1700s for racing at a gallop. Only horses registered in an approved stud book may be called Thoroughbreds.

foundation sire

One of the stallions at the root of a breed. The Thoroughbred's three are the Byerley Turk, the Darley Arabian and the Godolphin Arabian.

General Stud Book

The official register of Thoroughbreds in Britain, begun by James Weatherby with an introductory volume in 1791 and kept by the Weatherby family firm ever since.

closed stud book

A register that accepts only foals whose sire and dam are both already registered. No outside blood can enter.

tail-male line

A pedigree traced from sire to sire to sire. It follows only one path among many ancestors.

furlong

A racing distance of 220 yards, one-eighth of a mile (about 201 meters), from the old "furrow long" of a plowed field.

CORE IDEAS

The Thoroughbred is a made breed, and we know roughly when and how it was made. In late seventeenth-century England, racing was a passion of the king and the nobility. Native running horses already existed, small and hardy “Hobbies” and “Galloways,” but breeders wanted more speed and quality. They looked east. Between about 1680 and 1730, gentlemen imported stallions from the Ottoman lands and North Africa, called Turks, Barbs and Arabians, and crossed them with the best English and Irish mares.

Three of these stallions stand at the root of every Thoroughbred alive. The **Byerley Turk**, by tradition a war horse captured at the siege of Buda in 1686, was ridden by Captain Robert Byerley in Ireland about 1690. The **Darley Arabian** was bought in Aleppo, Syria, by the merchant Thomas Darley and shipped to his family in Yorkshire, arriving in 1704. The **Godolphin Arabian**, foaled about 1724, came to England about 1729 and ended up at the stud of the Earl of Godolphin. Imported stallions have more legend than record, and details of their lives are disputed. Their names in the pedigrees are not.

Pedigree records made the breed. In 1791 James Weatherby published *An Introduction to a General Stud Book*, with volume one following in 1793. Weatherbys still keep it. In time the book was **closed**: a foal could be registered only if both parents were. The American stud book, kept by The Jockey Club (founded 1894), works the same way. It also requires that every registered foal be conceived by natural cover, not by artificial insemination. Because of this, a Thoroughbred today has a written pedigree reaching back about three hundred years.

Follow the sire line and something striking appears. The Darley Arabian sired Bartlet’s Childers; he sired Squirt; Squirt sired Marske; and Marske sired **Eclipse**, foaled in 1764 during an eclipse of the sun. Eclipse was never beaten on the racecourse and became a great sire. Through his dam Spilletta, a granddaughter of the Godolphin Arabian, he also carried that stallion’s blood. A 2005 genetic study of the Y chromosome found that about 95 percent of male Thoroughbreds descend in direct male line from the Darley Arabian, almost all through Eclipse. The same research found that the female lines were largely native British and Irish mares. The “Eastern” horse supplied the sires; the island mares supplied much of the rest.

The modern Thoroughbred stands about 15.2 to 17 hands and weighs about 1,000 pounds. Everything about it serves the gallop: long legs with light lower bones, a deep chest, a large heart, big lungs, and long, sloping shoulders that allow a long stride. A galloping horse can lengthen its stride to more than 20 feet. Horses also have a spleen that stores red blood cells and squeezes them into the blood during hard work, sharply raising the blood’s capacity to carry oxygen. Guinness records a two-year-old Thoroughbred reaching about 44 miles per hour over two furlongs in 2008. Racing is measured in **furlongs**: the Kentucky Derby, first run in 1875 at Churchill Downs in Louisville, has been 1¼ miles (10 furlongs) since 1896.

Honest complexity belongs here too. Breeding for speed has costs. Thoroughbreds carry great weight on fine legs, and their thin-walled hooves and light bone make injuries more common than in sturdier breeds. Racehorses start racing as two-year-olds, before their

skeletons are fully mature, and many careers are short. Racing has also always been tied to gambling, which this course does not teach or encourage. Today many former racehorses are retrained as riding, hunting and jumping horses, and aftercare charities find homes for them. Thoroughbred blood has also improved many other breeds: the American Quarter Horse, the Standardbred trotter, and the European warmbloods used in Olympic jumping and dressage.

Solomon, who kept horses and chariots, wrote that “the race is not to the swift.” Even the fastest, best-bred horse can stumble, fall ill or meet a better one on the day. Pedigree tells us much, but not everything; a breeder plans, and the outcome remains in God’s hands.

PICTURE STUDY



Whistlejacket, George Stubbs, c. 1762 · Oil on canvas · The National Gallery, London
Wikimedia Commons · Public domain

George Stubbs spent some eighteen months dissecting horses in a Lincolnshire farmhouse so he could draw their bones and muscles exactly. In 1766 he published *The Anatomy of the Horse*. The Marquess of Rockingham commissioned this portrait of his racehorse Whistlejacket, a grandson of the Godolphin Arabian who had won a famous race at York in 1759. The canvas is about ten feet tall, and the horse is shown life-size against a plain background, with nothing to distract from his body.

Look closely

- Find the veins and muscles on the neck, shoulder and hindquarters. What does Stubbs’s study of anatomy add?
- Compare the head with the Arabian heads in Stop A2. What Eastern features do you see?
- Look at the legs. Are the lower legs heavy or fine? How does that fit a horse bred for speed?

Talk about it

1. Why might Stubbs and his patron have chosen a plain background instead of a landscape?
2. Whistlejacket is about four generations from an imported Eastern stallion. Which features would you call Eastern, and which belong to the new racing breed?

Safety first. Racehorses are fit, hot-blooded and quick to spook. At a farm or track, follow the handlers' rules exactly, stay behind barriers, never feed a horse without permission, and keep well clear of horses being led to or from exercise.

HANDS-ON: TRACE A PEDIGREE AND DO THE RACING ARITHMETIC

Build a four-generation pedigree chart of Eclipse and use racing distances to calculate real speeds.

You will need

- A large sheet of paper and a ruler
- Colored pencils (one color for the Darley line, another for the Godolphin line)
- A calculator

Steps

1. Draw a standard pedigree chart: the horse at left, sire above and dam below, branching right for each generation.
2. Fill in what this stop gives: Eclipse (1764); sire Marske; Marske's sire Squirt; Squirt's sire Bartlet's Childers; his sire the Darley Arabian. Dam Spilletta, a granddaughter of the Godolphin Arabian through her sire Regulus.
3. Color the tail-male line from Eclipse to the Darley Arabian in one color and the path to the Godolphin Arabian in another.
4. Count: in five generations, how many ancestor places are there in all ($2 + 4 + 8 + 16 + 32$)? How many of them does the tail-male line follow? Write a sentence on why "95 percent descend from the Darley Arabian" does not mean "95 percent of their genes come from him."
5. Racing arithmetic: convert $1\frac{1}{4}$ miles to furlongs and to meters ($1 \text{ mile} \approx 1,609 \text{ m}$). If a horse runs the distance in 2:01, find its average speed in miles per hour (miles $\div$ hours).

Check your work

- My chart is laid out sire-above, dam-below, with both colored lines correct.
- I explained the difference between a tail-male line and total ancestry.
- My speed calculation shows the work.

FIELD NOTEBOOK

1. **Breed card 3: Thoroughbred.** Draw a Thoroughbred at full gallop. On the back: origin, height (about 15.2-17 hh), the three foundation sires, and one racing fact.
2. Copy the tail-male line from the Darley Arabian to Eclipse as a vertical list with dates.
3. **Narration.** Write one paragraph explaining how the Thoroughbred was created and why its stud book is “closed.” A parent keeps this paragraph.

Did you know? Every Thoroughbred in the Northern Hemisphere has an official birthday of January 1, whatever day it was actually foaled. This keeps age groups simple for racing, so breeders try to have foals born early in the year. In the Southern Hemisphere the official birthday is August 1.

Go deeper.

- Nicholas Clee, *Eclipse* (2009): the life of the unbeaten horse and his eighteenth-century world.
- George Stubbs, *The Anatomy of the Horse* (1766): the plates can be seen at museum and library websites.
- National Museum of Racing and Hall of Fame, Saratoga Springs (racingmuseum.org), and the Kentucky Derby Museum, Louisville.
- Second video topic: “how a horse’s spleen and heart work during a gallop” (preview first).

Goes deeper in. Life Science, “Heredity and Genetics” and “The Circulatory System,” and History, “Georgian England” (coming soon).

For families. Sources: Weatherbys; The Jockey Club; National Museum of Racing; Britannica; the 2005 Y-chromosome study from Trinity College Dublin (reported widely) and related mitochondrial DNA research. Stories about the foundation sires (the Byerley Turk at Buda and the Boyne, the Godolphin Arabian’s early life) are partly tradition and are hedged. The Guinness speed record is from 2008. Racing is discussed only as history and sport; wagering is mentioned once, as a fact, without detail. The Godolphin Arabian’s story is told more fully in Trail D (*King of the Wind*); this stop does not repeat it. No public-domain primary source excerpt is used in this stop.

PRACTICE

1. **EASY** Name the three foundation sires of the Thoroughbred.
2. **EASY** What is a closed stud book?
3. **MEDIUM** How many furlongs and how many yards are in the 1¼-mile Kentucky Derby?
4. **MEDIUM** Give two features of the Thoroughbred’s body that suit galloping, and one cost that comes with breeding for speed.

5. **CHALLENGE** A horse wins the Derby ($1\frac{1}{4}$ miles) in 2 minutes 1 second. Find its average speed in miles per hour, to one decimal place.
6. **CHALLENGE** Research says about 95 percent of male Thoroughbreds descend in tail-male line from the Darley Arabian, yet most of their maternal lines are native British and Irish. Explain how both can be true, and why a horse 30 generations from the Darley Arabian carries only a tiny share of his genes.

Make it a game · Pedigree Detective. One player secretly chooses a horse from your Eclipse chart. Others ask yes-or-no questions only about relationships (“Is it a sire of a sire?” “Is it on the dam’s side?” “Is it more than three generations back?”). Guess in as few questions as possible. Keep score; fewest questions wins.

Scripture. “I returned, and saw under the sun, that the race is not to the swift, nor the battle to the strong, neither yet bread to the wise, nor yet riches to men of understanding, nor yet favour to men of skill; but time and chance happeneth to them all.” (Ecclesiastes 9:11, KJV)

The Preacher does not say speed is worthless; he says it guarantees nothing. Breeders plan carefully across centuries, yet outcomes rest with God. Humility about our plans is wisdom on the racecourse and everywhere else.

Practice: answers

1. The Byerley Turk, the Darley Arabian and the Godolphin Arabian.
2. A register that accepts only foals whose sire and dam are both already registered, so no outside blood can enter.
3. $1\frac{1}{4} \times 8 = 10$ furlongs; $10 \times 220 = 2,200$ yards.
4. Any two: long legs, long sloping shoulder, deep chest with large heart and lungs, light lower bones, long stride. Cost: fine legs and thin-walled hooves make injuries more common; careers are often short.
5. $2:01 = 121$ seconds $= 121 \div 3,600$ hours ≈ 0.03361 h. $1.25 \div 0.03361 \approx 37.2$ mph.
6. The tail-male line follows only the sire-of-the-sire path, one ancestor in each generation, and the Y chromosome passes only along that path. Each generation doubles the number of ancestors (2, 4, 8 ...), so a single ancestor 30 generations back fills one place among over a billion, though the same ancestor appears in many places through inbreeding. The female lines, traced by mitochondrial DNA, come down a different path, through the mares. So a horse can be Darley Arabian in the male line and largely native in total ancestry.

1.4 DRAFT HORSES: CLYDESDALE, SHIRE AND PERCHERON

OBJECTIVES

- Compare the Clydesdale, Shire and Percheron by origin, build, color and history of use.
- Explain horsepower as a unit and measure your own power output in horsepower.
- Trace the rise and fall of the draft horse in America and read an 1868 description of the Percheron.

Warm-up. Why is a car engine rated in “horsepower”? Guess how many horsepower a strong draft horse can produce for a few seconds. Write your guess; you will meet the real answer in this stop.

Video slot. Video coming. Draft horse breeds: Clydesdale, Shire and Percheron at work (plowing, logging, hitch driving, pulling contests). Search approved channels (Kentucky Horse Park, The Livestock Conservancy, a university extension or living-history farm channel); preview first.

KEY TERMS

draft horse

A heavy horse bred to pull loads, usually 16 to 19 hands and 1,600 to 2,200 pounds or more, with a broad chest, short strong back and powerful hindquarters. British spelling: draught.

feather

Long hair on the lower legs, heavy on Clydesdales and Shires and nearly absent on Percherons.

Percheron

A draft breed from Le Perche in northwestern France, usually gray or black, clean-legged and known for an active trot.

Clydesdale

A Scottish draft breed from the valley of the Clyde in Lanarkshire, usually bay with a white face, white legs and long feather, known for high, flashy action.

Shire

The great English draft breed of the Midlands, the tallest of the heavy breeds, usually black, bay or gray with feathered legs.

horsepower

A unit of power defined by James Watt: 33,000 foot-pounds of work per minute, or 550 foot-pounds per second (about 746 watts).

CORE IDEAS

For most of history, power meant muscle: men, oxen and horses. **Draft horses** were bred for the collar, to pull plows, wagons, canal boats, brewers' drays and city omnibuses. They are built differently from the Arabian or Thoroughbred. They have a more upright shoulder that sits well against a collar, a wide chest, short thick neck and back, and massive hindquarters to push into the load. They also have big, round feet and a calm temperament. People like to link them to the "great horses" of medieval knights. Here is honest complexity: armor-bearing war horses were probably about 15 to 16 hands, strong but not giants. The modern heavy breeds took their final shape in the eighteenth and nineteenth centuries, for farms, mines and cities.

The **Percheron** comes from Le Perche, a region of rolling farmland southwest of Paris. Legends tie it to Arab horses left after the Battle of Tours in 732. Better records show that French breeders did add Arabian stallions in the early 1800s, which helps explain the breed's fine head, gray coat and lively trot. Percherons pulled the heavy mail and passenger coaches called diligences at a fast trot, and later farm machinery and artillery. A French author, Charles Du Hays, praised the breed in a book translated into English in 1868; read his words in the primary source. Americans imported Percherons in great numbers from the 1850s on, and in the early 1900s they were the most common draft breed in the United States by a wide margin.

The **Clydesdale** was bred in Lanarkshire, Scotland, along the River Clyde, in the 1700s and 1800s. Farmers there crossed local mares with heavy Flemish stallions. Clydesdales hauled coal and goods through Glasgow and plowed Scottish farms, and the Clydesdale Horse Society was founded in 1877. They are usually bay or brown with bold white faces and legs and silky white feather. They lift their feet high, which makes them flashy in harness. A team of Clydesdales still pulls an advertising wagon for an American brewery, a tradition begun in 1933.

The **Shire**, from the English Midlands, is the tallest of the three, often over 17 hands and sometimes 2,200 pounds or more. Its society was founded as the English Cart Horse Society in 1878 and renamed the Shire Horse Society in 1884. Shires pulled the brewers' drays and canal boats of London and the farm wagons of the fen country. The tallest horse on record was a Shire, Sampson (later called Mammoth), foaled in 1846, said to have stood 21.2½ hands.

How strong is a draft horse? In the 1780s James Watt, selling steam engines, needed a unit his customers understood. From observing mill horses he defined one **horsepower** as 33,000 foot-pounds per minute: lifting 33,000 pounds one foot in a minute, or 550 pounds one foot in a second. Watt's figure was a steady working rate set high on purpose so that customers would not feel cheated. A horse can produce far more for a few seconds. A study published in *Nature* in 1993 measured a peak of nearly 15 horsepower in a horse pulling a heavy load, and a person sprinting up stairs can briefly reach 1 or even 2 horsepower. Steady, all-day work is the true test, and there the draft horse excels.

Then the tractor came. American farms counted roughly 25 million horses and mules around 1920. Within a generation tractors, trucks and cars had replaced most of them, and by the 1950s the draft breeds were close to disappearing in America. Some, like the Suffolk Punch, are still rare. Draft horses survived because some people kept them: Amish and other farming families, loggers working steep or delicate woodland, wagon-ride and parade teams, and breeders who refused to let the old lines die. The Percheron, Belgian, Clydesdale and Shire all have active breed associations today.

Draft horses are often called “gentle giants,” but they are honest work for their owners. A big horse may eat 25 to 30 pounds of hay a day. Feathered breeds need careful leg care to prevent skin disease and mites. Size makes every mistake around them more dangerous. Solomon’s proverb about the ox is true of the draft horse too: an empty stable is tidy, but strength in harness brings the harvest.

PICTURE STUDY



The Horse Fair, Rosa Bonheur, 1852-1855 · Oil on canvas · The Metropolitan Museum of Art, New York
Wikimedia Commons · Public domain

Rosa Bonheur, the most famous animal painter of nineteenth-century France, sketched for about a year and a half at the Paris horse market on the Boulevard de l'Hôpital, making sketch after sketch of the animals as they were led and shown. The horses on her canvas, more than 16 feet wide, are heavy Percherons being shown to buyers. The painting toured Britain and America and became one of the best-known animal pictures of the century.

Look closely

- Find a horse with a gray coat. Compare its head and legs with the description of the Percheron in this stop. Do you see feather?
- Find a rearing horse. How are the grooms controlling it?

- Look at the shoulders and hindquarters. Where does Bonheur show the most muscle, and why would a buyer look there?

Talk about it

1. Why might a painter studying draft horses go to a sale ground instead of a farm?
2. Bonheur shows the horses moving, not standing still. How does that help a buyer, or a viewer, judge a draft horse?

Safety first. A draft horse can weigh ten times what you do and can crush a foot without meaning to. Wear sturdy boots near one, stay at the shoulder where the horse can see you, and never stand between a horse and a wagon or wall. For the stair-climb project, an adult supervises, the stairs are dry and lit, and you hold the rail.

HANDS-ON: HOW MANY HORSEPOWER ARE YOU?

Repeat a classic physics experiment: measure your own power climbing stairs and express it in Watt's horsepower.

You will need

- A flight of stairs (indoor, dry, with a rail)
- A tape measure
- A stopwatch or phone timer
- A bathroom scale
- A calculator

Steps

1. Weigh yourself in pounds.
2. Measure the height of one step in feet (inches $\div$ 12) and multiply by the number of steps to get the total vertical height of the flight.
3. Time yourself walking up at a steady pace, and then going up as quickly as you safely can while holding the rail. Rest between trials.
4. $\text{Work} = \text{weight (lb)} \times \text{height (ft)}$. $\text{Power} = \text{work} \div \text{time (s)}$. $\text{Horsepower} = \text{power} \div 550$.
5. Record each trial in a table. Compare your walking and quick-climb figures with Watt's 1 horsepower and the 1993 study's peak of about 15 horsepower.
6. Read the Percheron primary source. Underline the phrase that describes the breed's greatest working quality, and explain in two sentences how it relates to power rather than strength alone.

Check your work

- My table shows weight, height, time, work, power and horsepower for each trial.
- I used 550 foot-pounds per second for one horsepower.
- I explained the difference between a brief peak and steady working power.

FIELD NOTEBOOK

1. **Breed card 4: Draft horses.** Draw the three breeds side by side to the same scale. Label color, feather and typical height for each.
2. Make a three-column comparison table: Clydesdale, Shire, Percheron (home region, society founded, color, legs, famous use).
3. **Narration.** Write one paragraph explaining why American farms had millions of draft horses in 1920 and very few by 1960, and who kept the breeds alive. A parent keeps this paragraph.

Did you know? Draft horses wear collars, not breast straps, for heavy work. A well-fitted collar spreads the load across the shoulders so the horse can lean its whole weight into it. The padded horse collar reached Europe in the Middle Ages and greatly increased how much a horse could plow or haul.

Primary source. *Charles Du Hays, The Percheron Horse, English translation (New York, 1868), Project Gutenberg #71972, from the opening chapter on the breed:*

Its movements are quick, spirited, and light. It exhibits great endurance, both when hard worked, and when forced to maintain for a long time any of its natural gaits, and it possesses the inestimable quality of moving fast with heavy loads. ... It has that fine oriental gray coat, the best adapted of all to withstand the burning rays of the sun in the midst of the fields—a coat which pleases the eye. ... Women and children from whose hands it is fed, can approach it without fear.

Go deeper.

- Charles Du Hays, *The Percheron Horse* (1868), free on Project Gutenberg.
- Maurice Telleen, *The Draft Horse Primer* (1977): a practical classic on keeping and working draft horses.
- The Livestock Conservancy (livestockconservancy.org): status pages for the Shire, Clydesdale, Percheron and Suffolk.
- Second video topic: “draft horse logging” or “plowing with a team” at a living-history farm (preview first).

Goes deeper in. Gardening & Animals, “Farm Animals and Their Work,” and History, “The Industrial Revolution” and “American Farm Life, 1880–1940” (coming soon).

For families. Sources: Du Hays (1868), copied from Project Gutenberg #71972; the ellipses mark omitted text between sentences. Percheron Horse Association of America; Clydesdale Horse Society; Shire Horse Society; USDA historical farm statistics (the horse and mule count is rounded); Stevenson and Wassersug, “Horsepower from a horse,” *Nature* (1993). The Battle of Tours legend about the Percheron is labeled a legend.

Sampson's height is the traditional record figure. The brewery hitch is named only as a historical fact; no product is promoted.

PRACTICE

1. **EASY** Which of the three breeds is usually gray or black with clean (unfeathered) legs?
2. **EASY** Where does each breed come from?
3. **MEDIUM** According to Du Hays, what is the Percheron's "inestimable quality"? Why would that matter for pulling diligences?
4. **MEDIUM** Du Hays praises the Percheron's gray coat as best for withstanding the sun. Is that a fact, an opinion or a mix? How could you test it?
5. **CHALLENGE** A 132-pound student climbs stairs 12 feet high in 4 seconds. Find the power in foot-pounds per second and in horsepower.
6. **CHALLENGE** Watt's horsepower is 33,000 ft-lb per minute, yet a horse was measured at a peak near 15 horsepower. Explain why both can be reasonable, and why Watt chose a generous figure.

Make it a game • Pulling Contest. Two players sit facing each other, feet together, holding a towel. On "Hitch!" both pull steadily, with no jerking (jerking loses the round, just as a good teamster never jerks a team). Then pull a laundry basket of books across the floor with a rope: add a book each round and record the most the team can move smoothly. Discuss why steady pulling beats sudden jerks.

Scripture. "Where no oxen are, the crib is clean: but much increase is by the strength of the ox." (Proverbs 14:4, KJV)

A stable without animals stays tidy, but nothing gets plowed. Work animals bring mess, cost and labor, and also harvest. The proverb teaches the value of honest strength put to work, which is the whole story of the draft horse.

Practice: answers

1. The Percheron.
2. Clydesdale: the valley of the Clyde, Lanarkshire, Scotland. Shire: the English Midlands. Percheron: Le Perche, northwestern France.
3. "Moving fast with heavy loads." Diligences were heavy coaches that had to keep to a schedule, so the horses needed both strength and speed at the trot over long stages.
4. A mix: light colors do reflect more sunlight, so the idea is reasonable, but "the best adapted of all" is a breeder's praise. You could test it by measuring coat-surface temperatures of gray and dark horses standing in the same sun.
5. $\text{Work} = 132 \times 12 = 1,584 \text{ ft-lb}$. $\text{Power} = 1,584 \div 4 = 396 \text{ ft-lb/s}$. $396 \div 550 = 0.72$ horsepower.
6. Watt's unit describes steady work a horse could keep up for hours, while 15 horsepower is a brief maximum effort lasting seconds. Power over a short burst is much higher than power over a working day. Watt set the unit generously high so that a buyer replacing horses with an

engine of a stated horsepower would find the engine did at least as much work, protecting his reputation.

1.5 THE AMERICAN QUARTER HORSE AND THE COWBOY

OBJECTIVES

- Trace the Quarter Horse from colonial quarter-mile racing to the cattle trails and the founding of its registry in 1940.
- Explain “cow sense” and the work of the cow horse, using an eyewitness-based account of a trail drive (Andy Adams, 1903).
- Plan the horses for a trail drive with real numbers, and name honest problems the breed has faced.

Warm-up. A trail herd of 2,500 cattle walks about 12 miles a day. How many days would it take to cover 600 miles? Now guess: how many horses would the cowboys need for that trip, and why more than one each?

Video slot. Video coming. The American Quarter Horse: cutting horses working cattle, ranch work, and Quarter Horse history. Search approved channels (American Quarter Horse Association, National Cowboy & Western Heritage Museum, Kentucky Horse Park); preview first.

KEY TERMS

Quarter Horse

An American breed of stock horse named for winning races of a quarter mile, known for heavily muscled hindquarters, fast acceleration and cow sense.

remuda

From Spanish: the herd of spare saddle horses kept by a cattle outfit, from which each cowboy rode his own string in turns.

cow sense

A horse’s instinct and trained skill for reading cattle: anticipating which way a cow will turn and moving to block it, sometimes before the rider asks.

cutting

Separating one animal from a herd and keeping it from returning. Today it is also a competition in which the rider loosens the reins and lets the horse work the cow alone.

vaquero

A Spanish or Mexican cattle herder on horseback. Much of the cowboy’s gear and many of his words (lariat, rodeo, remuda, chaps) came from the vaqueros.

AQHA

The American Quarter Horse Association, founded in 1940 in Fort Worth, Texas, to register and preserve the breed.

CORE IDEAS

The Quarter Horse is older than its name on any paper. In colonial Virginia and the Carolinas of the 1600s there were few racecourses but many straight village lanes. Planters raced their horses head to head, about a quarter of a mile, often on a Saturday before a crowd. Their horses mixed English stock with tough Spanish-descended horses obtained from the Chickasaw and other Southeastern peoples. The best were compact, heavily muscled and explosively fast from a standing start. Imported Thoroughbred blood strengthened them, especially through the stallion Janus, a grandson of the Godolphin Arabian brought to Virginia in the 1750s. People called them “quarter running horses.”

As oval tracks and longer races came to the East, quarter racing moved west with settlers. In Texas the eastern quarter horse met the Spanish horses of the vaqueros and the open range. Legendary sires such as Steel Dust, brought to Texas in the 1840s, gave their names to whole families of fast, cattle-wise horses. The type proved perfect for ranch work. A cow horse must sprint to head off a running steer, stop hard, turn on its hindquarters, and keep its head while a roped cow fights the rope. Above all it needs **cow sense**: the ability to read cattle and move before the cow does.

After the Civil War, Texas had millions of longhorn cattle and little money, while Northern cities wanted beef. From 1866 to the mid-1880s cowboys drove herds north to railheads in Kansas such as Abilene and Dodge City, and on to Northern ranges. Estimates of the total run to five million head or more. A typical outfit of 10 or 12 men moved about 2,500 to 3,000 cattle. It traveled 10 to 15 miles a day for two or three months, with a cook, a chuck wagon and a **remuda** of 100 or more horses. Each man rode a string of six to ten horses in rotation, saving the steadiest for night herding and the quickest for cutting. Trail hands were young men of many backgrounds: Texans, veterans of both armies, Mexican vaqueros, freedmen. They were paid perhaps 25 to 40 dollars a month.

Andy Adams went up the trail as a young man in the 1880s and later wrote *The Log of a Cowboy* (1903), a novel drawn closely from his own experience. Many historians count it the truest picture of a trail drive. In the primary source, the trail boss Flood warns his young riders about their horses, and the narrator explains why. Notice his comparison: “what the mule is to the army the cow-horse is to the herd.” The whole drive depended on keeping horses sound across a thousand miles of grass, rivers and storms.

The open range did not last. Barbed wire, patented by Joseph Glidden in 1874, fenced the plains. Railroads reached Texas, so cattle no longer had to walk north. The hard winter of 1886-87 killed huge numbers of cattle on the Northern range. Yet ranches still needed the quick, sensible stock horse. In 1940 a group of ranchers and horsemen met in Fort Worth and founded the **American Quarter Horse Association**. Registration number P-1 went to the stallion Wimpy, grand champion at the 1941 Fort Worth stock show. The AQHA has since grown into the largest single-breed registry in the world, with millions of horses registered.

Today a typical Quarter Horse stands about 14.3 to 16 hands and weighs 950 to 1,200 pounds. It has a short back, deep heart girth and the broad, powerful hindquarters that drive

its quick starts. Racing Quarter Horses can approach 55 miles per hour over a quarter mile, faster than Thoroughbreds over that distance. Others compete in cutting, reining, roping, barrel racing and ranch work. Here is honest complexity: “Quarter Horse” now covers several types, from lean racehorses heavy in Thoroughbred blood to stocky halter horses. A hereditary muscle disease, HYPP, was traced to the popular halter stallion Impressive (foaled 1969). Breeders learned that a single much-used sire can spread a fault as well as a virtue, and the AQHA now requires testing and limits registration of affected horses.

The real cowboy was neither a movie gunfighter nor a cartoon. He was a working man whose life and livelihood rode on animals he had to keep fit. The Psalmist reminds us whose those cattle and horses truly were: “the cattle upon a thousand hills” belong to God, and a good cowboy was His steward on the trail.

PICTURE STUDY



The Bronco Buster, Frederic Remington, 1895 · Bronze sculpture · Casts in many museums, including the Metropolitan Museum of Art, New York, and the Amon Carter Museum of American Art, Fort Worth
Wikimedia Commons · Public domain

Frederic Remington went west as a young man in 1881 and spent the rest of his career painting, drawing and sculpting cowboys, soldiers and horses. *The Bronco Buster* was his first sculpture, copyrighted in 1895, and it became one of the most famous American bronzes. The whole horse balances on its two hind legs, a hard problem for a sculptor.

Look closely

- Find the point where the bronze touches its base. How does Remington make a rearing horse stand up in metal?
- Look at the rider’s hands, legs and seat. How is he staying on?

- Look at the horse's hindquarters. Does this horse have the heavy muscling of a Quarter Horse type?

Talk about it

1. Breaking a horse like this was part of real ranch life, but good horsemen also trained horses gently over time. What does the sculpture show well, and what might it leave out?
2. Why do you think this image became a symbol of the American West?

Safety first. Never try to ride or handle an unbroken horse. Bucking horses are for trained professionals. On a ranch visit, stay outside the pen or arena, out of the way of working cattle and horses, and do what the rancher says at once.

HANDS-ON: PLAN THE REMUDA FOR A TRAIL DRIVE

You are the trail boss. Plan the horses and the schedule for a drive from South Texas to Kansas, using real historical figures and Flood's advice in the primary source.

You will need

- A U.S. map or atlas showing Texas, Oklahoma and Kansas
- Paper, ruler and calculator
- The primary source excerpt in this stop

Steps

1. Trace a route of about 600 miles from near San Antonio, Texas, to Abilene, Kansas. Mark three river crossings.
2. Assume 12 miles per day and figure the days needed. Add 10 percent for storms and river delays.
3. Your outfit: 2,500 cattle, a trail boss, a cook, a wrangler and 9 riders. Give each rider a string of 8 horses, add horses for the boss and wrangler, and add 10 percent spares. How large is your remuda?
4. Write three rules for horse care on your drive, each tied to a phrase in Flood's advice (for example, saddle blankets).
5. Explain in two sentences why a cowboy changed horses several times a day instead of riding one horse all day.

Check your work

- My map shows a sensible route with river crossings.
- My days and remuda size are worked out with numbers shown.
- My three rules quote or point to the primary source.

FIELD NOTEBOOK

1. **Breed card 5: American Quarter Horse.** Draw a Quarter Horse in a hard stop or a cutting crouch, hindquarters under it. On the back: origin, height (14.3–16 hh), registry founded 1940, best known for.
2. Sketch the cattle trail you planned with day markers.
3. **Narration.** Write one paragraph explaining how a breed named for quarter-mile racing became the cowboy's horse. A parent keeps this paragraph.

Did you know? A good cutting horse works so independently that, once the cow is chosen, the rider drops the reins slack and lets the horse do the rest. Judges count it against the rider for steering too much. The horse watches the cow's head and drops low, shifting left and right like a basketball guard.

Primary source. *Andy Adams, The Log of a Cowboy: A Narrative of the Old Trail Days (1903), chapter III, "The Start" (Project Gutenberg #12797). The trail boss Flood speaks to his riders as the drive begins:*

You are all well mounted, and on the condition of the *remuda* depends the success and safety of the herd. ... Accidents will happen to horses, but don't let it be your fault; keep your saddle blankets dry and clean, for no better word can be spoken of a man than that he is careful of his horses. ... And as all of us younger boys learned afterward, there was plenty of good, solid, horse-sense in Flood's advice; for before the trip ended there were men in our outfit who were as good as afoot, while others had their original mounts, every one fit for the saddle. Flood had insisted on a good mount of horses, and Lovell was cowman enough to know that what the mule is to the army the cow-horse is to the herd.

Go deeper.

- Andy Adams, *The Log of a Cowboy* (1903), free on Project Gutenberg.
- J. Frank Dobie, *The Mustangs* (1952): the Spanish horse in the West, for strong readers.
- National Cowboy & Western Heritage Museum, Oklahoma City (nationalcowboymuseum.org), and the American Quarter Horse Hall of Fame & Museum, Amarillo.
- Second video topic: "cutting horse competition explained" (preview first).

Goes deeper in. History, "The American West and the Cattle Kingdom," and Small Business & Economics, "Supply, Demand and the Cattle Drives" (coming soon).

For families. Sources: Andy Adams (1903), copied from Project Gutenberg #12797; the ellipses mark omitted sentences, and Flood's spoken words are shown without the book's quotation marks. The book is a novel built on Adams's real trail experience, which is why we call it eyewitness-based rather than a diary. Also: AQHA history pages; Britannica;

Texas State Historical Association (*Handbook of Texas*) on cattle trails. Cattle-drive totals, wages and remuda sizes vary by source and are given as ranges. Steel Dust's and Janus's histories are partly tradition. The drives Adams describes were not called "Quarter Horse" drives; the registry and breed name came in 1940.

PRACTICE

1. **EASY** Where did the name "Quarter Horse" come from?
2. **EASY** What is a remuda?
3. **MEDIUM** In the primary source, what does Flood say depends on "the condition of the remuda," and what single practical rule does he give?
4. **MEDIUM** Name three things that ended the great Texas trail drives.
5. **CHALLENGE** An outfit has 12 riders with 8 horses each, plus 6 horses for the boss and 6 for the wrangler. Add 10 percent spares (round up). The drive covers 720 miles at 12 miles a day. How many horses, and how many days? If each horse eats about 20 pounds of grass a day, how many tons of grazing does the remuda need?
6. **CHALLENGE** Explain Adams's comparison, "what the mule is to the army the cow-horse is to the herd." Then explain how the story of the stallion Impressive shows a danger in breeding from one famous horse.

Make it a game • Cutting Horse. Mark a "herd" area at one end of a room or yard with several players inside. One player is the "cow" and tries to get back to the herd; the "cutting horse" must block by sliding side to side, watching the cow's head, without touching. Time how long the horse holds the cow away. Switch roles. Discuss: why does watching the head work?

Scripture. "For every beast of the forest is mine, and the cattle upon a thousand hills." (Psalm 50:10, KJV)

God tells Israel He does not need their sacrifices, for every animal is already His. Ranchers own cattle and horses before men, but before God they are stewards. Flood's "careful of his horses" is a good definition of stewardship.

Practice: answers

1. From colonial quarter-mile match races in Virginia and the Carolinas, which these horses won.
2. The herd of spare saddle horses kept by a cattle outfit; each cowboy rode a string of them in turns.
3. "The success and safety of the herd." He tells them to keep their saddle blankets dry and clean (so the horses' backs do not get sore).
4. Barbed wire fencing the range (patented 1874), railroads reaching Texas, and the hard winter of 1886-87, along with quarantine laws against Texas cattle in some states.
5. $12 \times 8 = 96$, $+ 12 = 108$; 10 percent = 10.8, round up to 11; total 119 horses. $720 \div 12 = 60$ days. $119 \times 20 \times 60 = 142,800$ pounds $\div 2,000 = 71.4$ tons.

6. Mules carried an army's supplies; without them the army could not move or fight. In the same way the drive could not handle, guard or move the cattle without sound horses, so the horses were the foundation of the whole enterprise. Impressive was so popular that he sired very many foals, and a hereditary muscle disease (HYPP) he carried spread widely through the breed. Heavy use of one sire spreads hidden faults as fast as virtues, so breeders must test and keep genetic variety.

1.6 SHETLAND AND WELSH PONIES

OBJECTIVES

- Explain how harsh island and mountain environments shaped the Shetland and Welsh ponies.
- Read eighteenth- and nineteenth-century descriptions of Shetland ponies (quoted in a 1913 book) and draw conclusions from them.
- Describe the pit pony and the four sections of the Welsh stud book, with their height limits.

Warm-up. Find the Shetland Islands on a map. Then find a city at about the same latitude in North America (around 60° north). What would winter be like for an animal living outdoors there with no barn and no hay?

Video slot. Video coming. Shetland ponies in the Shetland Islands; Welsh Mountain ponies on the hills of Wales; history of pit ponies. Search approved channels (Kentucky Horse Park, The Livestock Conservancy, a British museum such as the National Coal Mining Museum for England); preview first.

KEY TERMS

Shetland pony

A small, strong pony from the Shetland Islands, no more than 42 inches (10.2 hh, about 107 cm) under the rules of the Shetland Pony Stud-Book Society, founded in 1890.

pit pony

A pony that worked underground in coal mines hauling tubs of coal along low tunnels; many were Shetlands or Shetland crosses.

Welsh Mountain Pony

Section A of the Welsh stud book: the smallest Welsh type, not over 12 hands, with a small head and often a slightly dished face.

Welsh Cob

Section D of the Welsh stud book: the largest Welsh type, over 13.2 hands with no upper limit, powerful and known for a ground-covering trot.

stud book

The official register of a breed's pedigrees. The Welsh Pony and Cob Society published its first volume in 1902, the year after its founding.

easy keeper

An animal that stays fat on little food. It is a gift on a windswept island and a danger on rich pasture, where ponies easily grow obese and develop laminitis, a painful hoof disease.

CORE IDEAS

The Shetland Islands lie more than a hundred miles north of the Scottish mainland, at about 60° north, the latitude of southern Alaska. They have almost no trees, little shelter and wind off the North Atlantic much of the year. Ponies have lived there for a very long time; carved horses appear on early medieval stones in the islands, though how and when ponies first arrived is not known. What is clear is how they lived. For centuries most Shetland ponies ran loose on the hills all year, found their own food and were caught up only when needed. The primary source shows how hard that life was.

Such a life selects hard. A **Shetland pony** is short-legged, deep-bodied and broad. It grows a thick double winter coat and a heavy mane and forelock that shed rain and snow. Its ears and nostrils are small, which saves heat. It will eat almost anything: heather, rough grass and, at low tide, seaweed from the shore. The Shetland Pony Stud-Book Society, founded in 1890, sets a top height of 42 inches (10.2 hh). For its size it is one of the strongest of all equines and is often said to pull about twice its own weight. Islanders used ponies to carry peat for fuel from the hills, and seaweed to fertilize their crofts.

Then came the coal pits. In 1842 Parliament passed the Mines Act, which forbade women and girls, and boys under ten, to work underground. Until then many of them had hauled coal in narrow tunnels. Mine owners needed another way to move coal along seams sometimes only three or four feet high, and small, strong, calm ponies were the answer. By the 1870s Shetlands were going south to the pits by the thousand, and studs in Shetland were founded for the purpose, most famously the Marquess of Londonderry's, which bred ponies for his collieries in north-east England. By about 1913 some 70,000 ponies worked underground in Britain. Some were well fed and cared for by miners who loved them. Others suffered from poor conditions, and later laws, including the Coal Mines Act of 1911, set rules for their care. The last pit ponies in Britain retired at the end of the twentieth century.

Shetlands also crossed the Atlantic. Imports to the United States grew in the 1880s, and the American Shetland Pony Club was founded in 1888. American breeders gradually developed a taller, finer-boned pony suited to children's riding and driving. So the "American Shetland" and the island Shetland now look rather different, though they share a name.

The ponies of **Wales** have run on the Welsh hills since before written records. A tradition says they survived because the hills were so remote. When Henry VIII's laws of the 1530s and 1540s ordered small stallions off the common lands in order to breed bigger war horses, the hardy mountain ponies held on where the king's officers could not easily reach. Over the eighteenth and nineteenth centuries some breeders added Arabian and other blood, which helps explain the Welsh pony's fine, often slightly dished head. In 1901 the Welsh Pony and Cob Society was founded, and its stud book divides the breed into four sections. **Section A**, the Welsh Mountain Pony, is not over 12 hands. **Section B**, the Welsh Pony, is a riding type not over 13.2 hands. **Section C**, the Welsh Pony of Cob Type, is also not over 13.2 hands. **Section D**, the **Welsh Cob**, is over 13.2 hands with no upper limit. Welsh Cobs carried farmers, pulled carts and, in war, hauled guns; they are famous for a powerful, ground-eating trot.

Here is the honest complexity of native ponies. The very traits that let them survive scarcity make them hard to keep in comfort. An **easy keeper** on lush pasture eats far more than it needs. It grows fat and risks laminitis, an inflammation inside the hoof that can cripple. Good pony owners therefore limit grazing, feed mostly hay and keep the pony working. Ponies are also clever. A pony that learns it can get away with something will try it again, so small does not mean simple, and a child's pony needs firm, fair, adult handling.

Agur the son of Jakeh wrote of “four things which are little upon the earth, but they are exceeding wise”: the ant, the coney, the locust and the spider. He might have added the pony. God fitted small creatures to hard places, and their hardiness served families on windswept islands and miners deep underground.

PICTURE STUDY



Carrying Peat, Photographer not named; plate in Charles and Anne Douglas, *The Shetland Pony*, Published 1913 · Photograph (book plate) · Charles and A. I. Douglas, *The Shetland Pony* (Edinburgh and London, 1913); digitized by Project Gutenberg (#59957)
Wikimedia Commons · CC BY-SA 2.0

This photograph comes from a 1913 book on the Shetland pony by Charles Douglas and Anne Isabel Douglas, which gathered the history, the old reports and the stud records of the breed. It shows ponies doing one of their oldest island jobs: carrying peat, cut and dried on the hills, home to be burned for heat and cooking in a land with almost no trees.

Look closely

- Look at the landscape. What do you see, and what is missing, that explains why islanders burned peat?
- Look at the ponies' build: legs, body, mane and coat. Which features fit a cold, windy island?

- Look at how the loads are carried. How is the weight balanced on the pony's back?

Talk about it

1. A photograph is a primary source too. What can it prove about ponies in Shetland in about 1913, and what can it not prove?
2. How did the pony's work make life on the islands possible?

Safety first. Small ponies are strong and quick, and they bite and kick as hard as their size allows. Approach at the shoulder, keep fingers flat when offering anything from your hand (with the owner's permission), and never let a younger child handle a pony without an adult.

HANDS-ON: PONY SILHOUETTES TO SCALE

Make paper silhouettes, all at the same scale, of a Shetland, the four Welsh sections and a 14.2-hand horse. Then use the primary source to write a short island report.

You will need

- Large sheets of paper or the back of wrapping paper
- A ruler, pencil, scissors and dark markers
- Tape for a wall display
- The primary source excerpt in this stop

Steps

1. Choose a scale of 1 inch on paper to 1 hand (4 inches) of real height.
2. Draw a simple side-view silhouette for each: Shetland 10.2 hh, Welsh A 12.0 hh, Welsh B 13.2 hh, Welsh C 13.2 hh (stockier), Welsh D 15.0 hh, and a 14.2 hh horse. Make each the right height at the withers.
3. Cut them out and tape them in a row along a baseline on the wall. Add a silhouette of yourself at the same scale.
4. Under the Shetland, write the figures in hands, inches and centimeters.
5. Read the primary source. Write a short island report (five sentences) as if to the Highland Society in 1801: how the ponies live, what they eat, why many die, and one improvement you would recommend.

Check your work

- Every silhouette is the correct height at my chosen scale.
- Welsh C looks heavier than Welsh B though both are the same height limit.
- My report uses at least two facts from the primary source.

FIELD NOTEBOOK

1. **Breed card 6: Shetland and Welsh.** Draw a Shetland and a Welsh Mountain Pony side by side. On the back: homes, height limits, and one historic job of each.
2. Make a four-row table of the Welsh sections with names and height limits.
3. **Narration.** Write one paragraph explaining how a law about women and children in 1842 changed the lives of Shetland ponies. A parent keeps this paragraph.

Did you know? In Shetland the open hill land shared by a township is called the *scattald*, an old Norse-rooted word. Crofters turned their ponies out on the scattald and rounded them up only when they needed them. Ponies raised on that rough, rocky ground grew such hard hooves that most worked without shoes.

Primary source. *Charles and A. I. Douglas, The Shetland Pony (1913), chapter II, "The Pony in Shetland" (Project Gutenberg #59957), quoting a Highland Society report of 1801 and the earlier writer Gifford:*

A Highland Society's report in 1801 tells us that "the horses live in the open fields, summer and winter, night and day, and never get a mouthful except what they can gather, not even when the ground is covered with snow." ... "They would be more numerous," says Gifford, "if in any way cared for; but they lie out in the open fields summer and winter, and get no food but what they can find for themselves; so in bad winters many of them die with hunger and cold."

Go deeper.

- Charles and A. I. Douglas, *The Shetland Pony* (1913), free on Project Gutenberg; it includes photographs and the old island reports.
- Shetland Pony Stud-Book Society (shetlandponystudbookociety.co.uk) and Welsh Pony and Cob Society (wpcs.uk.com): breed standards and history.
- National Coal Mining Museum for England (ncm.org.uk): pages on pit ponies.
- Second video topic: "Welsh Mountain ponies on the Carneddau hills" (preview first).

Goes deeper in. History, "The Industrial Revolution in Britain," and Geography, "The British Isles" (coming soon).

For families. Sources: Douglas and Douglas (1913), copied from Project Gutenberg #59957 (the ellipsis marks omitted text; we have not reproduced the book's exact quotation-mark style). "Gifford" is most likely Thomas Gifford of Busta, whose description of the Zetland (Shetland) Islands dates from 1733; the 1913 book does not identify him further. Shetland Pony Stud-Book Society; Welsh Pony and Cob Society (founded 1901, sections A-D); UK Mines Act 1842. The figure of about 70,000 pit ponies in 1913 is the one commonly given by British mining museums. The story that Welsh ponies escaped Henry VIII's laws in the hills is a tradition; the laws themselves are real. The "twice its

own weight” pulling claim is widely repeated and is hedged. The picture-study plate is from a book published in 1913, which is in the public domain in the United States.

PRACTICE

1. **EASY** What is the top height for a Shetland pony in the Stud-Book Society’s rules, in inches and in hands?
2. **EASY** Name the four sections of the Welsh stud book with their height limits.
3. **MEDIUM** According to the 1801 report and Gifford, how did Shetland ponies get their food, and what happened in bad winters?
4. **MEDIUM** Explain how the Mines Act of 1842 increased the demand for Shetland ponies.
5. **CHALLENGE** Gifford says the ponies “would be more numerous, if in any way cared for.” Using natural selection, explain how this harsh treatment may also have helped make the breed hardy. Then give one reason this does not excuse neglect.
6. **CHALLENGE** A family moves a Shetland pony from a windswept hill to a rich, green paddock and lets it graze all day. Predict what will happen and why, and propose a care plan.

Make it a game • Peat Ponies. Set out a “hill” of small cushions or folded towels at one end of the room and a “croft” basket at the other. Players carry two “peats” at a time balanced on their backs, crawling on hands and knees, from the hill to the croft. Anything that falls goes back to the hill. Who can bring home ten without a spill? Talk about why balanced loads matter for a working pony.

Scripture. “There be four things which are little upon the earth, but they are exceeding wise:” (Proverbs 30:24, KJV)

Agur goes on to name the ant, the coney, the locust and the spider, small creatures that survive by wisdom God built into them. The Shetland pony is another lesson in small things fitted by their Maker for hard places.

Practice: answers

1. 42 inches, which is 10.2 hands.
2. A: Welsh Mountain Pony, not over 12 hh. B: Welsh Pony, not over 13.2 hh. C: Welsh Pony of Cob Type, not over 13.2 hh. D: Welsh Cob, over 13.2 hh with no upper limit.
3. They lived in the open fields summer and winter and ate only what they could find for themselves, even under snow; in bad winters many died of hunger and cold.
4. It banned women, girls and boys under ten from working underground, where many had hauled coal. Mine owners needed another way to move coal along low tunnels, and small, strong, calm Shetland ponies fit the work.
5. Ponies that could not find food or bear the cold died before breeding, so the survivors that passed on their traits were the hardest: thick coats, thrifty digestion and small, heat-saving bodies. Over generations the breed became tougher. But each animal suffered, and Scripture teaches that the righteous man regards the life of his beast. Good breeders can keep hardiness by selection without letting animals starve.

6. The pony, an easy keeper adapted to scarce food, will overeat rich grass, grow obese and risk laminitis, a painful and possibly crippling hoof disease. Care plan: limit grazing (a dry lot or grazing muzzle for part of the day), feed mostly measured hay, provide regular work or exercise, check weight and hooves often, and ask a vet or farrier for advice.

1.7 THE CHINCOTEAGUE PONY AND THE ASSATEAGUE HERD

OBJECTIVES

- Describe Assateague Island and explain why its two herds are managed differently in Maryland and Virginia.
- Weigh the evidence for the shipwreck legend against the likelier colonial origin of the ponies.
- Model herd growth and explain carrying capacity, the reason for the annual Pony Penning and for fertility control.

Warm-up. Imagine a long, narrow island of sand, dunes and salt marsh with no fresh streams. What would horses eat and drink there? Make a quick list, then check it as you read.

Video slot. Video coming. The Assateague horses and the Chincoteague Pony Swim; barrier island ecology. Search approved channels (National Park Service, U.S. Fish and Wildlife Service, Smithsonian); preview first.

KEY TERMS

barrier island

A long, narrow island of sand lying parallel to a mainland coast, shielding bays and marshes behind it from the open sea. Storms and currents constantly reshape it.

feral

Living wild but descended from domestic animals. The Assateague horses are feral, not truly wild.

Pony Penning

The yearly roundup of the Virginia herd by the Chincoteague Volunteer Fire Company, including the swim across Assateague Channel and the sale of most foals.

carrying capacity

The largest population an environment can support year after year without being damaged.

fertility control

In the Maryland herd, a vaccine given to mares by dart (since 1994) that prevents pregnancy for a time, keeping numbers steady without roundups.

salt marsh

Low, grassy land flooded by tides. Its cordgrasses are the ponies' main food, and they are very salty.

CORE IDEAS

Assateague Island is a barrier island about 37 miles long off the Atlantic coast, crossing the line between Maryland and Virginia. On its ocean side lie beaches and dunes, inland are pine woods and thickets, and on the bay side there is salt marsh. Two federal agencies share the island. The National Park Service runs Assateague Island National Seashore, established in 1965, and the U.S. Fish and Wildlife Service runs Chincoteague National Wildlife Refuge, established in 1943, on the Virginia end. A fence at the state line divides the horses into two herds, each with its own owners and rules.

How did horses get there? The favorite story says they swam ashore from a wrecked Spanish galleon, and the legend is old and dear to the region. Historians find the evidence stronger for a plainer answer. In the 1600s colonial owners grazed horses, cattle and hogs on the barrier islands, where the water fenced them in for free and the animals escaped mainland fencing laws and taxes on livestock. Over time some of those animals ran free. The National Park Service says the horses most likely descend from such domestic stock. That is why they are called **feral** rather than wild. Honest history keeps the legend as legend and follows the records.

The ponies are small, usually about 12 to 13 hands, and stocky, often with a round, barrel-like belly. Genetically they are horses. Their size comes largely from their environment. They live mainly on salt-marsh cordgrass and beach grass, browse on bayberry, seaweed and even poison ivy, and drink from freshwater ponds that collect rainwater. The salt in their diet makes them drink roughly twice as much as a mainland horse, which gives their bellies a bloated look. Foals taken off the island and raised on good pasture and hay often grow taller than their parents. That is a living lesson that genes set limits and environment fills them in.

The **Virginia herd** belongs to the Chincoteague Volunteer Fire Company, founded in the early 1920s after destructive fires on Chincoteague Island. The company holds a grazing permit from the Fish and Wildlife Service that allows a herd of up to about 150 adult animals on the refuge. Every July, in the event called **Pony Penning**, volunteer “saltwater cowboys” round up the ponies. At slack tide, when the current is weakest, they swim them across the narrow Assateague Channel to Chincoteague, a swim of a few minutes. The next day most foals are sold at auction, and the money pays for veterinary care and the fire company’s work. A few foals are bought back and returned to the island to keep the herd healthy. The adults swim home. The custom of a firemen’s pony penning dates to the mid-1920s, and today it draws tens of thousands of visitors.

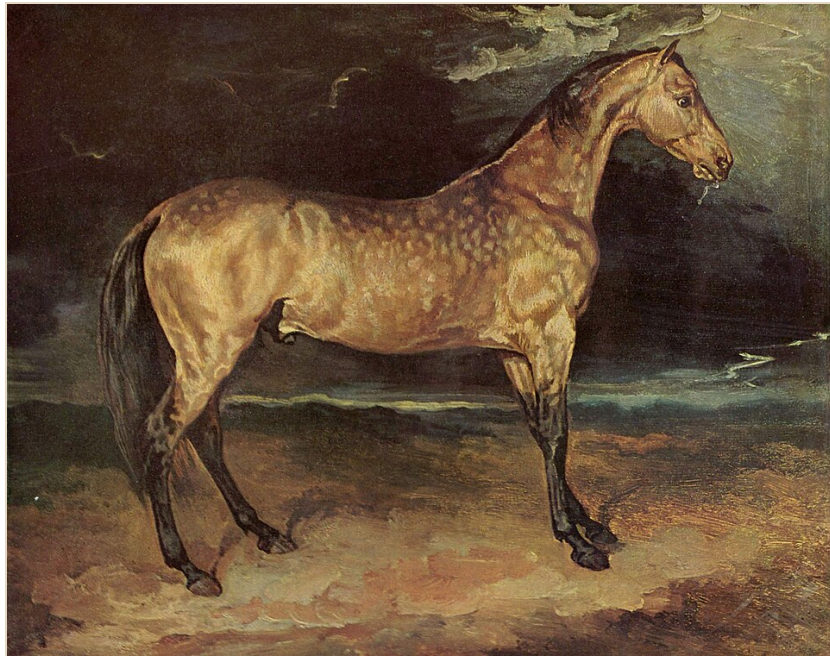
The **Maryland herd**, about 80 to 100 horses, is owned by the National Park Service and managed as a wild population with as little handling as possible. There is no roundup or sale. Instead, since 1994, rangers have darted chosen mares with a contraceptive vaccine, and each mare’s history is tracked, so that numbers stay near what the island can bear. Two herds and two methods give scientists a rare natural comparison.

Why limit the herds at all? Every island has a **carrying capacity**. Horses graze the dune grasses whose roots hold sand against storms, trample marsh, and compete for space with

shorebirds such as the piping plover, a threatened species that nests on open beaches. Too many horses would damage the island and, in the end, starve themselves. The managers' task is a balance between a beloved herd, a fragile island, and the birds and other creatures that share it. Herds also face disease, storms and hurricanes, and careless visitors. People who feed or pet the horses teach them to approach cars and crowds, and horses bite and kick. Rangers ask visitors to stay at least 40 feet away, about the length of a bus.

The Psalmist praises God who “sendeth the springs into the valleys” so that the wild creatures can drink. On Assateague the springs are rain-filled ponds among the dunes, and the provision is just enough. People who keep the herd within its means care for the horses and the island together.

PICTURE STUDY



Horse Frightened by Lightning, Théodore Géricault, c. 1813–1814 · Oil on canvas · The National Gallery, London

Wikimedia Commons · Public domain

Théodore Géricault, a French Romantic painter, loved horses so much that he rode, studied and painted them all his short life; he died at 32 after riding accidents. In this small picture there is no rider, no fence and no shelter, only a horse alone under a stormy sky. No one is sure what landscape it shows. It is a good picture for thinking about horses that live without a barn, as the Assateague herds do.

Look closely

- Find the horse's ears, eyes and nostrils. What do they tell you it is feeling?
- Look at the land and sky. Where could this horse shelter?
- Look at the light. Where is it brightest, and how does Géricault use it to make you feel the storm?

Talk about it

1. Assateague horses have no barn in storms. What do feral horses do instead (think of trees, dunes and the herd)?
2. Géricault painted a single horse, not a herd. How would a herd behave differently in a storm, and why?

Safety first. If you visit Assateague or Chincoteague, never feed, touch or approach the horses. Stay at least 40 feet away (about a bus length), keep food locked up in your car or tent, and watch from a car pull-off or viewing platform. The horses look gentle but bite and kick, and feeding them can make them sick.

HANDS-ON: MODEL A HERD ON AN ISLAND

Build a simple population model of the Virginia herd and test what happens with and without the yearly foal sale.

You will need

- Graph paper or a spreadsheet
- A calculator
- Colored pencils

Steps

1. Start with 150 adults, of whom 75 are mares. Assume 60 percent of mares foal each year, and 5 percent of adults die each year. Foals join the adults the next year (ignore foal deaths for simplicity).
2. Model A (no sale): for five years, compute $\text{foals} = 0.60 \times \text{mares}$, $\text{deaths} = 0.05 \times \text{adults}$, next year's adults = adults – deaths + last year's foals. Assume half the new adults are mares. Round to whole horses.
3. Model B (Pony Penning): the same, but each year all foals but 5 are sold before joining the herd.
4. Graph both models on one chart, adults against years. Draw a line at the 150-adult permit limit.
5. Write a paragraph: what would happen to the island in Model A by year five, and how do Pony Penning in Virginia and fertility control in Maryland each solve the problem?

Check your work

- My table shows each year's foals, deaths and adults for both models.
- My graph has labeled axes, two lines and the permit limit.
- My paragraph uses the term carrying capacity correctly.

FIELD NOTEBOOK

1. **Breed card 7: Chincoteague pony.** Draw a pinto or chestnut pony standing in salt marsh. On the back: home, height (about 12–13 hh), feral origin, and the two ways the herds are managed.
2. Draw a map of Assateague showing Maryland and Virginia, the fence, Chincoteague Island and the channel crossing.
3. **Narration.** Write one paragraph explaining why the Assateague horses are called “feral” and why their numbers must be kept down. A parent keeps this paragraph.

Did you know? The swim across Assateague Channel is timed for slack tide, the brief pause between the tide coming in and going out, when the current is weakest. The swim usually takes only a few minutes, and veterinarians check the herd before and after. Many of the ponies are pintos, splashed with large patches of white.

Go deeper.

- Assateague Island National Seashore, “Horses” pages (nps.gov/asis): herd history, fertility control and safety rules.
- Chincoteague National Wildlife Refuge (fws.gov/refuge/chincoteague): the Virginia herd and the refuge’s birds.
- Marguerite Henry’s Chincoteague books are covered in Trail D; read them after this stop for the story side.
- Second video topic: “piping plover nesting on barrier island beaches” (preview first).

Goes deeper in. Life Science, “Ecosystems and Populations,” and Earth Science, “Coasts and Barrier Islands” (coming soon).

For families. Sources: National Park Service (Assateague Island National Seashore); U.S. Fish and Wildlife Service (Chincoteague NWR); Chincoteague Volunteer Fire Company. The first firemen’s Pony Penning is dated 1924 or 1925 in different sources, so the stop says “mid-1920s.” The Maryland herd size varies year to year (roughly 80–100). The galleon story is presented as legend; the colonial-livestock origin is the explanation favored by the Park Service, not a proven certainty. No public-domain primary source excerpt is used in this stop. Misty and Pony Penning Day are told in Trail D; this stop does not repeat that story. The auction is mentioned as fact; children are not asked to bid or buy.

PRACTICE

1. **EASY** Which two states does Assateague Island cross, and what divides the two herds?
2. **EASY** Who owns each herd?
3. **MEDIUM** Why are the ponies called feral rather than wild, and what is the likeliest origin of the herd?

4. **MEDIUM** Give two reasons Assateague ponies are small and round-bellied, and the evidence that their size is not only genetic.
5. **CHALLENGE** Using Model A from the project (150 adults, 75 mares, 60 percent of mares foal, 5 percent adult deaths, foals join the next year, half of new adults are mares), compute adults at the start of year 2 and year 3.
6. **CHALLENGE** Compare the Virginia and Maryland methods of controlling herd size. Give one advantage and one drawback of each.

Make it a game • Carrying Capacity. Scatter 30 paper “grass” squares on the floor. Each player is a pony and must collect 3 squares in a round to survive. After each round, survivors “foal” (bring in another player or a stuffed animal), and only 5 new squares grow back. Play until ponies go hungry. Then replay with a “Pony Penning” rule that removes new foals each round. Compare the two games.

Scripture. “He sendeth the springs into the valleys, which run among the hills. They give drink to every beast of the field: the wild asses quench their thirst.” (Psalm 104:10-11, KJV)

Psalm 104 praises God as the provider of every creature, even animals no man tends. On Assateague the ponds among the dunes are just enough, and wise management keeps the herd within that provision.

Practice: answers

1. Maryland and Virginia; a fence at the state line.
2. The Maryland herd is owned by the National Park Service; the Virginia herd is owned by the Chincoteague Volunteer Fire Company, which grazes it on the national wildlife refuge under a permit.
3. They descend from domestic horses that went free, not from a never-tamed wild population. Most likely they came from livestock that colonial owners grazed on the barrier islands in the 1600s to avoid fencing and taxes; the shipwreck story is a legend.
4. Their poor, salty diet of marsh and beach grasses, and the large amount of water they drink because of the salt (bloated bellies). Foals raised off the island on good feed often grow taller than their parents, showing that environment plays a large part.
5. Year 1: foals = $0.60 \times 75 = 45$; deaths = $0.05 \times 150 = 7.5 \approx 8$; year 2 adults = $150 - 8 + 45 = 187$, mares = $75 - 4 + 23 \approx 94$ (keeping it simple: about half of 187). Year 2: foals = $0.60 \times 94 \approx 56$; deaths = $0.05 \times 187 \approx 9$; year 3 adults = $187 - 9 + 56 = 234$. (Small rounding differences are fine.) The herd grows by roughly a quarter each year without a sale, far past the 150-adult limit.
6. Virginia (roundup and foal sale): advantage, it pays for veterinary care, finds homes for foals and keeps a community tradition; drawback, roundups stress the horses and depend on finding buyers. Maryland (contraceptive darting): advantage, horses stay unhandled and no foals are removed; drawback, it needs constant record-keeping and ranger work, and fewer foals are born, so the herd ages and genetic variety must be watched.

1.8 COLORS AND MARKINGS: BAY, CHESTNUT, PALOMINO, BLAZE, STAR AND SOCK

OBJECTIVES

- Explain how two pigments and a few genes produce the basic coat colors: chestnut, black and bay.
- Use Punnett squares to predict foal colors, including why palomino never breeds true.
- Identify and record face and leg markings exactly, as on a registration diagram.

Warm-up. Two chestnut horses are bred together. Can their foal be bay? Write yes or no and your reason now. You will prove the answer by the end of the stop.

Video slot. Video coming. Horse coat color genetics (extension, agouti, cream and gray) and how to describe face and leg markings. Search approved channels (UC Davis Veterinary Genetics Laboratory, Kentucky Horse Park, a university extension equine channel); preview first.

KEY TERMS

base color

The coat color before any changes: black or chestnut (red), set by the extension gene. A horse with at least one dominant E can make black pigment; an ee horse is chestnut.

bay

A brown or reddish body with black points (mane, tail, lower legs and ear rims). The agouti gene (A) keeps black pigment to the points of a horse that can make black.

chestnut

A red-brown coat with mane and tail the same color or lighter, with no black points. Western horsemen often say sorrel for lighter shades.

palomino

A gold coat with a white or flaxen mane and tail, made when a chestnut carries one copy of the cream gene. It is a color, not a breed.

gray

A dominant gene that makes a horse born dark turn gradually white with age. Most “white” horses are gray.

markings

White areas on the face and legs. On the face, a star, strip, snip or blaze; on the legs, a coronet, sock or stocking. They are recorded exactly for identification.

CORE IDEAS

Every horse's color begins with two pigments made by skin cells called melanocytes.

Eumelanin is black, and **pheomelanin** is red. Which pigment a hair gets depends on a handful of genes. The first is the extension gene (*E*). A horse with at least one dominant copy (*EE* or *Ee*) can put black pigment in its coat. A horse with two recessive copies (*ee*) can make only red, and is **chestnut**. The mane and tail of a chestnut are red, flaxen or near the body color, but never black.

The second gene, agouti (*A*), decides where black may go. In a horse that can make black, a dominant *A* pushes black pigment to the "points" (mane, tail, lower legs and ear edges) and leaves the body reddish brown. That horse is **bay**, the most common horse color in the world. A horse with two recessive copies (*aa*) is black all over. Agouti cannot show on a chestnut, because there is no black for it to move, so a chestnut may hide agouti genes and pass them to its foals. This answers the warm-up. Two chestnuts are both *ee*, so every foal is *ee* and chestnut, whatever agouti genes they carry. A bay foal from two chestnut parents means a pedigree mistake.

Dilution genes then lighten the base colors. The **cream** gene is the best known. One copy turns a chestnut into a **palomino**, gold with a white or flaxen mane and tail; a bay into a buckskin; and a black into a smoky black. Two copies make a cream-colored horse with pink skin and blue eyes: a cremello from chestnut, a perlino from bay. So two palominos cannot guarantee a palomino. On average a quarter of their foals will be chestnut, half palomino and a quarter cremello. Breeders who want only palominos often cross a cremello with a chestnut, which gives a palomino every time. Registries such as the Palomino Horse Breeders of America, founded in 1941, register a color that can appear in many breeds.

Gray works differently. It is a dominant gene that does not change the color a foal is born with but turns it white over time. A gray foal may be born black, bay or chestnut, then show white hairs around the eyes, and by about six to ten years old may look almost white. Dappled stages are common along the way. Most "white" Arabians, Lipizzaners and Percherons are grays. True white horses, born white with pink skin, exist but are rare. Other patterns, such as roan, pinto and the leopard-spotted Appaloosa, come from still other genes.

Markings are white areas over pink skin, caused by genes that keep pigment cells from reaching those patches as the foal develops. On the face, a **star** is white on the forehead; a strip is a narrow line down the face; a snip is white between the nostrils; a **blaze** is a broad band from forehead to muzzle; and a bald face is white over most of the face. On the legs, a coronet is a thin band just above the hoof; a **sock** reaches up to about the fetlock or partway up the cannon; a stocking reaches the knee or hock. Registries, vets and passports record each marking on a diagram, with whorls (swirls of hair) and other features, so a horse can be identified for life.

Old horse-sellers had a rhyme: "One white foot, buy him; two white feet, try him; three white feet, look well about him; four white feet, go without him." It reflected a belief that white hooves, under white legs, were weaker. Modern studies of hoof hardness have generally not

found a real difference, though horsemen still argue about it. The honest complexity of color is that names and appearances vary. Sunlight bleaches coats, summer and winter coats differ, and one region's sorrel is another's chestnut. Today a DNA test from a few hairs can settle what the eye cannot.

In Zechariah's night vision, the prophet saw red horses, speckled and white, sent by the LORD to walk to and fro through the earth. Scripture notices horse colors, and so does every horseman, because careful seeing is the first step to knowing an animal well.

PICTURE STUDY



Mares and Foals in a River Landscape, George Stubbs, c. 1763–1768 · Oil on canvas · Tate Britain, London
Wikimedia Commons · Public domain

George Stubbs, who dissected horses to learn their anatomy, painted several frieze-like pictures of mares and foals for noble patrons. He arranged them in a row like a carved band of figures, and each animal is a portrait of a real horse. Because every animal stands clear, it is an excellent picture for practicing color and marking identification.

Look closely

- Name the color of each mare and foal. Which are bay (black points) and which chestnut (no black)?
- Find every white marking on faces and legs. Name each one exactly: star, strip, snip, blaze, coronet, sock or stocking.
- Compare foals with mares. Could any foal be turning gray? What would you look for?

Talk about it

1. Stubbs painted for owners who wanted to recognize their own horses. Why would exact colors and markings matter to them?
2. Choose one mare and one foal standing near her. If she is the dam, what can you say about the foal's possible sire from color alone?

Safety first. When you study markings on a real horse, ask the owner first, stand at the shoulder or in front of the horse at a slight angle where it can see you, and look at the legs from there. Never crouch beside or behind the hind legs to see a marking; ask the owner to show you instead.

HANDS-ON: COLOR GENETICS AND AN IDENTIFICATION CHART

Work the genetics of horse color with Punnett squares, then fill in a real identification chart for a horse you can see in person or in the picture study.

You will need

- Paper and colored pencils (red-brown, black, gold, cream, gray)
- A printed or hand-drawn horse outline: left side, right side, front of face, and all four legs
- Photographs of several horses, or a visit to a horse with its owner

Steps

1. Draw a Punnett square for $Ee \times Ee$. What fraction of foals will be chestnut?
2. Draw one for palomino $\times$ palomino (cream: $Cr/n \times Cr/n$) on a chestnut base. Color each box chestnut, palomino or cremello.
3. Draw one for a bay $Ee Aa \times$ a chestnut $ee aa$, considering both genes (a four-by-four square, or two separate squares multiplied). List the possible foal colors and their fractions.
4. On the outline, mark every white area of your chosen horse exactly, using the right names. Add whorls if you can see them.
5. Write the horse's description in one line, the way a registry would: color, face marking, leg markings (for example, "Bay; star and snip; left hind sock").

Check your work

- Each Punnett square is complete and the fractions are correct.
- I can explain why palomino does not breed true.
- My identification chart uses exact marking names on the correct legs.

FIELD NOTEBOOK

1. **Breed card 8: Colors and markings.** Draw four small horse heads (star, strip, blaze, bald face) and four legs (coronet, sock, stocking, and no white). Color one bay, one chestnut, one palomino and one gray.

2. Paste your three Punnett squares into the notebook.
3. **Narration.** Write one paragraph explaining to a younger child how a horse can be bay or chestnut, using the words “black points.” A parent keeps this paragraph.

Did you know? Each horse has small horny patches, called chestnuts, on the inside of its legs, and their shapes differ from horse to horse much as fingerprints differ from person to person. Some identification systems have recorded them. Today most registered horses are also identified by microchip and DNA.

Go deeper.

- Ben K. Green, *The Color of Horses* (1974): a Texas horseman and veterinarian’s classic, with color plates.
- D. Phillip Sponenberg, *Equine Color Genetics* (later editions with Rebecca Bellone): the standard reference for advanced students.
- UC Davis Veterinary Genetics Laboratory (vgl.ucdavis.edu): clear pages on each coat-color test.
- Second video topic: “how a gray horse changes color with age” (preview first).

Goes deeper in. Life Science, “Heredity and Genetics,” and Art, “Observing and Drawing Animals” (coming soon).

For families. Sources: UC Davis Veterinary Genetics Laboratory; Sponenberg, *Equine Color Genetics*; American Quarter Horse Association and The Jockey Club marking definitions (exact limits for sock and stocking vary slightly by registry); Palomino Horse Breeders of America. The gene names are simplified for teaching; real color genetics includes more genes and rare variants. The “white feet” rhyme exists in several versions and is quoted here as folk sayings are commonly given, not from a single written source. No public-domain primary source excerpt is used in this stop. The picture’s exact colors vary in reproductions; let the student judge from the best image you can find.

PRACTICE

1. **EASY** How can you tell a bay from a chestnut at a glance?
2. **EASY** Define star, blaze and sock.
3. **MEDIUM** A gray foal is born almost black. Its owner thinks it was misregistered. What would you explain?
4. **MEDIUM** Two chestnut horses have a bay foal. Using genetics, explain why this signals a pedigree error.
5. **CHALLENGE** Two palominos (both chestnut base, both Cr/n) are bred. Give the expected fractions of foal colors. Then name the cross that guarantees a palomino and explain why.
6. **CHALLENGE** A bay stallion that is Ee Aa is bred to a chestnut mare that is ee aa. List the possible foal colors and the fraction of each.

Make it a game · Name That Horse. One player secretly picks a horse from a set of photo cards (or from the picture study) and describes it only by color and markings, the way a registry would: “Chestnut; blaze; right fore and left hind socks.” The others must find the right horse. A wrong marking name costs a point. Then make it harder by describing a gray foal at birth and asking what it will look like at age ten.

Scripture. “I saw by night, and behold a man riding upon a red horse, and he stood among the myrtle trees that were in the bottom; and behind him were there red horses, speckled, and white.” (Zechariah 1:8, KJV)

In Zechariah’s vision the horses are messengers sent by the LORD through the earth, and their colors are noted with care. God’s Word is precise even about horses’ coats; careful observation honors the Creator who made such variety.

Practice: answers

1. A bay has black points (black mane, tail and lower legs); a chestnut has no black, with a mane and tail the body color or lighter.
2. Star: white on the forehead. Blaze: a broad white band from forehead to muzzle. Sock: white on the leg up to about the fetlock or partway up the cannon.
3. Gray foals are born colored (black, bay or chestnut) and turn white gradually with age. Look for white hairs around the eyes. A gray foal must have at least one gray parent.
4. Chestnuts are ee and can pass on only e. Their foal must be ee, which cannot make black pigment. A bay must have at least one E, so at least one recorded parent is wrong.
5. $Cr/n \times Cr/n$ gives $\frac{1}{4} Cr/Cr$ (cremello), $\frac{1}{2} Cr/n$ (palomino), $\frac{1}{4} n/n$ (chestnut). A cremello (Cr/Cr , chestnut base) $\times$ a chestnut (n/n) always gives Cr/n on a chestnut base, so every foal is palomino.
6. Extension: $Ee \times ee$ gives $\frac{1}{2} Ee$, $\frac{1}{2} ee$. Agouti: $Aa \times aa$ gives $\frac{1}{2} Aa$, $\frac{1}{2} aa$. Combined: $\frac{1}{4} Ee Aa$ (bay), $\frac{1}{4} Ee aa$ (black), $\frac{1}{2} ee$ (chestnut, whatever the agouti). So $\frac{1}{4}$ bay, $\frac{1}{4}$ black, $\frac{1}{2}$ chestnut.

TRAIL 1 BADGE QUIZ

The badge quizzes are optional. The student answers in writing without notes; a parent checks the answers against the key. Full sentences are expected for explanation questions, and work must be shown for calculations. Four right out of five earns the first badge quiz; five right out of six earns the second. Badges and the certificate are earned by completing the stops, not by scores.

Badge quiz 1 (Stops 1–5)

1. Convert 15.3 hh to inches and centimeters. Is the animal a horse or a pony by the common rule?
2. Why did the Bedouin trace an Arabian's pedigree through its mother, and which two points did they most regard in judging a horse, according to Lady Anne Blunt?
3. Name the three foundation sires of the Thoroughbred and explain what a closed stud book is.
4. A 150-pound student climbs 11 feet of stairs in 5 seconds. Find the power in horsepower.
5. What is cow sense, and what did Andy Adams mean by "what the mule is to the army the cow-horse is to the herd"?

Badge quiz 2 (Stops 6–8)

6. Explain how the Mines Act of 1842 affected Shetland ponies.
7. Name the four sections of the Welsh stud book and their height limits.
8. Why are the Assateague horses called feral, and how do the Maryland and Virginia herds differ in management?
9. Define carrying capacity and give one way too many horses would harm Assateague.
10. A bay mare (Ee Aa) is bred to a black stallion (Ee aa). What fraction of foals will be chestnut?
11. Write a one-line registry description of a gold horse with a white mane and tail, a broad white stripe down its face, and white to the fetlock on the left hind leg.

TRAIL CERTIFICATE: BREED DOSSIER AND TRAIL A CERTIFICATE

Assemble the eight breed trading cards and the eight narration paragraphs into a "Breed Dossier" with your name and the dates of each stop.

Add one finished project from the trail: the measuring stick and conversion table, the Eclipse pedigree, the horsepower table, the remuda plan, the scale silhouettes, the herd model graph, or the color-genetics squares.

Write a one-page essay comparing two breeds from the trail. How did the land and the work people needed shape each one? Quote or cite at least one primary source from the trail.

When the dossier is complete, a parent reviews it with the rubric and signs the Trail A certificate.

- **Accuracy:** Facts, heights, dates and calculations are correct, and legends are labeled as legends.
- **Use of sources:** The essay quotes or cites a primary source accurately and says what it shows and what it cannot prove.
- **Reasoning:** The essay explains causes, such as environment, work and selective breeding, rather than only listing features.
- **Craft:** Cards, drawings and charts are neat, labeled and complete; narrations are clear paragraphs in the student's own words.

Answer key

1. $15 \times 4 + 3 = 63$ inches; $63 \times 2.54 \approx 160$ cm. A horse (over 14.2 hh).
2. Mares were the most valued horses (quieter on raids and the source of good foals), so descent was traced through the dam. Blunt says they regarded the head and the tail most.
3. The Byerley Turk, the Darley Arabian and the Godolphin Arabian. A closed stud book registers only foals whose sire and dam are both already registered.
4. $150 \times 11 = 1,650$ ft-lb; $\div 5 = 330$ ft-lb/s; $\div 550 = 0.6$ horsepower.
5. Cow sense is a horse's ability to read cattle and move to block them, often before the rider asks. Adams meant that just as an army cannot move without its pack mules, a trail drive cannot work without sound horses; they were the foundation of success.
6. It banned women, girls and boys under ten from working underground. Mines needed another way to haul coal in low tunnels, so demand for small, strong Shetland ponies as pit ponies rose, and studs were founded in Shetland to breed them.
7. A, Welsh Mountain Pony, not over 12 hh; B, Welsh Pony, not over 13.2 hh; C, Welsh Pony of Cob Type, not over 13.2 hh; D, Welsh Cob, over 13.2 hh.
8. They descend from domestic livestock that ran free, likely put on the island by colonial owners. Maryland: owned by the National Park Service, managed hands-off with contraceptive darting. Virginia: owned by the Chincoteague Volunteer Fire Company, limited to about 150 adults by the yearly Pony Penning and foal auction.
9. The largest population an environment can support year after year without damage. Too many horses would overgraze the dune grasses that hold the sand, trample marsh, crowd nesting shorebirds, and eventually starve.
10. Chestnut requires ee. $Ee \times Ee$ gives $\frac{1}{4}$ ee. So $\frac{1}{4}$ of foals will be chestnut.
11. Palomino; blaze; left hind sock.

HORSES TRAIL B: RIDING AND CARE

The second trail of the Horses track teaches what a horseman must know: the points and skeleton of the horse, the saddle, bridle and bit, grooming and the daily health check, hooves and the farrier, feeding by the needs of the gut, the four gaits and Muybridge's photographs, safety on the ground, and the English and Western traditions with dressage, show jumping and barrel racing.

This is the  **Expert** level, for ages 14 and up, at a high-school standard. Each stop takes 35 to 50 minutes and stands by itself. The student reads the core ideas, works through a primary source (Xenophon's *On Horsemanship*, the oldest surviving riding manual in the Western world), writes a narration paragraph for the parent to keep, and does six practice problems with real numbers. Stop B5 builds the trail's main project: a **daily care chart, costed out**, to learn what a horse really costs. Riding and handling skills are practiced only with a qualified adult.

Five stops earn the **Horse Expert badge, Riding and Care, part 1**; eight stops earn part 2 and the **Trail B certificate**.

BEFORE YOU BEGIN

- Read a high-school level text of several pages and write a clear paragraph summarizing it.
- Work with percentages, ratios and rates (miles per hour, cost per day) using a calculator.

MASTERY CHECKLIST

- ☐ I can name and locate 25 points of the horse and match its leg joints to the human skeleton.
- ☐ I can explain how snaffle and curb bits work and check tack for fit and safety.
- ☐ I can groom a horse in order, take and judge TPR, and explain the hoof and the farrier's work.
- ☐ I can figure a ration by body weight and have costed out a year of a horse's care.
- ☐ I can describe the four gaits, approach and lead a horse safely, and compare English and Western riding.

GO DEEPER: BOOKS, MUSEUM PAGES AND RESOURCES

- **Xenophon, *On Horsemanship* (Project Gutenberg eBook #1176)**
(<https://www.gutenberg.org/ebooks/1176>): The free translation by H. G. Dakyns quoted at every stop of this trail.
- **Library of Congress: Eadweard Muybridge's *The Horse in Motion***
(<https://www.loc.gov>): Search "Muybridge horse in motion" for high-resolution scans of

the 1878 photographs (Stop B6).

- **United States Pony Clubs** (<https://www.ponyclub.org>): Free information on horsemanship standards and local clubs; its manuals are the standard for grooming, tack and safety.
- **National 4-H Council** (<https://4-h.org>): Find your state's 4-H horse program, with handling lessons, safety guides and project record books; many accept youth without a horse of their own.
- **Kentucky Horse Park: International Museum of the Horse** (<https://kyhorsepark.com>): Breed, history and tack exhibits; good for Stops B2, B6 and B8.

2.1 PARTS OF THE HORSE

OBJECTIVES

- Name and locate at least 25 points of the horse, and match the horse's leg joints to the human skeleton.
- Explain how the horse's legs and shoulders are built for speed and endurance: one toe, tendons below the knee, no collarbone and the stay apparatus.
- Judge a horse's conformation with the criteria of Xenophon (4th century B.C.) and of a modern horseman, and say where they agree.

Warm-up. Lay your forearm flat on a table and bend your wrist. Then stand and lift your heel. Now look at a picture of a horse's front and hind legs. Which joint on the horse is really your wrist, and which is really your ankle? Write your guesses before you read.

Video slot. Video coming. Points of the horse and equine leg anatomy (the horse's skeleton compared with the human skeleton; the stay apparatus). Search approved channels (Kentucky Horse Park, a university veterinary school or extension service, United States Pony Clubs, a 4-H horse program); preview first.

KEY TERMS

points of the horse

The standard names for the outer parts of a horse's body (poll, crest, withers, croup, hock and so on), used by riders, farriers and veterinarians alike.

conformation

The build of a horse: the shape, length and angle of its bones and how the parts fit together. Good conformation suits a horse for its work and helps keep it sound.

withers

The ridge at the base of the neck formed by the tall spines of the vertebrae between the shoulder blades; the point where height is measured and where the front of a saddle sits.

hock

The large joint in the middle of the hind leg; it matches the human ankle, and the point of the hock is the horse's heel bone.

fetlock and pastern

The fetlock is the ball-shaped joint above the hoof (the horse's knuckle); the pastern is the short, sloping section between the fetlock and the hoof (the horse's finger bones).

stay apparatus

A system of tendons and ligaments that lets a horse lock its legs and doze standing up with very little muscle effort.

CORE IDEAS

Every trade has its own vocabulary, and horsemanship has one of the oldest. When an instructor says “sit behind the withers,” a farrier says the horse is “long in the pastern,” or a veterinarian finds heat “just above the fetlock,” all three are using the **points of the horse**. Start at the head: the **poll** is the top of the head behind the ears; below it are the forelock, forehead, eyes, the soft **muzzle** with its nostrils, the jaw and the throatlatch where head meets neck. The top line of the neck is the **crest**. Then come the **withers**, back, loin, **croup** and the dock of the tail. Underneath are the chest, the girth (where a saddle’s girth passes), the barrel of the ribs, the belly and the flank. Horsemen also name the two sides: the left is the **near side** and the right the **off side**.

The legs surprise most beginners, because the horse walks on the tip of a single finger. What looks like a backward-bending “knee” on the front leg is really the **carpus**, the same joint as your wrist. The long **cannon bone** below it matches the bone behind your middle knuckle, and the two slender **splint bones** beside it are all that remain of the second and fourth digits. The **fetlock** joint is a knuckle; the long and short pastern bones are finger bones; and the last finger bone, the **coffin bone**, sits hidden inside the hoof, which is a giant fingernail. On the hind leg the true knee is the **stifle**, high against the belly, with a kneecap; the **hock** is the ankle, and its point is the heel. The **gaskin** between stifle and hock is the horse’s calf.

Why build a leg this way? Speed and economy. Below the knee and hock there are no muscles at all, only bone, tendon, ligament and skin. The heavy muscles sit high on the body and work the light lower leg by long tendons, like a puppeteer working strings. A light lower leg takes less energy to swing, so a horse can travel far and fast. The cost is that tendons and ligaments have a poor blood supply and heal slowly; a bowed tendon can take a year to mend. A horse also has no **collarbone**. Its forelegs are slung from the trunk by muscle and ligament, a living shock absorber, and they carry roughly 60 percent of its weight. That is one reason the saddle must sit behind the shoulder blades and fit the withers well.

A prey animal must be ready to run, even when resting. Through the **stay apparatus**, a horse can lock its front legs and hook its kneecap over a ridge on the thigh bone to lock one hind leg, then rest the other hind leg on its toe. So it can doze standing up and flee in a moment. It still needs to lie down for short spells of deep sleep, usually less than an hour or two in a day, often while another horse keeps watch.

The head holds three more design features. The eyes are set on the sides, giving nearly all-around vision but small **blind spots** directly in front of the nose and directly behind the tail. A horse breathes only through its nose, never its mouth, so wide, open nostrils matter in hard work. And its grinding teeth are very long and keep coming up out of the jaw as they wear down against tough grasses, a few millimeters a year. Horsemen estimate age by the teeth, and an equine dentist “floats” (files) sharp edges. Most adult horses have between 36 and 44 teeth.

Conformation is the study of how these parts fit together for work. About 2,400 years ago the Greek soldier Xenophon told buyers to judge the feet first, then the legs, chest, neck and

head, because a horse's use depends on its build. Modern judges still ask the same questions: Are the legs straight when seen from the front? Does the pastern slope at about the same angle as the front of the hoof? Is the shoulder long and sloping, the back short and strong, the neck set on high? In the 1750s the English painter George Stubbs spent about eighteen months dissecting horses in a Lincolnshire farmhouse to learn this structure, and he published *The Anatomy of the Horse* in 1766.

The honest complication is that conformation predicts but does not decide. Some famous horses had plain faults; Seabiscuit was small and knobby-kneed. A well-built horse can be ruined by poor care, and an average one can excel through good training, fitness and heart. A wise horseman learns the parts well enough to see faults, then judges the whole horse.

PICTURE STUDY



Whistlejacket, George Stubbs, c. 1762 · Oil on canvas · The National Gallery, London
Wikimedia Commons · Public domain

Whistlejacket was a chestnut racehorse of Arabian descent owned by the Marquess of Rockingham. Stubbs painted him life-size, nearly ten feet tall, against an empty background, so nothing distracts from the body. Only a man who had dissected horses for himself could paint the veins on the face, the muscles of the shoulder and the bend of the hock this exactly.

Look closely

- Find the poll, the crest, the withers and the croup. Trace the top line from ears to tail.
- Find the hock and the stifle on the hind legs carrying all the weight. Which joint is the horse's ankle?
- Find the veins and muscles on the face, neck and shoulder. Which muscles are working to hold the horse up?

Talk about it

1. Why might Stubbs have left out any rider, saddle or landscape?
2. Using Xenophon's test, is Whistlejacket's neck set on like a boar's or like a game-cock's? Give your evidence from the painting.

Safety first. Study the parts on a real horse only with an experienced adult holding it. Stand beside the shoulder, never directly in front or behind; touch the horse firmly rather than tickling; never kneel, sit or crawl under the horse. Wear closed, hard-toed shoes.

HANDS-ON: THE PARTS-OF-THE-HORSE POSTER, WITH A HUMAN COMPARISON

Make the labelled poster for your Field Notebook, then add a second column that shows each leg joint's match in the human body, and judge one horse by Xenophon's criteria.

You will need

- A large sheet of paper or poster board
- A clear side-view photograph or drawing of a horse standing square (a breed-society or museum image works well)
- Pencil, fine marker and colored pencils
- A ruler and a protractor
- The Xenophon passage in this stop

Steps

1. Draw or trace a horse in side view. Make it large; the legs need room.
2. Label at least 25 points: poll, forelock, muzzle, nostril, jaw, throatlatch, crest, withers, back, loin, croup, dock, shoulder, chest, elbow, forearm, knee, cannon, fetlock, pastern, coronet, hoof, barrel, flank, stifle, gaskin, hock and chestnut.
3. Color the leg bones lightly in one color and write the human match beside each: knee = wrist, cannon = hand bone, fetlock = knuckle, pastern = finger, coffin bone = fingertip; stifle = knee, hock = ankle, point of hock = heel.
4. With the protractor, measure the angle of the front of a hoof and the angle of its pastern on your photograph. Are they close? Write both numbers.
5. Read the Xenophon excerpt. Circle on your poster every part he names (the forearm, chest, neck, crest, head and jaw). Beside each, write his reason in your own words.
6. Finish with one sentence: "Judged by Xenophon, this horse is ...," and give one strength and one fault.

Check your work

- At least 25 points are labelled and spelled correctly.
- Every leg joint has its human match.
- Hoof and pastern angles are measured and recorded.
- Xenophon's parts are circled, with his reasons in my words.

FIELD NOTEBOOK

1. **Notebook page: Points of the horse.** Paste a small copy of your poster or draw a quick labelled side view.
2. **Narration.** In one paragraph, explain to a beginner why a horse's "knee" is not really a knee and why its lower leg is built without muscles. Give your parent the paragraph to keep.

Did you know? The horny patches on the inside of a horse's legs are called **chestnuts**, and the small horny bumps at the back of the fetlocks are **ergots**. Every horse's chestnuts are shaped a little differently, and some registries once used them for identification. A horse's skeleton has about 205 bones, but the number varies a little by breed; many Arabians have one fewer lumbar vertebra than other horses.

Primary source. *Xenophon, On Horsemanship, chapter I (c. 350 B.C.), translated by H. G. Dakyns. Project Gutenberg eBook #1176.*

Coming to the thighs below the shoulder-blades, or arms, these if thick and muscular present a stronger and handsomer appearance, just as in the case of a human being. Again, a comparatively broad chest is better alike for strength and beauty, and better adapted to carry the legs well asunder, so that they will not overlap and interfere with one another. Again, the neck should not be set on dropping forward from the chest, like a boar's, but, like that of a game-cock rather, it should shoot upwards to the crest, and be slack along the curvature; whilst the head should be bony and the jawbone small. In this way the neck will be well in front of the rider, and the eye will command what lies before the horse's feet. A horse, moreover, of this build, however spirited, will be least capable of overmastering the rider, since it is not by arching but by stretching out his neck and head that a horse endeavours to assert his power.

Go deeper. George Stubbs, *The Anatomy of the Horse* (1766; Dover reprint), the plates that taught artists and veterinarians for two centuries. Xenophon, *On Horsemanship* (free at Project Gutenberg), chapter I on choosing a horse. The Pony Club, *The Manual of Horsemanship*, the chapter on points of the horse. Second video topic: "horse skeleton compared with human skeleton," from a veterinary school.

Goes deeper in. Life Science, "Mammals" and "Bones and Muscles," and Art, "Drawing Animals" (coming soon).

For families. Sources: standard Pony Club and veterinary-school anatomy; The National Gallery, London, on *Whistlejacket*; Xenophon from the Project Gutenberg text, with straight quotation marks set as typographic ones. Figures given as "about" vary from horse to horse: the share of weight on the forelegs (commonly given as 60 to 65 percent), tooth counts (stallions and geldings usually have canine teeth, mares often do not), bone count and sleep time. Xenophon's dates are approximate; he lived about 430 to 354 B.C.

PRACTICE

1. **EASY** Which side of a horse is the near side, and which is the off side?
2. **EASY** Name the joints of the horse that match the human wrist, knee and ankle.
3. **MEDIUM** Why does the horse have no muscles below the knee and hock, and what is the cost of that design?
4. **MEDIUM** Explain how a horse can sleep standing up and why that matters for a prey animal.
5. **CHALLENGE** Read the Xenophon excerpt. (a) Why does he want the neck to rise “like that of a game-cock”? Give both of his reasons. (b) Explain in your own words his claim that a horse asserts its power “not by arching but by stretching out his neck and head.”
6. **CHALLENGE** A 1,100-pound horse carries 60 percent of its weight on its forelegs. (a) How much weight does each foreleg carry when it stands square? (b) A 165-pound rider mounts, and the same 60/40 split applies to the total. How much does each foreleg carry now, and by what percent did the load on each foreleg rise?

Make it a game • Point to the Point. A caller names a point of the horse (“hock!” “poll!” “fetlock!”). Players must touch the matching place on their own bodies (ankle, top of head, knuckle) within three seconds. A wrong touch or a slow touch makes you the next caller. For a harder round, the caller names the human part and players answer with the horse’s name for it.

Scripture. “Canst thou make him afraid as a grasshopper? the glory of his nostrils is terrible.” (Job 39:20, KJV)

God speaks to Job of the horse’s nostrils, the very part a horse must breathe through in hard work. Every point on your poster was designed before any man named it; anatomy is a study of God’s workmanship.

Practice: answers

1. The near side is the horse’s left; the off side is its right.
2. The wrist is the horse’s (front) knee or carpus; the human knee is the stifle; the ankle is the hock.
3. A light lower leg, moved by tendons from muscles high on the body, takes less energy to swing, so the horse can go fast and far. The cost is that tendons and ligaments have a poor blood supply, heal slowly and are easily injured.
4. The stay apparatus of tendons and ligaments locks the front legs, and the kneecap hooks over the thigh bone to lock a hind leg, so the horse rests with little muscle work. It can doze while staying ready to run from a predator.
5. (a) So the neck stands well in front of the rider and the horse’s eye looks ahead at the ground before its feet; and so even a spirited horse is less able to overpower the rider. (b) A horse that wants to run off or resist pushes its head down and forward against the bit, leaning its weight on the rider’s hands; a horse built with a high-set, arched neck naturally carries its head up and is easier to keep in balance and under control.

6. (a) $1,100 \times 0.60 = 660$ pounds on the forelegs, so 330 pounds on each. (b) Total 1,265 pounds $\times 0.60 = 759$ pounds, so 379.5 pounds on each foreleg. The rise is $49.5 \div 330 = 0.15$, an increase of 15 percent.

2.2 TACK: SADDLE, BRIDLE AND BIT

OBJECTIVES

- Name the main parts of an English saddle, a Western saddle and a bridle, and explain what each part does.
- Explain how a snaffle bit and a curb bit work, using the lever to show why a curb multiplies the rider's pull.
- Check tack for fit and safety before a ride, and weigh the claim that a bit is only as kind as the hands on the reins.

Warm-up. Hold a ruler near one end between your thumb and finger and press down on the far end. Now hold it in the middle and press with the same force. Which way makes a bigger push at your fingers? Keep the answer in mind; it explains the curb bit.

Video slot. Video coming. Parts of an English saddle and a Western saddle; how to tack up a horse; snaffle bit versus curb bit. Search approved channels (Kentucky Horse Park, United States Pony Clubs, a 4-H horse program, a university extension service); preview first.

KEY TERMS

tack

All the gear a horse wears to be ridden or driven: saddle, pad, girth, bridle, bit, reins and the rest. The word comes from “tackle.” The room where it is kept is the tack room.

saddle tree

The rigid frame inside a saddle that spreads the rider's weight over the long back muscles on each side of the spine; traditionally wood, now often synthetic.

girth / cinch

The strap under the belly that holds the saddle on. English riders say girth; Western riders say cinch and fasten it with a long leather latigo.

snaffle

A bit with no shanks; the reins attach to rings at the mouthpiece, so the pressure on the mouth equals the pull on the reins (direct pressure).

curb bit

A bit with shanks and a curb chain or strap under the chin; it works as a lever, multiplying the rein's pull and adding pressure on the chin groove and poll.

bars of the mouth

The toothless gums between a horse's front teeth and its cheek teeth, where the bit rests.

CORE IDEAS

Tack exists to solve two problems: how a person can sit on a horse without hurting its back, and how a person can ask the horse to go, stop and turn. The ancient Greeks rode with only a cloth and a bridle. Saddles with rigid frames came later, and the stirrup later still. The history is uncertain in its details, but toe-loops appear in India in the last centuries B.C., paired metal stirrups appear in China by about the A.D. 400s, and stirrups had reached Europe by about the 700s. A rider with stirrups can stand, brace and balance at speed, and the stirrup changed warfare and travel alike.

The heart of every saddle is the **tree**. It must clear the withers and the spine completely and spread the rider's weight over the broad muscles on either side. An English saddle has a low **pommel** at the front, a seat, a **cantle** at the back, flaps over the rider's legs, stirrup leathers and irons, and a **girth** buckled to straps called billets. It is light, often 10 to 20 pounds, and lets the rider feel the horse closely. A Western saddle has a **horn** rising from the fork, a deep seat, a high cantle, wide skirts, broad fenders over the stirrup leathers, and a **cinch** fastened by a latigo. It weighs 25 to 40 pounds or more, and it was built for long days working cattle, with the horn to hold a rope tied or "dallied" around it. A pad or blanket goes under either saddle to cushion and absorb sweat.

The **bridle** holds the bit and gives the reins something to work. Its crownpiece goes over the poll; the browband keeps it from sliding back; the **throatlatch** under the jaw keeps it from pulling off over the ears; the cheekpieces hold the bit at the right height; the noseband (on English bridles) closes the jaw lightly; and the reins run to the rider's hands. A **halter** is different: it is for leading and tying, and no one should tie a horse by its bridle reins, which break or tear the mouth if the horse pulls back.

The bit rests on the **bars of the mouth**, the toothless gap God built into the horse's jaw, over the tongue. A **snaffle** works by direct pressure: one pound of pull on the reins is about one pound on the mouth, acting on the tongue, bars and corners of the lips. Most young horses and most English riders start in a snaffle, often a jointed one. A **curb bit** has shanks below the mouthpiece and a chain or strap under the chin. When the reins pull the bottom of the shanks back, the shanks turn, the chain tightens in the chin groove, and the top of the shank (the purchase) tips forward, drawing the crownpiece down on the poll. Because it is a lever, a small pull becomes a larger squeeze. Horsemen describe a curb by its shank ratio; with a 2-inch purchase and a 4-inch lower shank, a pull is multiplied two or three times, depending on how the lever is figured. That is why curb bits are paired with soft hands and light contact, and why Western riders, who often use curbs, ride on a loose rein and turn by **neck reining**.

Fit is a safety matter as well as a comfort matter. A bit should stick out about a quarter inch on each side; a snaffle is usually adjusted to make one or two soft wrinkles at the corners of the mouth. A fist's width should fit under the throatlatch, two fingers under the noseband. The tree must clear the withers by two or three fingers with a rider aboard. A saddle that pinches leaves sore spots, and later white hairs, where the pressure was. Before every ride,

check stitching, cracked leather, stirrup bars, buckles and keepers; tighten the girth in stages and check it again after mounting.

The honest complication is that no piece of steel is “kind” or “cruel” by itself. A mild snaffle in rough, jerking hands hurts more than a curb in quiet ones, and bitless bridles such as the hackamore and bosal work on the nose and chin with pressure of their own. Xenophon, writing about 2,400 years ago, kept a rough spiked bit alongside a smooth one, which riders today would call harsh; yet in the same book he insisted that a rider must use a light hand and give the horse relief the moment it obeys. Good tack helps; good hands, patience and training matter more.

PICTURE STUDY



Prince Balthasar Charles on Horseback, Diego Velázquez, c. 1635–1636 · Oil on canvas · Museo del Prado, Madrid

Wikimedia Commons · Public domain

Velázquez, court painter to King Philip IV of Spain, painted the king’s son, about six years old, on a powerful pony in the leaping pose of the riding school. The picture was hung high in a royal palace, which is why the pony’s belly looks so round from below. Look closely: the painter shows real tack.

Look closely

- Find the bit. Can you see a shank and a chain? Is it a snaffle or a curb?
- Find the saddle, the stirrup and the girth. How does the boy sit?
- Follow the reins from the bit to the boy’s hand. Are they tight or loose?

Talk about it

1. Why would a painter show a young prince controlling a strong horse with such light reins?
2. Velázquez painted a rich saddle and bridle. What do the tack and the pose tell viewers about the boy and his training?

Safety first. Tack up only under an experienced adult's eye. Tie the horse by a halter, never by the reins. Tighten the girth gradually, keep your fingers clear of the buckles and the horse's mouth, and never ride in tack with cracked leather, torn stitching or a stirrup too small for your boot.

HANDS-ON: THE CURB LEVER AND THE TACK-CHECK CARD

First, build a model curb bit from a ruler and measure for yourself how a lever multiplies force. Then make a laminated tack-check card for your Field Notebook.

You will need

- A 12-inch wooden ruler with a hole near one end, or a paint stirrer
- A pencil or dowel as the pivot (the mouthpiece)
- Two loops of string and a small luggage scale or spring scale (or a bag of coins as a weight)
- Index cards, a marker and clear packing tape

Steps

1. Hold the pencil level and lay the ruler across it so that 2 inches stick up above the pencil (the purchase) and the rest hangs below (the shank).
2. Tie a loop at the top of the ruler and fix it to a heavy book or table edge (the chin chain and poll). Tie a second loop at the 4-inch mark below the pencil (the rein ring).
3. Pull the rein loop back with the scale until it reads 1 pound. Estimate the force on the top loop by feeling it, or measure it with a second scale if you have one. Then move the rein loop to the 6-inch mark and repeat.
4. Write a rule from your results: how did the shank length change the force?
5. On one index card, draw a bridle and label crownpiece, browband, throatlatch, cheekpiece, noseband, bit and reins. On the back, write the fit checks: bit a quarter inch wider than the mouth, one or two wrinkles, fist under the throatlatch, two fingers under the noseband.
6. On a second card, write the saddle checks: tree clears the withers, pad smooth and pulled up into the gullet, stitching and leathers sound, girth tightened in stages and checked after mounting. Cover both cards with tape.

Check your work

- My lever model shows that a longer shank multiplies the pull.
- My bridle card names seven parts and four fit checks.
- My saddle card lists the safety checks before a ride.

FIELD NOTEBOOK

1. **Notebook page: Tack.** Draw an English saddle and a Western saddle side by side and label five parts on each. Paste your tack-check cards beside them.
2. **Narration.** In one paragraph, explain the difference between a snaffle and a curb to someone who has never seen a bit, and say why the rider's hands matter more than the bit. Your parent keeps the paragraph.

Did you know? Horses have a natural gap of several inches between their front teeth and their cheek teeth, so a bit fits there without touching the grinding teeth. Some horses grow small “wolf teeth” just in front of the cheek teeth, right where the bit sits; equine dentists often remove them. Saddle sizes are measured differently in each tradition: English seats in inches from the nail at the pommel to the cantle (often 15 to 18 inches), Western seats from the swell to the cantle (often 13 to 17 inches).

Primary source. *Xenophon, On Horsemanship, chapter X (c. 350 B.C.), translated by H. G. Dakyns. Project Gutenberg eBook #1176.*

In the first place, then, you ought to have at least two bits. One of these should be smooth, with discs of a good size; the other should have heavy and flat discs studded with sharp spikes, so that when the horse seizes it and dislikes the roughness he will drop it; then when the smooth is given him instead, he is delighted with its smoothness, and whatever he has learnt before upon the rough, he will perform with greater relish on the smooth.

Go deeper. Xenophon, *On Horsemanship* (Project Gutenberg), chapters IX to XI on handling spirited horses, bits and the light hand. The Pony Club, *The Manual of Horsemanship*, chapters on saddlery. Susan E. Harris, *The United States Pony Club Manual of Horsemanship: Basics for Beginners / D Level*. Second video topic: “how a curb bit works,” from a university extension or saddlery maker.

Goes deeper in. Gardening & Animals, “Caring for Animals,” and Life Science, “Simple Machines: Levers” (coming soon).

For families. Sources: Pony Club and 4-H manuals; Museo del Prado on Velázquez's portrait. The history of the stirrup is debated; the dates given are approximate and widely cited, and the stop hedges them. Curb leverage is described several ways in horse books (some divide the lower shank by the purchase, some divide the whole shank by the purchase), so the stop gives a range. Xenophon's spiked bit is presented plainly as part of his time; the stop does not recommend it. Saddle weights and seat sizes vary widely.

PRACTICE

1. **EASY** What is the saddle tree, and what must it never touch?
2. **EASY** Where in the horse's mouth does the bit rest?

3. **MEDIUM** Name two differences between an English saddle and a Western saddle, and give the reason for one of them.
4. **MEDIUM** Why should a horse never be tied by its bridle reins?
5. **CHALLENGE** A curb bit has a 2-inch purchase above the mouthpiece and a 5-inch shank below it. (a) Using the simple ratio lower shank $\div$ purchase, what is the leverage? (b) If the rider pulls with 3 pounds of force, about how much force does the lever produce at the top of the shank? (c) Why do some horsemen give a higher figure for the same bit?
6. **CHALLENGE** Read Xenophon on the two bits. (a) What training method is he describing? (b) In one or two sentences, judge it: what do Xenophon and a good modern horseman agree on, and where would a modern horseman disagree?

Make it a game · Tack Room Relay. Lay out cards with the names of 14 tack parts (pommel, cantle, horn, fender, latigo, girth, crownpiece, browband, throatlatch, noseband, snaffle, curb chain, reins, stirrup). Two teams race to sort them into three piles: English saddle, Western saddle, bridle (some go in two piles; a team must say why). Each correct card scores a point; each good explanation scores a bonus.

Scripture. “Behold, we put bits in the horses’ mouths, that they may obey us; and we turn about their whole body.” (James 3:3, KJV)

James uses the bit to teach that a small thing steers a great one, and then applies it to the tongue. A rider learns the same lesson twice: small, careful pressures do much, and the one who controls his hands and words is the one fit to guide others.

Practice: answers

1. The rigid frame inside the saddle that spreads the rider’s weight over the back muscles. It must never press on the withers or the spine.
2. On the bars, the toothless gums between the front teeth and the cheek teeth, over the tongue.
3. Any two: the Western saddle has a horn, a deeper seat, a higher cantle, wide skirts and fenders, a cinch and latigo, and is much heavier; the English saddle is lighter, with a low pommel, flaps and a buckled girth. Reason example: the horn holds a rope dallied around it when roping cattle; the deep seat keeps the rider secure through long days and quick turns.
4. If the horse pulls back, the reins pull the bit hard against its mouth, which can injure it, and the reins or bridle will break, leaving a frightened loose horse. Horses are tied by a halter and lead rope, with a quick-release knot.
5. (a) $5 \div 2 = 2.5$, a ratio of 2.5 to 1. (b) About $3 \times 2.5 = 7.5$ pounds. (c) Some measure the whole shank ($2 + 5 = 7$ inches) against the purchase, giving 3.5 to 1, because they treat the chin chain, not the mouthpiece, as the pivot. In a real mouth the forces are shared among tongue, bars, chin groove and poll, so any single number is an approximation.
6. (a) He makes the wrong choice uncomfortable (the rough bit) and the right result pleasant (the smooth bit), so the horse learns to prefer the smooth and to carry out what it learned with relish; it is pressure and relief. (b) They agree that a horse learns from release of pressure and that the goal is a horse working willingly on a gentle bit. A modern horseman would reject the spiked bit as needlessly harsh, since good timing and light hands teach the same lesson with a plain snaffle.

2.3 GROOMING, STEP BY STEP

OBJECTIVES

- Groom a horse in the right order with the right tools, and explain the purpose of each step.
- Use grooming as a daily health check, including temperature, pulse and respiration and their normal ranges.
- Compare Xenophon's ancient instructions for a groom's position with modern practice.

Warm-up. Run a fine comb through your own hair from the ends upward, then from the roots downward. Which way pulls less? Then rub your forearm briskly in small circles with your palm and look at the skin. What happened? Both tell you something about grooming a horse.

Video slot. Video coming. How to groom a horse step by step (curry comb, dandy brush, body brush, picking out hooves) and how to take a horse's temperature, pulse and respiration. Search approved channels (United States Pony Clubs, a 4-H horse program, a university extension or veterinary school, Kentucky Horse Park); preview first.

KEY TERMS

curry comb

A rubber or plastic comb with short teeth or ridges, rubbed in small circles over the fleshy parts of the body to loosen dirt, dead hair and scurf.

dandy brush

A stiff-bristled brush, flicked in short strokes with the lie of the hair, that sweeps away what the curry comb has loosened.

body brush

A soft, dense brush that removes fine dust and spreads the skin's natural oils; used on the face, legs and the whole coat to finish.

hoof pick

A blunt metal hook used to clean packed dirt and stones from the sole and from the grooves beside the frog, working from heel toward toe.

thrush

A black, foul-smelling infection of the frog caused by bacteria and fungi that thrive in wet, dirty footing; prevented by daily hoof cleaning and dry bedding.

TPR

Temperature, pulse and respiration: the three vital signs a horseman learns to take. For an adult horse at rest: about 99 to 101°F, 28 to 44 beats a minute, and 10 to 24 breaths a minute.

CORE IDEAS

Grooming has three purposes: to clean the horse, to keep its skin and coat healthy, and to give the groom a close daily look at every inch of the animal. The third may matter most. A horseman who grooms the same horse every day knows its normal lumps, scars and temperament, and notices at once a new swelling, a cut, a warm leg, or a horse that turns its head away when brushed over the back. Many problems that would cost months if found late cost days if found early.

Begin by tying the horse safely: with a halter and lead rope, to something solid at about the height of the withers, with about an arm's length of rope and a **quick-release knot** (or in cross-ties). Then work in order, from the top of the horse down and from front to back, first on the near side and then on the off side. The **curry comb** goes first, in firm small circles on the neck, shoulders, back, barrel and hindquarters, but never on the bony face or lower legs. It lifts dirt and loose hair and stirs up the skin. Next the **dandy brush** is flicked with the lie of the hair to sweep that dirt off. Then the soft **body brush** goes over everything, including the face and legs, in long strokes; every few strokes the groom scrapes it clean against the curry comb. A damp sponge or cloth wipes the eyes and nostrils, and a separate sponge cleans under the tail.

Manes and tails need patience. Hair pulled out of a tail grows back slowly, so many grooms pick tails out by hand, strand by strand, or brush from the ends upward after applying a detangler. Stand to the side of the hindquarters, not directly behind, and hold the tail and draw it toward you.

Then the feet. Stand at the shoulder facing the tail, run your hand down the back of the leg, lean gently into the horse, and say "foot" or "up." Hold the hoof in your hand, never on your knee, and clean with the **hoof pick** from heel to toe, cleaning out the deep grooves on either side of the frog. Look for stones, nails, cracks, a loose shoe, heat, or the black, smelly mark of **thrush**. Finish all four feet on every grooming, before and after riding. Grooming before saddling matters too: a lump of dried mud under the saddle or girth can rub a raw sore called a gall.

Every horseman should know **TPR**. Normal temperature for an adult horse at rest is about 99 to 101°F (37.2 to 38.3°C), taken with a lubricated thermometer in the rectum while an assistant holds the horse and the taker stands at the side of the hindquarters. Normal pulse is about 28 to 44 beats a minute, felt where an artery crosses the inside of the jaw. Normal breathing is about 10 to 24 breaths a minute, counted by watching the flank rise. Count for 15 seconds and multiply by four. Each horse has its own normal, so a wise owner records the readings on a quiet day. A resting pulse above about 60, or a fever above about 102°F, means call the veterinarian.

Horses groom one another. Two herd-mates stand head to tail and nibble along the withers, neck and back. Researchers in France found in the early 1990s that scratching a horse at that favorite place on the lower neck and withers lowered its heart rate. That is one reason grooming builds trust: it speaks the horse's own language of friendship.

The honest complication is that “more” grooming is not always better. A horse living out in winter needs the grease and dander in its coat to shed rain and hold warmth, so it is best to curry off mud and leave the coat’s oils alone. Frequent bathing with soap dries the skin. Working horses that are clipped in winter for comfort must then be blanketed. Good grooming fits the horse, the season and the work.

PICTURE STUDY



Hambletonian, Rubbing Down, George Stubbs, 1799–1800 · Oil on canvas · National Trust, Mount Stewart, Northern Ireland
Wikimedia Commons · Public domain

In March 1799 the racehorse Hambletonian won a famous, hard-fought match race at Newmarket. His owner asked Stubbs, then in his seventies, to paint him afterward. Stubbs did not paint a triumph; he painted the moment of care after the race, as a stable lad rubs down the exhausted, still-excited horse.

Look closely

- Find the stable lad’s cloth. Where on the horse is he working, and where is he standing?
- Look at the horse’s eye, nostrils, veins and stance. How does Stubbs show that he has just run hard?
- Find the trainer at the head. What is his job while the lad works?

Talk about it

1. Why might Stubbs have chosen to show the rubbing down rather than the race itself?
2. If you were the groom, what three things would you check on this horse first, and why?

Safety first. Groom only with an adult who knows the horse. Tie with a halter and quick-release knot, never by the reins. Stand beside the horse, never directly in front or behind, and keep a hand on the horse as you move around it so it knows where you are. Never kneel or sit on the ground to work on the legs; bend or crouch so you can move away quickly. Taking a rectal temperature is an adult-supervised task with someone holding the horse.

HANDS-ON: THE GROOMING KIT CHECKLIST AND A TWO-WEEK HEALTH LOG

Build the grooming-kit checklist for your Field Notebook, then keep a two-week log of TPR and coat and hoof notes for one horse, or for your dog or cat if no horse is available (find its normal ranges with a parent or veterinarian).

You will need

- Paper or a printed chart with 14 rows
- A pencil and a watch or phone with a seconds display
- Access to a horse with its owner's permission (or a family pet)
- Optional: a digital veterinary thermometer, used only by an adult

Steps

1. Make the checklist: curry comb, dandy brush, body brush, mane and tail comb or detangler, two sponges (one for face, one for dock), hoof pick, towel or stable rubber, fly spray, and a small first-aid kit with thermometer. Beside each, write its purpose in five words or fewer.
2. Write the grooming order as numbered steps from memory, then check it against this stop.
3. Make a log with columns for date, time, temperature, pulse, respiration, coat and skin, feet, and mood.
4. Each day for two weeks, at about the same time and with the animal at rest, count breaths for 15 seconds and pulse for 15 seconds; multiply each by four. An adult may take the temperature.
5. Note anything unusual: heat, swelling, a cut, a loose shoe, thrush, a horse that will not eat.
6. At the end, find the average of each vital sign and write the animal's own "normal." Compare it with the textbook ranges.

Check your work

- My grooming kit has at least nine items with purposes.
- I wrote the grooming order correctly.
- My log has at least ten days of readings and an average.
- I know which readings mean "call the vet."

FIELD NOTEBOOK

1. **Notebook page: The grooming kit.** Draw each tool and label it with its job. Paste in your two-week log.
2. **Narration.** In one paragraph, tell what a good groom would see, feel and check while grooming a horse, and why grooming is a health check as much as a cleaning. Give the paragraph to your parent to keep.

Did you know? Before brushes were cheap, grooms used a **wisp**, a pad of twisted hay, to rub and “strap” a horse’s muscles to a shine. A horse sheds its coat twice a year; the change is triggered mainly by the length of the day, not the temperature, so horses under stable lights may shed early. A white horse is never “white” to a groom: it is usually a gray, and grays show every stain.

Primary source. *Xenophon, On Horsemanship, chapter VI (c. 350 B.C.), translated by H. G. Dakyns. Project Gutenberg eBook #1176.*

We will now explain how the operation of grooming may be performed with least danger to oneself and best advantage to the horse. If the groom attempts to clean the horse with his face turned the same way as the horse, he runs the risk of getting a knock in the face from the animal’s knee or hoof. When cleaning him he should turn his face in the opposite direction to the horse, and planting himself well out of the way of his leg, at an angle to his shoulder-blade, proceed to rub him down. He will then escape all mischief, and he will be able to clean the frog by folding back the hoof. Let him clean the hind-legs in the same way.

Go deeper. The Pony Club, *The Manual of Horsemanship*, chapters on grooming and the horse’s health. Susan E. Harris, *The United States Pony Club Manual of Horsemanship*, the sections on grooming and health checks. Cherry Hill, *Horsekeeping on a Small Acreage*, on daily care routines. Your state university’s extension service pages on taking a horse’s vital signs. Second video topic: “how horses groom each other,” from a university or wildlife channel.

Goes deeper in. Gardening & Animals, “Caring for Animals,” and Life Science, “The Heart and Lungs” (coming soon).

For families. Sources: American Association of Equine Practitioners and university extension guidance on normal vital signs (ranges vary slightly by source; foals run higher); Pony Club grooming order; National Trust on Stubbs’s *Hambletonian*. The heart-rate finding is from C. Feh and J. de Mazières, “Grooming at a preferred site reduces heart rate in horses,” *Animal Behaviour* (1993). Xenophon is quoted from the Project Gutenberg text. If no horse is available, the log works with a family dog or cat; a veterinarian can give normal ranges.

PRACTICE

1. **EASY** Put these in the right order: body brush, hoof pick, curry comb, dandy brush.
2. **EASY** Why is the curry comb never used on the face or lower legs?
3. **MEDIUM** You count 5 breaths and 9 heartbeats in 15 seconds on a resting horse. What are its respiration and pulse? Are they normal?
4. **MEDIUM** Give two reasons to groom before saddling.
5. **CHALLENGE** A horse standing quietly in its stall has a pulse of 17 beats in 15 seconds and a temperature of 102.6°F. It has not eaten its hay and keeps turning to look at its side.
(a) Work out the pulse. (b) What do these signs together suggest, and what should the owner do?
6. **CHALLENGE** Read Xenophon on grooming. (a) Where does he tell the groom to stand, and why? (b) Name one way modern practice agrees with him and one thing a modern horseman would add.

Make it a game · Groom's Order Scramble. Write each grooming step on a card (tie up, curry, dandy brush, body brush, mane and tail, face sponge, dock sponge, pick feet, check for injuries). Shuffle the cards. Players race to lay them in order and, for each card, say one thing to watch for at that step. A second round: the caller reads a TPR number and players shout "normal" or "call the vet."

Scripture. "Be thou diligent to know the state of thy flocks, and look well to thy herds."
(Proverbs 27:23, KJV)

To know the state of an animal you must look and touch, day after day. Grooming is this verse put into practice: diligence that catches trouble early and shows care for the creatures God has put in our keeping.

Practice: answers

1. Curry comb, dandy brush, body brush, then the hoof pick (many grooms pick the feet first as well as last; either is fine if the feet are done every time).
2. Those parts are bony with little flesh over the bone, so firm currying would hurt; the soft body brush or a cloth is used instead.
3. Respiration $5 \times 4 = 20$ breaths a minute; pulse $9 \times 4 = 36$ beats a minute. Both are within normal resting ranges (10-24 and 28-44).
4. Dirt or dried mud under the saddle or girth can rub sores (galls); and grooming lets you find cuts, heat, swelling or a sore back before you ride.
5. (a) $17 \times 4 = 68$ beats a minute, well above the normal 28-44. (b) A high resting pulse, a fever and looking at the flank with no appetite suggest pain and illness, possibly colic or an infection. Call the veterinarian at once, keep the horse quiet, remove feed until the vet advises, and record the readings and the time.
6. (a) Facing the opposite way from the horse, out of the way of its leg and at an angle to its shoulder, because a groom facing the same way as the horse can be struck in the face by the knee or hoof. (b) Agreement: modern grooms stand at the shoulder facing the tail to pick up a foot, and keep out of the line of a kick or strike. Additions might include: tie the horse with a

quick-release knot, keep a hand on the horse while moving around it, never kneel, and use the grooming as a health check.

2.4 HOOVES AND THE FARRIER: “NO HOOF, NO HORSE”

OBJECTIVES

- Name the outer and inner parts of the hoof and explain how the hoof carries and cushions a horse’s weight.
- Use hoof growth rates to explain why a farrier visits every six to eight weeks, and cost out a year of hoof care.
- Weigh shoeing against going barefoot, and explain laminitis, the most feared disease of the foot.

Warm-up. Look at your own fingernail. Where does it grow from? Does it hurt to trim the tip? What would happen if you cut too close? Write your answers; a horse’s hoof wall follows the same rules.

Video slot. Video coming. A farrier trimming and shoeing a horse; anatomy of the equine hoof (wall, sole, frog, white line, coffin bone). Search approved channels (American Farrier’s Association, a university veterinary school or extension service, Kentucky Horse Park); preview first.

KEY TERMS

hoof wall

The hard outer shell of the hoof, made of keratin like a fingernail; it grows down from the coronary band and has no nerves in its outer part.

frog

The rubbery, V-shaped pad on the underside of the hoof that absorbs shock, gives grip and helps blood circulate in the foot.

white line

The pale seam on the sole where the wall joins the sole; it marks the inner edge where a farrier may safely drive nails.

coffin bone

The last bone of the leg, shaped like a small hoof, held inside the hoof wall by hundreds of interlocking leaves of tissue called laminae.

laminitis

Painful inflammation of the laminae that hold the coffin bone to the wall; in severe cases (founder) the bone rotates or sinks inside the hoof.

farrier

A craftsman who trims horses’ hooves and makes and fits horseshoes; from the Latin *ferrum*, iron.

CORE IDEAS

A 1,000-pound horse stands on four hooves, each only about five inches across. At the gallop, a single front hoof can strike the ground with well over the horse's whole weight. If those feet fail, nothing else about the horse matters; it cannot work, cannot graze comfortably and sometimes cannot live. So horsemen have said for centuries, "**No hoof, no horse.**" An English book on the foot published in 1751 carried the title *No Foot, No Horse*, and Xenophon made the same point about 2,100 years earlier.

From the outside, the hoof has a **wall**, the hard shell you see when the horse stands; a **sole**, the slightly hollowed plate underneath; the **frog**, a rubbery wedge pointing toward the toe; the bars, where the wall turns inward at the heels; and the **coronary band** (coronet) at the top, where the wall grows from. The **white line** is the seam between wall and sole. Inside are the **coffin bone**, the small navicular bone behind it, the digital cushion that absorbs shock, and the **laminae**: hundreds of primary leaves of tissue, each carrying many smaller ones, interlocking with the inside of the wall like the pages of two closed books pressed together. That bond holds the whole horse up.

The wall grows down from the coronet about a quarter to three-eighths of an inch a month, faster in summer and in young horses. A whole new toe takes about nine months to a year to grow from top to bottom; the shorter heels take about four to six. In the wild, horses wear their hooves down on hard, dry ground as fast as they grow. Domestic horses, kept on softer ground and moving less, usually do not. Overgrown hooves split, flare and throw the leg off balance, straining tendons and joints. So a **farrier** trims them, usually every six to eight weeks, rasping the wall level and shaping it so the hoof and pastern line up.

Some horses also need shoes. A shoe protects a hoof that wears faster than it grows, on roads, rocks or in hard work; it can add grip, or correct a fault in the way a horse moves. Most are steel; racehorses wear light aluminum "plates." The farrier shapes the shoe hot or cold, then drives nails into the insensitive wall just outside the white line, angled outward so they come out the side of the wall. The tips are cut and bent over ("clinched"). A nail driven too far inward reaches living tissue, and the horse flinches and may go lame. Iron horseshoes nailed to the hoof were in common use in Europe by the Middle Ages; in London the farriers formed a fellowship in 1356. Today, many horses with strong feet doing light work go **barefoot** with regular trims, and hoof boots can be strapped on for rough rides. Shoes protect but limit the natural spreading of the heels at each step; barefoot is natural but not every hoof can stand every job. The farrier, the owner and often the veterinarian decide horse by horse.

The most feared foot disease is **laminitis**. When the laminae become inflamed, the bond between the bone and wall weakens, and the coffin bone may tip or sink under the horse's weight. The horse rocks back on its heels to take weight off its toes and is in great pain. Common causes are a horse breaking into the grain bin, too much rich spring grass, obesity and certain hormone diseases, and extra weight borne on one leg while the other is injured. That last kind took the life of the Kentucky Derby winner Barbaro in January 2007, eight months after he shattered a hind leg in the Preakness. Secretariat was put down for laminitis

in 1989. Prevention lies largely in feeding and weight control, which links this stop to the next.

A horseman checks feet every day. Pick them out; look for cracks, thrush, stones and loose or shifted shoes; feel the wall for heat; and learn to find the **digital pulse** on either side of the back of the fetlock. A pulse that is easy to feel and pounding warns of trouble in the foot, from an abscess to laminitis. The honest complication is cost and skill: in many states anyone may call himself a farrier, so owners look for training and certification, such as that of the American Farrier's Association, and keep to a schedule even when the feet "look fine."

PICTURE STUDY



Shoeing, Sir Edwin Landseer, 1844 · Oil on canvas · Tate Britain, London
Wikimedia Commons · Public domain

Landseer was the most popular animal painter in Victorian Britain. Here he shows an everyday scene in a smithy, where the same man often shod horses and mended tools. The mare is calm, the smith works steadily, and the animals around them seem to wait their turn.

Look closely

- Find the hoof the smith is holding. How does he support the leg, and where does he stand?
- Find the tools and the shoe. What is the smith about to do?
- Look at the mare's ears and eye. Is she frightened or patient? How can you tell?

Talk about it

1. What does this painting suggest about how a good farrier treats a horse?

2. Compare this forge with a modern farrier working from a truck. What has changed, and what has not?

Safety first. Watch a farrier only from where the farrier tells you to stand, out of reach of the horse's legs, and never touch hot shoes, tools or the forge. Hoof nails, rasp filings and discarded shoes are sharp; pick them up from the barn floor. A horse may pull its foot away suddenly: never put your hand or foot under a hoof that is being held.

HANDS-ON: THE HOOF MODEL AND A YEAR OF HOOF CARE, COSTED OUT

Build a cross-section model of the hoof, then cost out a year of hoof care for one horse, as part of the trail's care chart.

You will need

- Modeling clay in three or four colors (or a drawing on poster board)
- A plastic knife
- Paper, pencil and a calculator
- Local prices from a farrier, a stable or a 4-H leader (or the sample prices below)

Steps

1. Shape a coffin bone from one color of clay. Wrap it in a thin layer of a second color for the laminae. Add the wall in a third color, open at the back.
2. Add the sole underneath, the frog as a wedge, and a ridge for the coronary band at the top. Cut the model in half from front to back and label every layer.
3. Use a ruler to show growth: mark the coronary band on your model and work out where it would be after 1, 3 and 6 months at three-eighths of an inch a month.
4. Cost it out. Sample prices (check local ones; they vary widely): a barefoot trim \$50; a full set of four shoes \$180. Work out the yearly cost for a barefoot horse trimmed every 6 weeks and for a shod horse reset every 7 weeks. Add one emergency visit for a lost shoe at \$60.
5. Write a two-sentence recommendation for a family with a trail horse that is ridden on gravel roads twice a week.

Check your work

- My model shows wall, laminae, coffin bone, sole, frog and coronary band.
- I worked out growth for 1, 3 and 6 months.
- I costed both barefoot and shod care for a year, with my work shown.
- My recommendation gives reasons.

FIELD NOTEBOOK

1. **Notebook page: The hoof.** Draw the underside of a hoof and a side cross-section, and label ten parts. Add your yearly hoof-care cost to the care chart.

2. **Narration.** In one paragraph, explain to a new horse owner why “no hoof, no horse” is true, and what a good daily foot check includes. Your parent keeps the paragraph.

Did you know? Before nailed shoes, the Romans sometimes tied iron “hipposandals” onto horses’ feet with straps. Horseshoes were valuable iron, so smiths and farmers reused old ones. Racehorse plates weigh only a few ounces each, while a draft horse’s shoe can weigh several pounds. The hoof wall at the toe is commonly about three-eighths to half an inch thick.

Primary source. *Xenophon, On Horsemanship, chapter I (c. 350 B.C.), translated by H. G. Dakyns. Project Gutenberg eBook #1176.*

...the first point to examine, we maintain, will be the feet. Just as a house would be of little use, however beautiful its upper stories, if the underlying foundations were not what they ought to be, so there is little use to be extracted from a horse, and in particular a war-horse, if unsound in his feet, however excellent his other points; since he could not turn a single one of them to good account. In testing the feet the first thing to examine will be the horny portion of the hoof. For soundness of foot a thick horn is far better than a thin. ... “You may tell a good foot clearly by the ring,” says Simon happily; for the hollow hoof rings like a cymbal against the solid earth.

Go deeper. Xenophon, *On Horsemanship* (Project Gutenberg), the whole of chapter I and chapter IV on hardening the feet. American Farrier’s Association, educational pages on the hoof and on choosing a farrier. Doug Butler, *The Principles of Horseshoeing*, the standard textbook, for a serious student. Second video topic: “inside the horse’s hoof: laminae and the coffin bone,” from a veterinary school.

Goes deeper in. Gardening & Animals, “Caring for Animals,” and Small Business & Economics, “Budgets and Costs” (coming soon).

For families. Sources: university veterinary and extension guidance on hoof growth and farrier intervals (figures vary by horse, age and season); the American Farrier’s Association; Tate on Landseer’s *Shoeing*. The 1751 book is Jeremiah Bridges’s *No Foot, No Horse*; the saying itself is older and widely used. The date when nailed shoes began is debated, so the stop says only that they were common by the Middle Ages. The Worshipful Company of Farriers traces its fellowship to 1356. Sample prices are illustrative only; ask local farriers. Xenophon is quoted from the Project Gutenberg text; “...” marks omitted words.

PRACTICE

1. **EASY** Where does the hoof wall grow from?
2. **EASY** Why can a farrier drive nails into the hoof without hurting the horse, and where must the nails go?

3. **MEDIUM** A crack starts at the coronary band. The toe is $3\frac{3}{4}$ inches long and grows $\frac{3}{8}$ inch a month. How many months until the crack grows out at the ground?
4. **MEDIUM** Give two reasons a horse might need shoes and one reason a horse might do better barefoot.
5. **CHALLENGE** Using the sample prices (\$50 trim, \$180 for four shoes, \$60 lost-shoe visit), find the yearly hoof cost for (a) a barefoot horse trimmed every 6 weeks and (b) a shod horse reset every 7 weeks plus one lost-shoe visit. Round visits down to whole visits in a 52-week year. (c) What is the difference?
6. **CHALLENGE** Read the Xenophon excerpt. (a) What comparison does he use for the feet, and why does it fit? (b) He quotes Simon that a good hoof “rings like a cymbal.” What would a hollow ring tell a buyer about the hoof? (c) Name one tool a modern veterinarian or farrier uses that Xenophon did not have.

Make it a game · Farrier’s Questions. One player is the farrier and thinks of a hoof part or problem (frog, white line, thrush, laminitis, coronary band, clinch). The others ask yes-or-no questions (“Is it inside the hoof?” “Can you see it from underneath?”). Twenty questions are allowed. Whoever guesses becomes the farrier and must give one fact about the answer.

Scripture. “Therefore whosoever heareth these sayings of mine, and doeth them, I will liken him unto a wise man, which built his house upon a rock:” (Matthew 7:24, KJV)

Xenophon compared a horse’s feet to a house’s foundation; the Lord Jesus spoke of the foundation of a whole life. A horse stands on sound feet, and a man stands on the words of Christ heard and done.

Practice: answers

1. The coronary band (coronet) at the top of the hoof.
2. The outer wall is keratin with no nerves, like a fingernail. Nails must go into the wall outside the white line, angled out, never inside it into living tissue.
3. $3.75 \div 0.375 = 10$ months.
4. Shoes: hooves wearing faster than they grow on hard or rocky ground; hard work; extra traction; correcting a fault or supporting an injury. Barefoot: strong hooves on soft ground or light work, letting the heel spread naturally and avoiding nail holes and cost.
5. (a) $52 \div 6 = 8.67$, so 8 trims $\times \$50 = \400 . (b) $52 \div 7 = 7.43$, so 7 resets $\times \$180 = \$1,260$, plus \$60 = \$1,320. (c) $\$1,320 - \$400 = \$920$ more for the shod horse. (Families who round up to 9 trims and 8 resets get \$450 and \$1,500.)
6. (a) A house’s foundations: however fine the upper stories, the house is useless if the foundation is bad; however good a horse’s other points, it is useless if its feet are unsound, because all its weight and work rest on them. (b) A ringing sound suggests a hard, thick, concave hoof that stands up off the ground (a sound “foundation”), rather than a thin, flat, soft one. (c) Any one: X-rays (radiographs), hoof testers, nerve blocks, ultrasound, steel shoes made to measure, hoof boots.

2.5 FEEDING: HAY, GRAIN AND WATER

OBJECTIVES

- Explain how the horse's digestive system (small stomach, long hindgut, no vomiting) shapes the rules of feeding.
- Work out a daily ration of hay, grain and water by body weight, and judge condition by the body condition score.
- Cost out a horse's daily and yearly care and weigh what owning a horse really requires.

Warm-up. Guess: how many pounds of hay does a 1,000-pound horse eat in a day? How many gallons of water does it drink? Write your guesses, then pick up a full gallon jug of water and imagine carrying ten of them to the barn every morning.

Video slot. Video coming. How a horse's digestive system works (hindgut fermentation, the cecum) and how to feed a horse: forage first, feeding by weight, water needs. Search approved channels (a university extension or veterinary school, Kentucky Equine Research, a 4-H horse program); preview first.

KEY TERMS

forage

Grass and hay, the fiber-rich plant food that should make up most of every horse's diet.

concentrate

Grain or a commercial feed (oats, corn, pellets) that packs more energy into a small volume; used only when forage alone is not enough for the work.

hindgut

The cecum and large colon, where microbes ferment fiber into energy the horse can absorb; it holds far more than the stomach.

colic

Any pain in the abdomen; in horses usually from the gut. It ranges from mild gas to a twisted intestine needing surgery, and it is a leading cause of death in horses.

body condition score

A 1-to-9 scale (the Henneke scale) for judging fat cover by eye and touch; about 5 is ideal, with ribs easily felt but not seen.

ration

The planned amount of each feed a horse gets in a day, worked out by weight, work and condition.

CORE IDEAS

A horse is built to graze. Left free on pasture, horses spend something like 14 to 17 hours a day eating, taking small bites of grass nearly all day and night. Their insides are designed for

that steady trickle of fiber, and almost every feeding rule follows from that design.

Start at the stomach. It is small for so large an animal, holding only about 2 to 4 gallons, less than a tenth of the whole digestive tract, and it makes acid all the time, whether food is coming or not. Long gaps without forage leave acid splashing on an empty stomach, which is one cause of the ulcers common in stabled horses. A horse also cannot vomit; a strong muscle at the entrance to the stomach lets food go only one way. Next comes the small intestine, about 70 feet long, where sugars, starch, fat and protein are digested. Then the **hindgut**: the **cecum**, a blind pouch holding roughly 7 to 8 gallons, and the large colon, holding perhaps 20 more. There, billions of microbes ferment the tough fiber of grass and hay into fatty acids that supply much of the horse's energy. Because those microbes are specialists, a sudden change in feed can upset them badly.

From this design come the rules horsemen have passed down. **Forage first**: a horse should eat at least 1.5 percent of its body weight in hay or pasture each day, and most eat about 2 to 2.5 percent in total feed. A 1,000-pound horse, then, eats roughly 20 to 25 pounds a day, most of it hay. **Feed by weight, not by scoop**: a scoop of oats and a scoop of pellets weigh very different amounts. **Feed little and often**: several meals, or slow-feeder hay nets, are better than one or two big ones. **Change slowly**: switch hay or grain gradually over a week or two. **Grain only as needed**: many horses in light work need no grain at all. When grain is fed, most advisers keep any one meal under about half a percent of body weight (5 pounds for a 1,000-pound horse), because starch that spills undigested into the hindgut can sour it, bringing colic or laminitis.

Hay comes in two main kinds. Grass hays such as timothy, orchardgrass and Bermuda grass are the everyday staple. Legume hays, chiefly alfalfa, are richer in protein, energy and calcium, good for growing or hard-working horses but too rich in quantity for some easy keepers. Good hay smells sweet, is green rather than brown or black, and has no mold or thick dust; moldy hay can cause colic and lung disease. Alfalfa hay should come from a trusted grower, because blister beetles crushed into the bales are poisonous to horses.

Water matters even more than food. An idle 1,000-pound horse in cool weather drinks about 5 to 10 gallons a day; in heat or hard work it may need 15 to 20 or more, and a nursing mare more still. Horses drink less when water is near freezing, and too little water in winter can bring on impaction colic, so many owners use heated buckets or tank heaters. A salt block, or loose salt, should always be available. The old rule "never let a hot horse drink" has been softened by research: a horse cooling out after work may safely have small, frequent drinks, but should be walked until its breathing settles. In *Black Beauty* (1877), Anna Sewell made this a turning point of her story, when a well-meaning young groom gives a hot, exhausted horse a full pail of cold water and no blanket.

Colic is the great danger of poor feeding. A national U.S. survey in the late 1990s estimated about four colic cases a year for every hundred horses, with roughly one in ten of those fatal. Signs include pawing, looking at the flank, lying down and rolling, sweating, and passing no manure. Any of these means call the veterinarian. Condition is judged on the 1-to-9 **body**

condition score devised by Don Henneke in 1983: a 1 is starving, a 9 is obese, and about 5 is right. A weight tape around the girth gives a fair estimate of weight.

Feeding is also where the cost of a horse becomes plain. Hay, bedding, salt, the farrier, the veterinarian and dentist, and the board or land and fencing add up month after month. The horse cannot buy its own dinner, and it cannot complain except by losing condition. Caring well for one horse is a daily obligation, which is why a family counts the cost before they buy.

PICTURE STUDY



Mares and Foals in a River Landscape, George Stubbs, c. 1763–1768 · Oil on canvas · Tate Britain, London
Wikimedia Commons · Public domain

Stubbs painted several pictures of brood mares and their foals at peace in the English countryside. They were painted for owners of racing studs, who wanted to see their bloodstock well fed and contented. The horses graze together as a small herd, as horses are made to live.

Look closely

- Judge the body condition of the mares: can you see ribs? Are hips and spine covered? What score from 1 to 9 would you give?
- Find the grass and the water. What does this landscape give the horses besides food?
- How are the horses arranged? Which ones touch or stand close to each other?

Talk about it

1. What feeding and care does this pasture provide naturally that a horse in a stall must be given by hand?
2. Why would a wealthy owner want a painting of horses doing nothing but grazing?

Safety first. Never carry feed or treats into a field of loose horses; they may crowd, kick or bite one another to reach it, and you may be caught between them. Feed buckets over a fence or from a stall door with an adult. Keep feed rooms latched: a horse that breaks in and gorges on grain can develop colic or laminitis. Hay bales are heavy (often 40 to 70 pounds); lift with your legs and get help.

HANDS-ON: THE DAILY CARE CHART, COSTED OUT

This is the trail's big project: a daily care chart for one 1,000-pound horse in light work, costed for a day, a month and a year, so you learn what a horse really costs.

You will need

- Paper or a spreadsheet
- A calculator
- Local prices from a feed store, stable or 4-H leader, or the sample prices below
- Your hoof-care cost from Stop B4

Steps

1. Draw a daily chart with times (morning, midday, evening, night check) and jobs: water check, hay, grain if any, salt, picking out feet, mucking out, turnout, health check.
2. Work out the ration: hay at 2 percent of 1,000 pounds = 20 pounds a day. No grain for light work, or a ration balancer at 1 pound a day.
3. Cost it. Sample prices (check your own; they change by region and year): hay \$12 for a 50-pound bale; ration balancer \$35 for a 50-pound bag; a salt block \$15 that lasts 3 months; bedding \$8 a bag, 4 bags a week.
4. Add yearly costs: hoof care (your Stop B4 figure), a veterinary visit with vaccines and a dental float (sample \$400), and deworming or fecal tests (sample \$80).
5. Find the daily, monthly and yearly totals. Then estimate how many hours a week the chores take.
6. Read the Xenophon excerpt and write one line on your chart that answers his question: who will see the horse every day?
7. Show the chart to your parent. If your family keeps horses, compare it with what you really spend.

Check your work

- My chart shows each daily job and its time.
- My ration is figured by weight.
- I found daily, monthly and yearly costs, with work shown.
- I estimated the hours of work as well as the money.

FIELD NOTEBOOK

1. **Notebook page: The care chart.** Paste in your costed daily care chart and a labelled sketch of the horse's digestive tract (stomach, small intestine, cecum, large colon).
2. **Narration.** In one paragraph, explain why a horse must be fed "little and often" and mostly on hay, using what you know about its stomach and hindgut. Your parent keeps the paragraph.

Did you know? A horse makes several gallons of saliva a day, and it chews hay far more times than it chews grain, so hay keeps the stomach better buffered. Horses' teeth grind side to side, which is why their grinding teeth wear sharp edges that the dentist must float. A gallon of water weighs about 8.3 pounds, so a horse drinking 10 gallons takes in over 80 pounds of water a day.

Primary source. *Xenophon, On Horsemanship, chapter IV (c. 350 B.C.), translated by H. G. Dakyns. Project Gutenberg eBook #1176.*

We will now suppose the purchaser has found a horse which he admires; the purchase is effected, and he has brought him home—how is he to be housed? It is best that the stable should be placed in a quarter of the establishment where the master will see the horse as often as possible. It is a good thing also to have his stall so arranged that there will be as little risk of the horse's food being stolen from the manger, as of the master's from his larder or store-closet. To neglect a detail of this kind is surely to neglect oneself; since in the hour of danger, it is certain, the owner has to consign himself, life and limb, to the safe keeping of his horse.

Go deeper. Anna Sewell, *Black Beauty* (1877; free at Project Gutenberg), the chapters "Going for the Doctor" and "Joe Green." Your state university extension service, publications on feeding the horse and on hay quality. Cherry Hill, *Horsekeeping on a Small Acreage*, on pasture, hay storage and costs. Second video topic: "how the horse's hindgut works," from a veterinary school.

Goes deeper in. Gardening & Animals, "Caring for Animals," Life Science, "Digestion," and Small Business & Economics, "Budgets and Costs" (coming soon).

For families. Sources: university extension and equine-nutrition guidance (National Research Council, *Nutrient Requirements of Horses*, 2007); USDA National Animal Health Monitoring System equine study (1998) for colic rates; D. R. Henneke and others (1983) for the condition score; Tate on Stubbs. All capacities and intake figures are approximate and vary with the horse. Sample prices are illustrative; costs vary greatly by region, and pasture or boarding changes everything. The Xenophon text is from Project Gutenberg; the translator's footnote numbers are omitted and his "--" is shown as a dash. *Black Beauty* is summarized here; Trail D treats the book itself.

PRACTICE

1. **EASY** What should make up most of a horse's diet?
2. **EASY** Why should a feed change be made gradually, over a week or two?
3. **MEDIUM** An 1,100-pound horse should eat 2 percent of its weight in hay each day. How many pounds is that? How many days does a 50-pound bale last?
4. **MEDIUM** What is the most grain an 1,100-pound horse should get in one meal, using the half-percent rule? Why the limit?
5. **CHALLENGE** For the 1,100-pound horse eating 22 pounds of hay a day: (a) How many 50-pound bales does it need in a year? Round up. (b) At \$12 a bale, what is the yearly hay bill? (c) If a family buys hay only once, before winter, and 1 cubic foot of stacked hay weighs about 10 pounds, how many cubic feet of storage do they need?
6. **CHALLENGE** Read the Xenophon excerpt. (a) Give his two pieces of advice about the stable and his reason for them. (b) Show how his advice still fits modern feeding rules, using at least one fact from this stop.

Make it a game • Feed Store Price Is Right. A parent writes the real local price of five items (a bale of hay, a bag of feed, a salt block, a farrier trim, a vet visit) on hidden cards. Players write their guesses; the closest without going over wins each round. Finish by adding all five real prices and guessing how many weeks of a family's grocery money that would be.

Scripture. "He causeth the grass to grow for the cattle, and herb for the service of man: that he may bring forth food out of the earth;" (Psalm 104:14, KJV)

The grass a horse is made to eat is God's provision. When we cut and store it as hay, we become stewards of that provision, responsible to give each animal in our care its food in due season.

Practice: answers

1. Forage: grass and hay.
2. The microbes in the hindgut are suited to the old feed; a sudden change upsets them and can cause colic or laminitis.
3. $1,100 \times 0.02 = 22$ pounds a day. $50 \div 22 \approx 2.3$ days per bale.
4. $1,100 \times 0.005 = 5.5$ pounds. Larger meals send undigested starch into the hindgut, where it ferments too fast and can cause colic or laminitis.
5. (a) $22 \times 365 = 8,030$ pounds; $8,030 \div 50 = 160.6$, so 161 bales. (b) $161 \times \$12 = \$1,932$. (c) $8,030 \div 10 \approx 803$ cubic feet, a stack about 10 feet by 10 feet by 8 feet.
6. (a) Put the stable where the master will see the horse as often as possible, and arrange the stall so the horse's food cannot be stolen; because in danger the owner trusts his very life to the horse, so neglecting the horse is neglecting himself. (b) Seeing the horse often lets the owner notice early signs of colic, poor appetite or weight loss; making sure the full ration actually reaches the horse matters because a horse needs steady forage (about 2 percent of its weight daily) and its small, always-acid stomach suffers from long gaps.

2.6 WALK, TROT, CANTER AND GALLOP

OBJECTIVES

- Describe the footfall order, number of beats and typical speed of the walk, trot, canter and gallop.
- Explain leads at the canter and gallop, and why a horse balances best leading with the inside leg on a turn.
- Tell how Eadweard Muybridge's photographs of 1878 answered an old question, and what they changed for science and art.

Warm-up. Get down on hands and knees and try to “walk” like a horse, moving one limb at a time. Which limb follows your left hind (your left knee)? Then try to “trot,” moving diagonal pairs together. Which is easier to keep steady?

Video slot. Video coming. Horse gaits in slow motion: walk, trot, canter and gallop footfalls and leads; Eadweard Muybridge's *The Horse in Motion* (1878). Search approved channels (Kentucky Horse Park, the Library of Congress, a university veterinary or biomechanics program, United States Pony Clubs); preview first.

KEY TERMS

gait

A horse's pattern of moving its legs. The four natural gaits of most horses are the walk, trot, canter and gallop.

beat

Each separate sound of a hoof or pair of hooves landing in one stride. The walk has four beats, the trot two, the canter three and the gallop four.

diagonal pair

A front leg and the opposite hind leg (left fore with right hind), which move together at the trot.

lead

At the canter or gallop, the front leg that reaches farthest forward and lands last in each stride. On a left turn the horse should be on the left lead.

suspension

The moment in a stride when all four feet are off the ground, found in the trot, canter and gallop but never in the walk.

posting

In English riding, rising out of the saddle on one beat of the trot and sitting on the next, to spare horse and rider the bounce.

CORE IDEAS

A horse's legs move in fixed patterns called **gaits**, and each has its own rhythm you can hear on a hard road. The **walk** is a four-beat gait: left hind, left fore, right hind, right fore, a steady one-two-three-four. Two or three feet are always on the ground, there is no moment of suspension, and the speed is about 4 miles an hour, a brisk human pace. The head and neck nod with each step to help balance.

The **trot** is a two-beat gait in **diagonal pairs**: left fore and right hind strike together, then right fore and left hind, with a moment of **suspension** between. It is the steadiest, most symmetrical gait, which is why veterinarians trot a horse in hand to find a lameness; a sore leg shows as an uneven rhythm or a head that bobs up when the sore front foot lands. A working trot runs about 8 to 10 miles an hour. Western riders ask for a slow, smooth trot called the jog. English riders often **post**, rising on one beat and sitting on the next; on a circle they rise as the outside front leg goes forward.

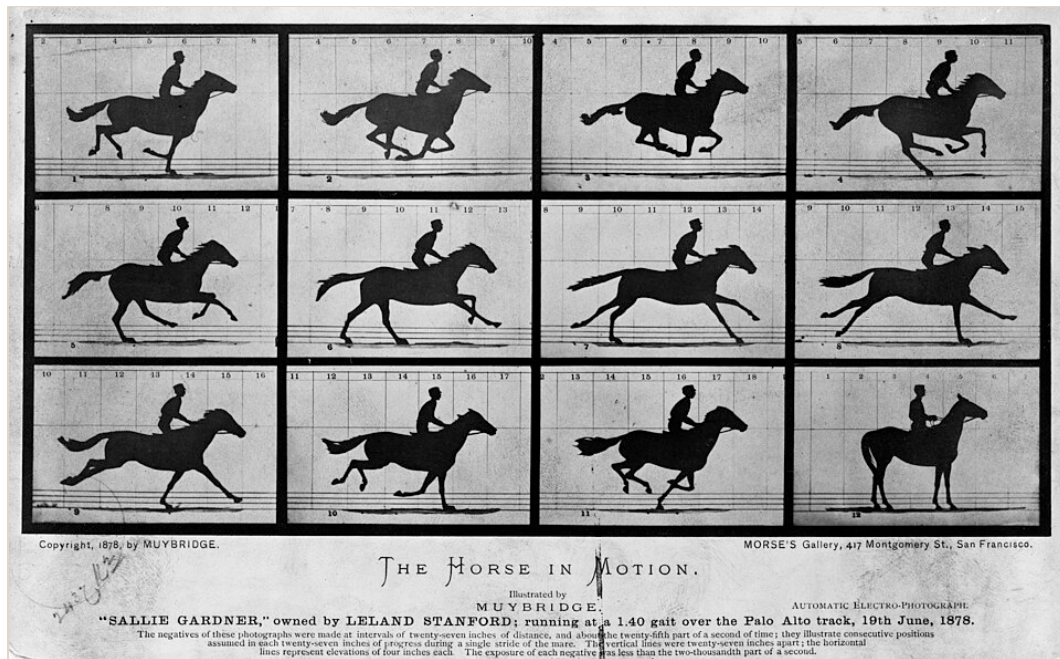
The **canter** is a three-beat gait. On the left lead it goes: right hind; then left hind and right fore together; then the left fore, the **leading leg**; then suspension. On a circle or turn to the left, a horse balances best on the left lead, because its inside legs reach farther under its body. If it canters left on the right lead (the "counter-canter") it must be strong and well balanced; if its front and hind legs lead on different sides it is "disunited" and awkward. A trained horse can change leads in the air during the moment of suspension, a **flying change**. The canter runs roughly 10 to 17 miles an hour; Western riders ride a slow canter called the lope.

The **gallop** is the canter stretched out until the diagonal pair splits, giving four beats: on the left lead, right hind, left hind, right fore, left fore, then a long suspension. Racing Thoroughbreds gallop at about 35 to 40 miles an hour, covering 20 feet or more with each stride. The fastest timed Thoroughbred in the record books ran about 44 miles an hour over a quarter mile. Galloping costs a great deal of energy, and horses chosen for speed are still built for short bursts, not long chases. Researchers in 1981, measuring the oxygen used by ponies on a treadmill, found that horses naturally pick the gait and speed that use the least energy for the distance, switching from walk to trot to gallop at just the points where the next gait becomes cheaper.

For thousands of years no one could see clearly what a horse's legs did at speed. Painters showed galloping horses with legs stretched fore and aft like a rocking horse, and horsemen argued whether a trotting horse ever had all four feet off the ground. Leland Stanford, a railroad builder and former governor of California who bred trotting horses, hired the English-born photographer **Eadweard Muybridge** to find out. After early attempts, in June 1878 at Stanford's farm in Palo Alto, Muybridge lined up twelve cameras along a track, fired by threads or electrical switches as the mare Sallie Gardner galloped past. The pictures, sold as *The Horse in Motion*, settled it: all four feet do leave the ground, but bunched beneath the belly, not stretched out. Muybridge went on to publish *Animal Locomotion* (1887) with 781 plates, and his work helped lead to the motion picture.

The honest complication is that not every horse fits four neat gaits. “Gaited” breeds have extra four-beat gaits, smooth to ride: the running walk of the Tennessee Walking Horse, the tölt of the Icelandic horse, the paso of the Paso Fino. Standardbred pacers move their legs in lateral pairs (left fore with left hind), a two-beat gait. In 2012 Swedish and other researchers reported a single gene variant, nicknamed the “gait keeper,” that strongly affects whether a horse can perform these extra gaits. Training, build and breeding all shape how a horse moves, and the rider’s seat, legs and hands decide which gait the horse is asked for and how smoothly the change is made.

PICTURE STUDY



The Horse in Motion (“Sallie Gardner,” owned by Leland Stanford, running at a 1:40 gait over the Palo Alto track, 19th June 1878), Eadweard Muybridge, 1878 · Photographs (albumen prints) mounted on card ·

Library of Congress, Washington, D.C.

Wikimedia Commons · Public domain

These are among the most important photographs ever made of an animal. Each frame lasted a tiny fraction of a second. For the first time, people could study the gallop one instant at a time. The lines on the backdrop were spaced so the distance traveled could be measured.

Look closely

- Find the frame (or frames) where all four feet are off the ground. Where are the legs: stretched out or tucked under?
- Follow one front leg through the frames. When does it land? Can you tell which lead the horse is on?
- Look at the rider. How does the rider’s body move or stay still?

Talk about it

1. Why did painters for centuries show galloping horses with all four legs stretched out?
2. Should an artist paint a horse as the camera sees it or as the eye seems to see it? Give one reason for each side.

Safety first. Never try faster gaits without an instructor, a properly fitted helmet that meets the ASTM F1163 standard with SEI certification, and boots with a heel. Ask for each new gait only in a fenced arena on good footing. When watching gaits from the ground, stay outside the arena fence.

HANDS-ON: FOOTFALL CHARTS AND A MUYBRIDGE FLIPBOOK

Chart the beats of each gait, then make a flipbook from Muybridge's frames to see the gallop move.

You will need

- A printout of Muybridge's *The Horse in Motion* (Library of Congress or Wikimedia Commons)
- Scissors, a stapler or binder clip, and an index-card stack
- Graph paper and colored pencils
- A drum, two wooden spoons or a tabletop

Steps

1. Make a footfall chart for each gait: four rows (LH, LF, RH, RF) and columns for time. Shade the time each foot is on the ground. Mark the suspension.
2. Tap out each rhythm on a table: walk 1-2-3-4, trot 1-2, canter 1-2-3 (pause), gallop 1-2-3-4 (pause). Have someone guess the gait from the sound.
3. Cut out Muybridge's frames, glue each to the right edge of an index card in order, and staple the stack at the left. Flip it.
4. Find and mark the frame with all four feet off the ground.
5. Read the Xenophon excerpt. On your canter chart, mark which leg should lead on a left turn, and write his reason in your own words.
6. If you can watch a real horse (or a slow-motion video), compare it with your charts and correct any mistakes.

Check your work

- My four footfall charts show the right number of beats and the suspension.
- My flipbook shows the gallop in order.
- I marked the correct lead for a left turn, with Xenophon's reason.

FIELD NOTEBOOK

1. **Notebook page: The four gaits.** Paste in your footfall charts, with the beats and typical speed of each gait.

2. **Narration.** In one paragraph, tell the story of how Muybridge photographed Sallie Gardner and what the pictures proved. Your parent keeps the paragraph.

Did you know? Racehorse speeds are often written as times for a distance: a mile in 1:36 means 1 minute 36 seconds, which works out to 37.5 miles an hour. Muybridge was born Edward James Muggeridge in Kingston upon Thames, England, and changed the spelling of his name more than once. The title on the 1878 card says Sallie Gardner was “running at a 1:40 gait,” meaning a pace that would cover a mile in 1 minute 40 seconds.

Primary source. *Xenophon, On Horsemanship, chapter VII (c. 350 B.C.), translated by H. G. Dakyns. Project Gutenberg eBook #1176.*

Since, too, the preference is given to starting on the left foot, it will best conduce to that lead if, while the horse is still trotting, the signal to gallop should be given at the instant of making a step with his right foot. As he is on the point of lifting his left foot he will start upon it, and while turning left will simultaneously make the first bound of the gallop; since, as a matter of instinct, a horse, on being turned to the right, leads off with his right limbs, and to the left with his left.

Go deeper. Library of Congress, *The Horse in Motion* and other Muybridge photographs (search “Muybridge horse in motion” at loc.gov). Eadweard Muybridge, *Animals in Motion* (Dover reprint of plates from *Animal Locomotion*). Xenophon, *On Horsemanship* (Project Gutenberg), chapters VII and VIII. Second video topic: “the tölt and the running walk: gaited horses explained.”

Goes deeper in. Life Science, “How Animals Move,” Arithmetic, “Rates and Speed,” and History, “Inventions of the 1800s” (coming soon).

For families. Sources: Library of Congress catalog record for *The Horse in Motion* (1878); D. F. Hoyt and C. R. Taylor, “Gait and the energetics of locomotion in horses,” *Nature* (1981); L. S. Andersson and others, on the DMRT3 “gait keeper” mutation, *Nature* (2012); Guinness World Records for the fastest Thoroughbred (Winning Brew, 2008, about 43.97 mph over two furlongs). Speeds for each gait are typical ranges. A popular story says Stanford hired Muybridge to settle a wager; historians doubt it, and the story leaves it out. The Commons file name is believed correct; if it does not load, use the search phrase.

PRACTICE

1. **EASY** How many beats are in the walk, trot, canter and gallop?
2. **EASY** Which gait has no moment of suspension?
3. **MEDIUM** Write the footfall order of the canter on the right lead.
4. **MEDIUM** Why do veterinarians trot a horse to check for lameness?
5. **CHALLENGE** A racehorse runs a mile (5,280 feet) in 1 minute 36 seconds. (a) What is its speed in miles per hour and in feet per second? (b) If it takes 2.3 strides each second,

how long is each stride? (c) Sallie Gardner's card says she was at a "1:40 gait." How fast is that in miles per hour?

6. **CHALLENGE** Read the Xenophon excerpt. (a) What lead does he prefer, and what does a horse do by instinct when turned left or right? (b) At what moment in the trot does he give the signal, and why does that produce the left lead? (c) How does his reasoning match the canter footfall you learned?

Make it a game • Name That Gait. One player stands behind a door and taps a gait rhythm on a table or a drum: four even beats, two beats, three beats and a pause, or four quick beats and a pause. The others call out "walk," "trot," "canter" or "gallop." Then switch to moving: the caller names a gait and lead ("canter, left lead!"), and players skip or gallop across the yard on the correct leading foot.

Scripture. "If thou hast run with the footmen, and they have wearied thee, then how canst thou contend with horses? and if in the land of peace, wherein thou trustedst, they wearied thee, then how wilt thou do in the swelling of Jordan?" (Jeremiah 12:5, KJV)

God answered Jeremiah's complaint with a picture everyone understood: no man can keep pace with a galloping horse. The question called the prophet to endurance; harder trials lay ahead, and God was strengthening him for them.

Practice: answers

1. Walk 4, trot 2, canter 3, gallop 4.
2. The walk.
3. Left hind; then right hind and left fore together; then right fore (the leading leg); then suspension.
4. The trot is a regular, symmetrical two-beat gait, so any unevenness shows clearly; a horse lame in front lifts its head when the sore foot lands.
5. (a) 96 seconds; $3,600 \div 96 = 37.5$ mph; $5,280 \div 96 = 55$ feet per second. (b) $55 \div 2.3 \approx 23.9$ feet per stride. (c) 100 seconds a mile: $3,600 \div 100 = 36$ mph.
6. (a) The left; a horse turned right leads off with its right limbs, and turned left with its left. (b) While the horse is still trotting, the signal is given just as it steps with its right foot, so it is about to lift the left foot and strikes off on it while turning left. (c) On the left lead, the left fore is the leading leg that reaches farthest and lands last; turning left while asking puts the inside (left) legs in the leading position for balance, which is exactly why a horse turning left should be on the left lead.

2.7 SAFETY AROUND HORSES: APPROACH, LEAD, NEVER STAND BEHIND

OBJECTIVES

- Explain how a horse's nature as a prey animal (flight, herd instinct, wide vision with blind spots) shapes every safety rule.
- Approach, halter, lead, tie and move around a horse correctly, and explain the reason for each step.
- Choose proper safety gear and judge Xenophon's ancient safety rules against modern practice.

Warm-up. Hold your hands beside your eyes like blinkers, then slowly bring them behind your head until they disappear from view. Now imagine you could see almost all the way around, except a narrow strip right behind you and a small patch right in front of your nose. Where would you not want anyone to sneak up on you?

Video slot. Video coming. Safety around horses: approaching, haltering, leading and tying a horse; a quick-release knot; reading a horse's ears and body language. Search approved channels (United States Pony Clubs, a 4-H horse program, a university extension service, Kentucky Horse Park); preview first.

KEY TERMS

flight response

A prey animal's instinct to run first and think later when startled; a horse's first defense is speed, its second is a kick or strike.

blind spot

The areas a horse cannot see: a narrow zone directly behind it and a small patch directly in front of and below its nose.

near side

The horse's left side, from which horses are traditionally led, haltered, saddled and mounted.

quick-release knot

A knot for tying a horse that holds firm but comes free with one pull on the loose end, so a panicking horse can be let loose quickly.

point of balance

A spot near the horse's shoulder: a handler in front of it tends to stop or turn the horse back; a handler behind it tends to push the horse forward.

ASTM/SEI helmet

An equestrian helmet tested to the ASTM F1163 standard and certified by the Safety Equipment Institute; replaced after any hard fall.

CORE IDEAS

Every horse safety rule begins with one fact: the horse is a **prey animal**. For thousands of years its survival depended on noticing danger first and running before asking questions. A plastic bag, a dog, a sudden movement or a strange smell can set off the **flight response** faster than a rider can think. If it cannot run, a horse will defend itself with its hind feet (kicking), its front feet (striking) or its teeth. A horse weighs perhaps ten times what a teenager weighs. Most horses are gentle and willing, but even a kind horse can hurt someone by accident, by spooking sideways, stepping on a foot, or swinging its head. Many horse-related injuries happen on the ground, while leading, grooming and tacking up, not only while riding.

Sight and hearing come next. With its eyes on the sides of its head, a horse sees almost all the way around itself, but it has a **blind spot** directly behind and another directly in front of its nose. It also sees mostly in motion and judges depth less well than we do. So approach a horse at an angle toward its shoulder, where it can see you, and speak as you come. Never rush up from behind or reach suddenly at the face. Let it sniff the back of your hand, then touch the neck or shoulder firmly; a tickling touch can feel like a fly. Watch its **ears**: forward means attention, one turned back toward you means listening, and both pinned flat against the neck, with a swinging tail or a lifted hind foot, means a warning.

Never stand directly behind a horse. A kick has the most power at the end of the leg's swing, a few feet behind the horse. If you must pass behind, either walk well clear, more than a horse's length away, or walk very close, with a hand on the hindquarters and your voice telling the horse where you are, so that if it kicks it can only push, not strike. Never duck under a tied horse's neck or crawl under its belly, and never stand directly in front of a horse that might jump forward.

Leading has its own rules. By long tradition, horses are handled from the **near side**, the left; one common explanation is that mounted soldiers wore swords on the left hip and mounted from that side. Walk beside the horse's head and shoulder, not ahead of it dragging it and not behind it. Hold the lead rope in your right hand about 6 to 12 inches below the halter, and fold the extra rope in your left hand in loops or a figure eight. Never wrap the rope around your hand, wrist or body: a frightened horse can drag a person tied to it. Turn the horse away from you, so its feet move away from yours. Go through gates and doors fully open, and never let a horse rush past you.

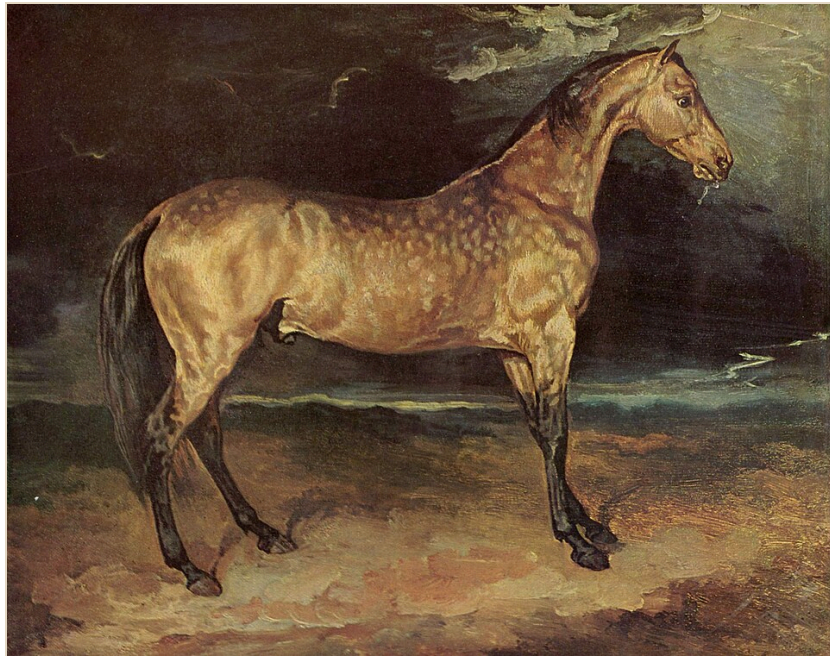
Tying is done with a halter, never with the reins, to something solid at about withers height, with about an arm's length of rope and a **quick-release knot**; many barns add a loop of breakable twine so a panicking horse breaks free rather than breaking its neck. In a field, never carry treats into a group of loose horses, and be careful at gates and feeding time, when the herd's pecking order may cause kicks between horses with you caught between them.

Gear matters. For riding, wear a helmet that meets the **ASTM F1163** standard with **SEI** certification, properly fitted and replaced after any hard fall, since head injuries are the main

cause of serious riding injuries. Wear boots with a smooth sole and a small heel so a foot cannot slip through the stirrup, and around horses on the ground wear sturdy closed shoes, never sandals. Ride with a buddy, tell someone where you are going, and learn the emergency dismount.

The honest complication is that no horse is entirely “bombproof” and no set of rules makes a careless person safe. Experienced horsemen are hurt when they get casual. The deepest rule is the one Xenophon gave about 2,400 years ago: stay calm. A frightened handler and an angry handler both make a horse more dangerous. Patience, attention and quiet confidence keep both people and horses safe.

PICTURE STUDY



Horse Frightened by Lightning, Théodore Géricault, c. 1813–1814 · Oil on canvas · The National Gallery, London

Wikimedia Commons · Public domain

The French painter Théodore Géricault loved horses all his short life and painted them again and again. Here a single gray horse stands on a wild plain as lightning flashes in the distance. There is no rider; the painting is only about the horse and its fear.

Look closely

- Find the lightning. Where is the horse looking: toward it or away?
- Look at the head, neck, ears and legs. Which signs show the horse is about to run?
- How do the dark colors and empty landscape make the scene feel?

Talk about it

1. If you had to lead this horse to its stable during the storm, where would you stand and what would you do?

2. Why might the painter have left the horse alone, with no person or other horse nearby?

Safety first. Practice approaching, haltering, leading and tying only with an experienced adult horseman and a quiet, well-trained horse. Wear closed, sturdy shoes, keep long hair tied back, and never wrap a lead rope around any part of your body. If a horse pulls away hard, let go; no horse is worth a dragging injury.

HANDS-ON: THE SAFE HANDLER'S DEMONSTRATION

Learn and demonstrate five ground skills. Practice the knot on a post or chair first; then, if a horse and a qualified adult are available, demonstrate the rest with a real horse. Otherwise, demonstrate with a family member playing the horse.

You will need

- A cotton lead rope (or any thick rope about 8 to 10 feet long) and a halter
- A fence post, chair back or banister
- A sheet of paper for a safety card
- A qualified adult horseman and a quiet horse, if available

Steps

1. Tie a quick-release knot on a post 20 times until you can tie it without looking, then pull the free end to release it every time.
2. Approach: walk toward the shoulder at an angle, speak, offer the back of your hand, and touch the neck firmly.
3. Halter: stand on the near side, slip the noseband over the nose, bring the strap over the poll behind the ears, and fasten it; check that two fingers fit under the noseband.
4. Lead: walk at the shoulder, rope in the right hand, slack folded in the left; halt, then turn the horse away from you.
5. Pass behind: show both safe ways, either well clear or close with a hand on the hindquarters while speaking.
6. Write a safety card of ten rules from this stop, with the reason for each. Add one line from the Xenophon excerpt.
7. Have a parent or instructor watch your demonstration and sign: "I watched _____ demonstrate safe approach, haltering, leading, turning away and passing behind. Signed _____, date _____."

Check your work

- I can tie and release a quick-release knot without looking.
- I demonstrated approach, haltering, leading, turning away and passing behind.
- My safety card gives ten rules with reasons.
- A parent or instructor signed my demonstration.

FIELD NOTEBOOK

1. **Notebook page: The safe zones.** Draw a horse from above. Shade its blind spots and its kick zone in red, the safe approach at the shoulder in green, and mark where a handler walks when leading.
2. **Narration.** In one paragraph, explain to a younger child why a horse may kick or spook even if it is kind, and what three rules will keep them safe. Your parent keeps the paragraph.

Did you know? A horse can turn each ear separately through a wide arc to catch sounds from different directions. Horses can sleep standing up, so a standing horse with its head low and a hind foot resting may be dozing; speak before you touch it. A horse's sense of smell is keen: many horses snort and sniff at a new object before they will trust it.

Primary source. *Xenophon, On Horsemanship, chapter VI (c. 350 B.C.), translated by H. G. Dakyns. Project Gutenberg eBook #1176.*

The man who has to do with the horse should know, with regard to this and all other necessary operations, that he ought to approach as little as possible from the head or the tail to perform them; for if the horse attempt to show vice he is master of the man in front and rear. ... The one best precept—the golden rule—in dealing with a horse is never to approach him angrily. Anger is so devoid of forethought that it will often drive a man to do things which in a calmer mood he will regret. Thus, when a horse is shy of any object and refuses to approach it, you must teach him that there is nothing to be alarmed at, particularly if he be a plucky animal; or, failing that, touch the formidable object yourself, and then gently lead the horse up to it.

Go deeper. Xenophon, *On Horsemanship* (Project Gutenberg), chapter VI. The Pony Club, *The Manual of Horsemanship*, on handling horses on the ground. Your state 4-H horse program's safety lessons and horse-handling guides. Second video topic: "how horses see," from a veterinary school.

Goes deeper in. Gardening & Animals, "Caring for Animals," and Life Science, "Senses and Behavior" (coming soon).

For families. Sources: Pony Club and 4-H horse-handling guidance; ASTM International standard F1163 and the Safety Equipment Institute certification program for equestrian helmets; The National Gallery, London, on Géricault. The near-side tradition is explained several ways; the sword explanation is common but not certain. Injury statistics vary by study, so the stop gives no single figure. The project must be done with a qualified adult; families without access to a horse can do it with a person playing the horse. Xenophon is quoted from the Project Gutenberg text; "..." marks omitted words.

PRACTICE

1. **EASY** Where are a horse's two blind spots?
2. **EASY** From which side is a horse traditionally led, and where does the handler walk?
3. **MEDIUM** Why must a lead rope never be wrapped around your hand, and what should you do with the extra rope?
4. **MEDIUM** A horse pins both ears flat back and swings its hindquarters toward you. What is it saying, and what should you do?
5. **CHALLENGE** Read the Xenophon excerpt. (a) Why does he say to approach "as little as possible from the head or the tail"? (b) What is his "golden rule," and why? (c) Name two modern rules from this stop that follow from his advice.
6. **CHALLENGE** You are leading a horse past a blue tarp flapping on a fence. It stops, snorts and swings its hindquarters toward you. Using Xenophon's advice and the modern rules, describe step by step what you would do.

Make it a game · Safe or Sorry?. A caller describes a situation ("You walk up behind a dozing horse and pat its rump," "You tie with a quick-release knot to a solid post," "You carry carrots into a field of six horses"). Players stand up for safe and sit down for sorry. Anyone who answers correctly and gives the reason earns a point; the first to five points becomes the caller.

Scripture. "Be ye not as the horse, or as the mule, which have no understanding: whose mouth must be held in with bit and bridle, lest they come near unto thee." (Psalm 32:9, KJV)

A horse must be managed with gear and care because it cannot reason about its fears. God calls His people to something better: to be taught by His word and to come near to Him willingly, without needing to be held by a bridle.

Practice: answers

1. Directly behind it and directly in front of (and just below) its nose.
2. The near (left) side, walking beside the horse's head and shoulder.
3. If the horse bolts, the loop tightens and you can be dragged or have fingers broken. Fold the extra rope in loops or a figure eight held in your other hand, so it can be dropped.
4. It is warning that it may kick. Move calmly out of range toward the shoulder or away, do not stand behind it, and tell the adult in charge; do not punish it in anger.
5. (a) Because if the horse becomes dangerous, it has the man at its mercy in front (striking, biting) and behind (kicking); the safe place is at the side, near the shoulder. (b) Never approach a horse angrily, because anger acts without forethought and leads a man to do things he will regret, and it makes the horse worse. (c) Any two: approach at an angle toward the shoulder; never stand directly behind or in front; pass behind either close with a hand on the horse or well clear; stay calm and speak quietly; never punish in anger.
6. Stay calm and keep your voice low. Keep your position at the shoulder, not in front or behind, and turn the horse's head slightly toward you so its hindquarters swing away. Do not pull it straight at the tarp or wrap the rope. Give it time to look and sniff. As Xenophon advises, walk

to the tarp yourself and touch it while the horse watches, then lead it up gently a step at a time, rewarding each step with a release. If it will not go and becomes dangerous, lead it away to a safe distance, try again later with an adult, and if it pulls free, let go rather than be dragged.

2.8 ENGLISH AND WESTERN RIDING; DRESSAGE, JUMPING AND BARREL RACING

OBJECTIVES

- Compare English and Western riding (history, tack, seat and aids) and explain why each developed as it did.
- Explain the goals and scoring of dressage, show jumping and barrel racing, using real rules and numbers.
- Match a horse's build and temperament to a discipline, and trace the classical tradition of training back to Xenophon.

Warm-up. Hold a pencil in each hand like reins and turn an imaginary horse left by pulling the left rein. Now hold both “reins” in one hand and move that hand left so the right rein touches the horse's neck. Why might a cowboy prefer the second way?

Video slot. Video coming. English and Western riding compared; a dressage test explained; show jumping rules and faults; how barrel racing works (the cloverleaf pattern). Search approved channels (Kentucky Horse Park, the FEI, USEF or US Equestrian, a 4-H horse program, the Spanish Riding School); preview first.

KEY TERMS

English riding

The European tradition of riding with a light saddle without a horn, direct contact on two reins held in two hands, and the posting trot; used in dressage, jumping, eventing and hunting.

Western riding

The ranch tradition from Spanish and Mexican vaqueros and American cowboys, with a deep saddle and horn, a loose rein held in one hand and slow, smooth gaits (jog and lope).

neck reining

Turning a horse by laying the rein against the side of its neck; the horse moves away from the pressure, leaving the rider's other hand free.

dressage

From the French for “training”: the art of developing a horse's balance, suppleness and obedience, shown in tests of set movements scored by judges.

fault (show jumping)

A penalty in show jumping: 4 faults for a knocked-down rail or a first refusal, plus time faults for going over the time allowed.

cloverleaf pattern

The barrel-racing course: a run around three barrels set in a triangle, in a pattern that looks like a three-leaf clover, timed to the hundredth of a second.

CORE IDEAS

Riding styles grew out of work. **English riding** comes from European cavalry, the riding schools of kings and nobles, and cross-country hunting over hedges and ditches. Its saddle is light and close to the horse, without a horn, so the rider can feel the horse and fold forward over a jump. The rider keeps steady contact with two reins in two hands, turning by direct rein, and posts to the trot. **Western riding** comes from the cattle ranch. Spanish settlers brought horses and the horseman's craft to Mexico in the 1500s; the Mexican *vaquero* developed it on the open range, and American cowboys in Texas and California learned from him ("lariat," "lasso," "rodeo" and "chaps" all come from Spanish words). A cowboy spent long days in the saddle and needed one hand free for a rope, so the Western saddle is deep and secure with a horn to dally a rope, the reins are held in one hand on a loose rein, and the horse is taught **neck reining** and slow, comfortable gaits, the jog and the lope.

Dressage is the oldest of the riding arts. Its roots run back to Xenophon, who wanted a horse to carry itself proudly, as if showing off of its own accord. Renaissance masters in Italy and France, such as Federico Grisone in Naples (1550) and, in the 1700s, François Robichon de la Guérinière, wrote the methods that classical riders still study. The Spanish Riding School of Vienna, first mentioned in 1565, still trains its white Lipizzaner stallions in this tradition. In competition, horse and rider perform a set test in an arena 20 by 60 meters, marked by letters around the sides (A, K, E, H, C, M, B, F, with X in the center). Judges score each movement from 0 to 10, and the final score is a percentage. At the highest level, the Grand Prix includes the piaffe, a cadenced trot in place; the passage, a slow, floating trot; and canter pirouettes. Dressage, show jumping and eventing have all been Olympic sports since the 1912 Games in Stockholm.

Show jumping tests boldness, accuracy and care. A course of perhaps 10 to 16 numbered obstacles must be jumped in order within a time allowed. Under international rules, a rail knocked down costs 4 faults, a first refusal 4 faults, and a second refusal elimination; going over the time adds 1 fault for each second or part of a second. Grand Prix fences stand up to about 1.60 meters (5 feet 3 inches), and ties are broken by a faster "jump-off." The official high-jump record, set in Chile in 1949 by the horse Huaso and Captain Alberto Larraguibel, is 2.47 meters, just over 8 feet. **Eventing**, born from cavalry tests of an officer's horse, combines dressage, cross-country jumping and show jumping in one competition.

Barrel racing is a Western speed event, one of the most popular in American rodeo. Three barrels stand in a triangle. In a full-size pattern the first two are about 90 feet apart and the third about 105 feet beyond them. The horse runs in through the timer, circles the barrels in a **cloverleaf pattern**, and sprints home. Knocking over a barrel adds 5 seconds; running off pattern means no time. Winning runs in a large arena often take about 14 to 17 seconds. The event demands a burst of speed, sharp turns on the haunches and a calm mind under pressure, so American Quarter Horses, bred for short sprints and cattle work, dominate it. Other Western events include reining (spins and sliding stops, sometimes called Western dressage), cutting (separating a cow from the herd) and trail classes.

Which is better? Neither. Each grew from honest work, and good riders in both share the same foundations: a balanced, independent seat; quiet, light hands; clear aids; and a horse that is relaxed and willing. Many riders cross over, and a Western reining horse and a dressage horse are both trained to answer the lightest aids. What differs is the purpose, and that shapes the horse: a sturdy, quick, cow-wise Quarter Horse for barrels and cutting; a tall, powerful warmblood for dressage or jumping; a sure-footed, sensible horse of almost any breed for trail riding.

The honest complication is that every sport tempts riders to win at the horse's expense: too much work too young, harsh gear, or drugs to hide pain. Each governing body writes rules about tack, spurs, veterinary checks and drug testing, and good horsemen in every discipline hold to Xenophon's standard: a horse should do beautiful things willingly, not by force. A young rider should choose a discipline by asking what the horse is suited for, what can be done safely, and what costs the family can bear, and then learn its basics thoroughly from a good instructor.

PICTURE STUDY



The Bronco Buster, Frederic Remington, 1895 · Bronze sculpture · Casts at the Metropolitan Museum of Art, New York; the Amon Carter Museum of American Art, Fort Worth; and other museums
Wikimedia Commons · Public domain

Frederic Remington was an illustrator and painter of the American West. *The Bronco Buster* was his first sculpture, copyrighted in 1895, and it became one of the most famous images of the cowboy. The whole weight of horse and rider balances on the horse's two hind legs.

Look closely

- Find the Western saddle, the stirrups and the cowboy's chaps. What features of Western tack can you see?

- Look at the cowboy's seat and legs. How does he keep his balance?
- Where is the horse's weight? How did the sculptor make the bronze stand up?

Talk about it

1. How is this cowboy's riding different from the calm, collected riding of dressage? What does each kind of riding ask of the horse?
2. Today's trainers try to start young horses without a fight. Why might a ranch in the 1890s have "broken" horses this way, and what has changed?

Safety first. Every discipline begins with lessons from a qualified instructor on a suitable horse. Wear an ASTM F1163/SEI-certified helmet in English and Western riding alike, and boots with a heel. Jumping and speed events add risk: learn them only after a secure seat at the walk, trot and canter, on a horse trained for the work, and never jump or run barrels alone.

HANDS-ON: TWO TRADITIONS CHART AND A SCALE BARREL PATTERN

Make a comparison chart of English and Western riding for your Field Notebook, then lay out a barrel pattern to scale and run it on foot.

You will need

- Poster paper or a notebook spread
- Graph paper, a ruler and a pencil
- Three buckets, cones or chairs and a tape measure
- A stopwatch (or a phone)

Steps

1. Make a chart with rows for history, saddle, bridle and bit, how the reins are held, gaits and their names, rider's clothes and typical events. Fill in English and Western columns.
2. On graph paper, draw a full-size barrel pattern to a scale of 1 square = 10 feet: barrels 1 and 2 are 90 feet apart, barrel 3 is 105 feet from each of them, and the timer line is 60 feet in front of barrels 1 and 2.
3. Scale it down for your yard or a park: divide every distance by 5 (18 feet, 21 feet, 12 feet). Set out three buckets.
4. Run the cloverleaf on foot: right around barrel 1, left around 2 and 3, then sprint home. Time three runs. Add 5 seconds for each bucket knocked over.
5. Read the Xenophon excerpt and add a row to your chart: "What both traditions train for."

Check your work

- My chart compares English and Western riding in at least seven rows.

- My barrel pattern is drawn to scale and labelled.
- I timed three runs and scored penalties correctly.

FIELD NOTEBOOK

1. **Notebook page: Two traditions.** Paste in your chart and draw a dressage arena with its letters and a barrel pattern with arrows.
2. **Narration.** In one paragraph, explain why Western riders use one hand and a horn while English riders use two hands and no horn, tracing each back to the work it came from. Your parent keeps the paragraph.

Did you know? No one is sure why the letters around a dressage arena were chosen; one popular story says they marked where riders or grooms waited in a German royal stable yard, but there is no proof. In barrel racing the first barrel may be taken to the right or to the left, as long as the rest of the cloverleaf follows the same pattern. The famous white Lipizzaners of Vienna are born dark brown or black and turn gray-white over six to ten years.

Primary source. *Xenophon, On Horsemanship, chapter VIII (c. 350 B.C.), translated by H. G. Dakyns. Project Gutenberg eBook #1176.*

As there will, doubtless, be times when the horse will need to race downhill and uphill and on sloping ground; times, also, when he will need to leap across an obstacle; or, take a flying leap from off a bank; or, jump down from a height, the rider must teach and train himself and his horse to meet all emergencies. In this way the two will have a chance of saving each the other, and may be expected to increase their usefulness.

Go deeper. Xenophon, *On Horsemanship* (Project Gutenberg), chapters VIII and XI on leaping and on the parade horse. The Spanish Riding School of Vienna's website, on its history and its Lipizzaners. The FEI (Fédération Équestre Internationale) and US Equestrian websites, for rules and short explanations of each Olympic discipline. Second video topic: "a dressage Grand Prix test explained" or "reining: spins and sliding stops."

Goes deeper in. History, "The American West" and "Spain and the New World," and Gardening & Animals, "Caring for Animals" (coming soon).

For families. Sources: FEI Jumping and Dressage rules (current rule: a second refusal eliminates; 1 time fault per second or part of a second over the time allowed); Women's Professional Rodeo Association standard barrel pattern (90 feet between first and second barrels, 105 feet to the third, maximums that shrink to fit smaller arenas); Guinness World Records and the FEI for Huaso's 1949 high jump; the Spanish Riding School on its 1565 founding date; the Metropolitan Museum of Art on Remington. Rules change from time to time and differ between associations; check the current rulebook before competing. Xenophon is quoted from the Project Gutenberg text.

PRACTICE

1. **EASY** What does the word “dressage” mean?
2. **EASY** Why does a Western saddle have a horn?
3. **MEDIUM** Explain neck reining and why a cowboy needed it.
4. **MEDIUM** Name the three disciplines of eventing and say where eventing came from.
5. **CHALLENGE** (a) A barrel racer’s clock time is 15.84 seconds, and two barrels fall. What is the official time? (b) A show jumper knocks down one rail, has one refusal, and finishes 2.3 seconds over the time allowed. How many faults? (c) A dressage test has 25 scored movements worth 10 points each, and a horse earns 172 points. What is its percentage?
6. **CHALLENGE** Read the Xenophon excerpt. (a) What situations does he say the rider must prepare for, and why? (b) Which modern discipline is closest to what he describes, and why? (c) How does his phrase “saving each the other” apply to riding today?

Make it a game · Arena Letters Relay. Mark a 20-by-40-step rectangle in a yard and place cards for A, K, E, H, C, M, B and F around it, with X in the center. A caller reads a short “test” (“Enter at A, track left at C, circle at E, halt at X, salute”). Players walk, trot (jog) or canter (skip) through it. Score each movement from 0 to 10 as judges would, and add up the percentages.

Scripture. “The horse is prepared against the day of battle: but safety is of the LORD.” (Proverbs 21:31, KJV)

Horses in every discipline are prepared with years of patient training, and Scripture honors that work. Yet the verse reminds the horseman where final safety rests: we train and prepare with all our skill, and we trust the outcome to the Lord.

Practice: answers

1. “Training,” from French.
2. To dally (wrap) a rope around after roping cattle; it comes from ranch work.
3. The rider holds both reins in one hand and lays the rein against the side of the horse’s neck; the horse moves away from the pressure. It left the cowboy’s other hand free for a rope or for work with cattle.
4. Dressage, cross-country and show jumping. It grew out of cavalry tests of an officer’s horse.
5. (a) $15.84 + 2 \times 5 = 25.84$ seconds. (b) Rail 4 + refusal 4 + time 3 (2.3 seconds counts as 3 started seconds) = 11 faults. (c) $172 \div 250 = 0.688$, or 68.8 percent. (Real tests also double some marks with coefficients and add collective marks; this is simplified.)
6. (a) Racing up and down hills and slopes, leaping across obstacles, flying leaps from banks and jumping down from heights; the rider must train himself and his horse for every emergency so that each can save the other and both become more useful. (b) Eventing, especially its cross-country phase with banks, ditches and slopes, which grew from cavalry tests of just these skills. (c) A well-trained horse and a well-trained rider keep each other safe: the horse’s

steadiness protects the rider, and the rider's balance and judgment protect the horse; training is a partnership, not simply control.

TRAIL 2 BADGE QUIZ

The badge quiz is optional and may be written or oral. Answers should be in complete sentences, with work shown for problems involving numbers. Four right out of five earns the first badge; five right out of six earns the second. Badges and the certificate are earned by doing the stops, not by scores.

Badge quiz 1 (Stops 1-5)

1. Name the joints of the horse that match the human wrist and ankle, and explain why a horse's lower leg has no muscles.
2. Explain the difference between a snaffle and a curb bit.
3. A resting horse breathes 6 times and its heart beats 10 times in 15 seconds. Find its respiration and pulse and say whether they are normal.
4. What is laminitis, and name two causes.
5. A 1,200-pound horse eats 2 percent of its weight in hay daily. How many pounds a day, and how many 50-pound bales a year (round up)?

Badge quiz 2 (Stops 6-8)

6. Give the number of beats in each of the four gaits, and say which has no suspension.
7. What did Muybridge's 1878 photographs of Sallie Gardner prove?
8. Give three rules for leading a horse safely, with a reason for each.
9. What is Xenophon's "golden rule" in dealing with a horse, and why?
10. Explain how the Western saddle and neck reining grew out of ranch work.
11. A barrel racer runs 16.10 seconds and knocks over one barrel. A show jumper has two rails down and is 1.2 seconds over time. Give each final result.

TRAIL CERTIFICATE: MY HORSE CARE HANDBOOK AND TRAIL B CERTIFICATE

Gather the trail's work into a handbook: the labelled parts-of-the-horse poster, the tack-check cards, the grooming-kit checklist and health log, the hoof model or drawing, the costed daily care chart, the footfall charts, the safety card with its signed demonstration, and the English-and-Western comparison chart.

Include all eight narration paragraphs, which the parent has kept.

Finish with a one-page essay: "Should our family own a horse?" Use your costed care chart, the hours of work, and at least one passage of Xenophon or Scripture.

When the handbook is done, a parent signs the Trail B certificate.

- **Accuracy:** Anatomy, tack, care and gait facts are correct, and terms are used properly.
- **Numbers:** Rations, costs, rates and scores are worked correctly with the work shown and units labelled.
- **Sources:** Xenophon and Scripture are read closely, quoted exactly and used as evidence in narrations and the essay.

- **Judgment and care:** The student weighs trade-offs honestly (shoes or barefoot, cost and time, discipline and horse) and shows a steward's concern for the animal's welfare and safety.

Answer key

1. The front knee (carpus) is the wrist; the hock is the ankle. A light lower leg, moved by tendons from muscles high on the body, takes less energy to swing, so the horse can travel fast and far.
2. A snaffle has no shanks and works by direct pressure: the pull on the rein equals the pressure on the mouth. A curb has shanks and a chin chain and works as a lever, multiplying the rein's pull and adding pressure on the chin groove and poll.
3. Respiration 24 breaths a minute (top of the normal 10-24 range); pulse 40 beats a minute (normal, 28-44). Both are within normal limits, though the breathing is worth watching.
4. Inflammation of the laminae that hold the coffin bone to the hoof wall; in severe cases the bone rotates or sinks. Causes include grain overload, rich spring grass, obesity or hormone disease, and extra weight borne on one leg because of injury to another.
5. $1,200 \times 0.02 = 24$ pounds a day. $24 \times 365 = 8,760$ pounds; $8,760 \div 50 = 175.2$, so 176 bales.
6. Walk 4, trot 2, canter 3, gallop 4. The walk has no suspension.
7. That a galloping horse has all four feet off the ground at one moment, but with the legs gathered under the body, not stretched out fore and aft as painters had shown.
8. Any three: lead from the near side at the shoulder, where the horse can see you and you can control it; hold the rope about 6 to 12 inches below the halter with slack folded in the other hand, never wrapped around your hand, so you cannot be dragged; turn the horse away from you so its feet move away from yours; never walk directly in front or let it rush past you through gates.
9. Never approach a horse angrily, because anger acts without forethought and drives a man to do things he will regret; a calm handler makes a calmer, safer horse.
10. Cowboys and vaqueros worked cattle all day and needed one hand free for a rope. The horn holds a dallied rope, the deep seat keeps the rider secure, and neck reining lets the rider steer with one hand on a loose rein.
11. Barrel racer: $16.10 + 5 = 21.10$ seconds. Show jumper: $4 + 4 + 2$ (1.2 seconds counts as 2 started seconds) = 10 faults.

HORSES TRAIL C: FAMOUS HORSES IN HISTORY

The third trail of the Horses track follows eight famous horses, and the horses of Scripture, across more than two thousand years: Bucephalus and the young Alexander; Pharaoh's chariots, Job's warhorse and the white horse of Revelation; Marengo and Copenhagen at Waterloo; the riders and mustangs of the Pony Express; Traveller and Cincinnati, the horses of Lee and Grant; Sergeant Reckless, who carried ammunition for the Marines in Korea; Seabiscuit, the Depression's underdog; and Secretariat's record-breaking Belmont of 1973.

This is the ● **Expert** level, for ages 14 and up, at a high-school standard. Each stop takes 35 to 50 minutes and stands by itself. A student reads the core ideas, works with a primary source where one exists (Plutarch, the King James Bible, Mark Twain, Robert E. Lee), studies a public-domain picture, completes a project that uses real numbers and evidence, and writes a one-paragraph narration for the parent to keep. Each stop adds a card to a **Famous Horses timeline** in the Field Notebook, and every stop asks the historian's question: how do we know?

Five stops earn the **Horse Historian badge, part 1**; eight stops earn part 2 and the **Trail C certificate**. The badge quizzes below are optional; badges are earned by doing the stops.

BEFORE YOU BEGIN

- Read a page of older English (such as the King James Bible or a nineteenth-century book) and summarize it accurately.
- Work with fractions, decimals, percentages and rates (miles per hour), using a calculator where needed.

MASTERY CHECKLIST

- ☐ I can place eight famous horses on a timeline from about 356 BC to 1973 and tell one documented fact about each.
- ☐ I can read a primary source, quote it accurately, and say what it can and cannot prove.
- ☐ I can separate what is documented from what is estimated or legendary, using examples such as Marengo's history and Secretariat's heart.
- ☐ I can explain from Scripture why the horse is praised as God's creation and why we are warned not to trust in horses.
- ☐ I can calculate speeds, loads and costs from historical numbers, and I have written eight narration paragraphs.

GO DEEPER: BOOKS, MUSEUM PAGES AND RESOURCES

- **Project Gutenberg** (<https://www.gutenberg.org>): Free public-domain texts for this trail: Plutarch's *Lives*, Mark Twain's *Roughing It*, Captain Robert E. Lee's *Recollections*

and Letters of General Robert E. Lee, Grant's Personal Memoirs and Xenophon's On Horsemanship.

- **Pony Express National Historic Trail (National Park Service)** (<https://www.nps.gov/poex>): Maps, station histories and the official figures for Stop C4.
- **National Museum of the Marine Corps** (<https://www.usmcmuseum.com>): Exhibits and the statue of Sergeant Reckless (Stop C6); free admission in Triangle, Virginia.
- **National Museum of Racing and Hall of Fame** (<https://www.racingmuseum.org>): Hall of Fame pages on Seabiscuit, War Admiral and Secretariat for Stops C7 and C8.
- **National Army Museum (London)** (<https://www.nam.ac.uk>): Online pages on Marengo's skeleton and the Battle of Waterloo for Stop C3.
- **Library of Congress: Prints and Photographs** (<https://www.loc.gov/pictures>): Free historic photographs, including Muybridge's *The Horse in Motion* (1878) and Civil War images for Stop C5.

3.1 BUCEPHALUS AND YOUNG ALEXANDER

OBJECTIVES

- Explain, from Plutarch's own words, how the young Alexander tamed Bucephalus and why the method worked.
- Place Bucephalus in the campaigns of Alexander the Great, from Macedon to the Hydaspes River (326 BC).
- Weigh an ancient source: what Plutarch could know, what he may have polished, and what other writers confirm.

Warm-up. Stand with your back to a bright window or lamp and walk slowly toward a wall. Watch your shadow move ahead of you. Now imagine you are a 1,000-pound animal whose whole design says “run first, ask later.” What would that dark, moving shape at your feet look like? Keep the answer in mind as you read.

Video slot. Video coming. Alexander the Great and Bucephalus; the Alexander Mosaic from Pompeii; ancient Greek cavalry. Search approved channels (Getty Museum, British Museum, Smithsonian, Khan Academy / Smarthistory); preview first.

KEY TERMS

Macedon

The kingdom north of Greece ruled by Philip II and then by his son Alexander (356–323 BC).

talent

An ancient weight of silver used as money; an Attic talent was about 26 kilograms (57 pounds), equal to 6,000 drachmas.

Companion cavalry

The heavy cavalry of Macedonian nobles who rode beside the king and usually struck the decisive blow in battle.

Plutarch

A Greek writer (about AD 46–120) whose *Parallel Lives* pairs famous Greeks and Romans to teach virtue and vice by example.

flight instinct

A horse's built-in urge, as a prey animal, to run from anything sudden or strange before deciding whether it is dangerous.

Bucephala

The city Alexander founded on the Hydaspes (Jhelum) River, in what is now Pakistan, in memory of his horse.

CORE IDEAS

In the 340s BC, King **Philip II** of **Macedon** was building the most dangerous army in the Greek world, and horses were at its heart. His **Companion cavalry** rode without stirrups (they had not yet been invented) and charged with long lances. The best horses came from Thessaly, the broad plain to the south. So when a Thessalian dealer named Philonicus brought a big, black stallion to court, the king came out to look. The asking price was thirteen **talents**. An Attic talent was about 26 kilograms of silver, or 6,000 drachmas, and a skilled worker in that age earned roughly a drachma a day. Thirteen talents was, in plain terms, several lifetimes of wages.

The horse would not be ridden. As Plutarch tells it, he reared at every attempt and would not even bear the voices of Philip's grooms. Philip ordered him led away. His son Alexander, then a boy (the story is usually dated to when he was about twelve or thirteen), complained aloud that they were losing a fine horse for want of skill and boldness. Philip asked whether he thought he knew better than his elders; Alexander said he could manage this horse, and offered to pay the whole price if he failed. What he did next is in the **Primary source** box. When he rode back, Philip wept and told him to look for a kingdom worthy of himself, "for Macedonia is too little for thee."

Why did it work? A horse is a prey animal, built with a strong **flight instinct**: eyes set on the sides of the head to see nearly all the way around, legs made for sudden speed, and a nervous system that reacts first and thinks second. A dark shape that jumps and follows at your feet is exactly what a predator in the grass looks like. Facing the sun put the shadow behind the horse, out of sight. Alexander also did what good horsemen still teach: he watched before he acted, he let the horse move forward a little instead of fighting it, he kept a quiet contact on the reins, and he did not punish fear. A generation earlier the Athenian soldier Xenophon had written in *On Horsemanship* that a frightened horse should be shown that there is nothing to fear, never beaten into it. Alexander may well have been taught that rule.

The horse was named **Bucephalus**, Greek for "ox-head." Ancient writers disagreed about why: a brand in the shape of an ox head, a white mark on his forehead, or simply a broad, heavy skull. He carried Alexander across the Persian Empire, through the great battles of the Granicus (334 BC), Issus (333 BC) and Gaugamela (331 BC). Plutarch adds that when tribesmen south of the Caspian Sea once seized the horse, Alexander threatened to destroy their whole country unless he was returned. He was.

Bucephalus died in 326 BC beside the Hydaspes River (the modern Jhelum in Pakistan), after Alexander's hard-fought battle with the Indian king Porus. Plutarch honestly gives two accounts: most said he died of wounds some time after the battle; one writer who was on the march, Onesicritus, said he died of old age at thirty. Alexander founded a city on the river and named it **Bucephala**. Plutarch says he also named a city after a favorite dog, Peritas. Three years later, in 323 BC, Alexander himself died at Babylon at thirty-two.

Now the honest complexity. Plutarch wrote around AD 100, more than four hundred years after these events. He used earlier histories written by men who knew Alexander, but nearly all of those books are lost, so we cannot check his wording. The dialogue between father and son may have been polished in the telling; ancient biographers wrote to teach character, and Plutarch plainly saw in this scene the first sign of Alexander's boundless ambition. The numbers also raise questions. If Bucephalus was thirty in 326 BC, he was foaled about 356 BC, the same year as Alexander, which would make him around twelve, not a green young colt, when the boy rode him. Yet the horse, the city and the horse's fame are reported by several independent writers, including Arrian and Quintus Curtius, so historians accept Bucephalus as real even where details are uncertain.

Christians reading this story have one more source to set beside Plutarch. The prophet Daniel, writing of a swift goat from the west that overthrew a two-horned ram, explains that "the rough goat is the king of Grecia" and that its great horn "is the first king" (Daniel 8:21). Christian interpreters from early times have seen Alexander in that horn, which was broken at the height of its strength (Daniel 8:8). His empire split apart within a few years of his death. Proverbs puts the horse and the conqueror in their place: the horse is prepared against the day of battle, but safety is of the LORD.

PICTURE STUDY



The Alexander Mosaic (detail: Alexander on Bucephalus), Unknown Roman mosaicist, probably copying a lost Greek painting, About 100 BC (the Greek original perhaps about 300 BC) · Floor mosaic of small stone and glass pieces · National Archaeological Museum, Naples (found in the House of the Faun, Pompeii)
Wikimedia Commons · Public domain

This mosaic covered the floor of a rich house in Pompeii and was buried by Mount Vesuvius in AD 79, which is why it survives. It shows Alexander charging the Persian king Darius III, probably at Issus or Gaugamela. The horse beneath him is traditionally taken to be Bucephalus. The whole floor is about 5.8 meters wide, made of more than a million tiny

pieces, and is thought to copy a famous Greek painting made within a generation of Alexander's death.

Look closely

- Find Bucephalus's head. How has the artist shown strength and motion in the neck and ears?
- Find what Alexander is wearing and holding. What is missing that a modern rider would expect (look at his feet)?
- Find the places where the mosaic has been lost. How do they change what you can know about the scene?

Talk about it

1. This is a Roman copy of a Greek painting of a Greek king. How many steps lie between the real horse and this image, and what might change at each step?
2. Plutarch and this mosaic both come long after Alexander. Which do you trust more for the look of Bucephalus, and why?

HANDS-ON: READ PLUTARCH LIKE A HISTORIAN

Use the Primary source box to take apart Plutarch's account the way a historian does: what happened, how we know, and what the author wanted us to learn.

You will need

- The Primary source excerpt (printed or on screen)
- Two colored pencils or highlighters
- A sheet of paper ruled into three columns
- Optional: Plutarch's *Life of Alexander*, chapters 6 and 61, from Project Gutenberg or the library

Steps

1. Read the excerpt aloud once, slowly. The English is from the 1600s; look up any word you do not know (for example, "curbed").
2. In one color, underline every thing Alexander *observed*. In the other, underline every thing he *did*.
3. Head your three columns "Observation," "Action," "Why it works for a prey animal." Fill in at least four rows.
4. Below the chart, list two things Plutarch could have learned from earlier writers and one thing (a speech, a feeling, a tear) he may have added or shaped.
5. Write two or three sentences answering: what lesson about Alexander's character did Plutarch want readers to take from this scene?
6. Optional: read chapter 61 and compare how Plutarch reports the two accounts of Bucephalus's death. What does his care there tell you about him as a historian?

Check your work

- My chart has at least four observation–action pairs, each explained.
- I named what Plutarch probably knew and what he may have shaped.
- I stated the moral Plutarch drew, in my own words.

FIELD NOTEBOOK

1. **Famous Horses timeline, card 1: Bucephalus.** Draw Bucephalus from the mosaic or your imagination. On the back: dates (about 356–326 BC), owner, three battles, and how he died (both accounts).
2. Sketch a map from Pella in Macedon to the Hydaspes River. Mark the Granicus, Issus, Gaugamela and Bucephala.
3. **Narration (one paragraph; the parent keeps it):** Tell the taming of Bucephalus in your own words, explaining why turning the horse toward the sun worked, and end with one sentence on how far we can trust Plutarch’s account.

Did you know? Stirrups did not exist in Alexander’s day; they reached Europe more than a thousand years later. Alexander’s cavalymen gripped with their legs and rode on a cloth or skin, which made a calm, well-trained horse even more valuable. Plutarch notes that Alexander “let fall his upper garment” before mounting: a loose cloak flapping on a nervous horse’s side would have startled it again.

Primary source. *Plutarch, Life of Alexander, chapter 6 (about AD 100), in the seventeenth-century English “Dryden” translation, as reproduced at Livius.org; the same translation is on Project Gutenberg (Plutarch’s Lives, ebook #674). The opening sentence is Alexander’s reply to his father; the second paragraph is from the end of the chapter.*

“I will pay,” answered Alexander, “the whole price of the horse.” At this the whole company fell a-laughing; and as soon as the wager was settled amongst them, he immediately ran to the horse, and taking hold of the bridle, turned him directly towards the sun, having, it seems, observed that he was disturbed at and afraid of the motion of his own shadow; then letting him go forward a little, still keeping the reins in his hand, and stroking him gently when he found him begin to grow eager and fiery, he let fall his upper garment softly, and with one nimble leap securely mounted him, and when he was seated, by little and little drew in the bridle, and curbed him without either striking or spurring him.

... his father shedding tears, it is said, for joy, kissed him as he came down from his horse, and in his transport said, “O my son, look thee out a kingdom equal to and worthy of thyself, for Macedonia is too little for thee.”

Go deeper. Plutarch, *Life of Alexander* (chapters 6, 44 and 61 on Bucephalus), free on Project Gutenberg. Arrian, *The Campaigns of Alexander*, book 5 (the battle with Porus and the founding of Bucephala). Xenophon, *On Horsemanship* (about 350s BC), also on

Project Gutenberg, the oldest surviving horse-training manual in the West. Second video topic: the Alexander Mosaic and how ancient mosaics were made.

Goes deeper in. History, “Ancient Greece: Philip, Alexander and the Hellenistic World,” and Life Science, “Mammals: Predator and Prey” (coming soon).

For families. Sources: Plutarch, *Alexander* 6, 44, 61; Arrian, *Anabasis* 5.19. The excerpt is the Dryden-series translation as printed at Livius.org; it was checked phrase by phrase there, but our tools could not open the full Gutenberg file, so if you compare it with Gutenberg #674 (Clough’s revision) you may find small differences in wording or punctuation. Alexander’s age at the taming is not given by Plutarch; “about twelve or thirteen” is the usual estimate. The horse’s color, the meaning of his name and the exact cause of death differ among ancient writers, and the stop says so. The wage comparison (about a drachma a day) is a rough classical Athenian figure. The mosaic shows a battle; one Persian is pierced by Alexander’s lance, shown without gore.

PRACTICE

1. **EASY** What price did Philonicus ask for the horse, and what was the horse afraid of?
2. **EASY** What does “Bucephalus” mean, and where did he die?
3. **MEDIUM** From the Primary source, list three things Alexander did after mounting or while mounting that a modern trainer would approve, and say why each helps a frightened horse.
4. **MEDIUM** Name two reasons a historian might doubt the exact words Plutarch gives to Philip, and one reason to accept that Bucephalus was real.
5. **CHALLENGE** One talent = 6,000 drachmas. A skilled worker earned about 1 drachma a day and worked about 300 days a year. How many drachmas were 13 talents, and about how many years of work would that be?
6. **CHALLENGE** Onesicritus said Bucephalus died at age 30 in 326 BC. Alexander was born in 356 BC and is usually said to have tamed the horse at about 12. How old was the horse at the taming on these numbers, and what does that suggest about the sources?

Make it a game · Shadow and Sun. Outdoors on a sunny day (or with one bright lamp indoors), one player is the “horse” and stands still. The “trainer” must guide the horse, by voice and gentle hand signals only, to a goal 15 steps away without the horse ever seeing its own shadow in front of it. If the shadow falls ahead, the horse may “shy” one step back. Switch roles and try a different starting angle. Afterward, talk about how the trainer had to think about where the light was before every move.

Scripture. “The horse is prepared against the day of battle: but safety is of the LORD.” (Proverbs 21:31, KJV)

Philip’s army and Alexander’s horse were the best that skill and silver could prepare, and Alexander conquered from Greece to India. Yet he died at thirty-two and his empire broke apart. Scripture does not scorn the well-trained horse; it reminds us who holds the outcome.

Practice: answers

1. Thirteen talents; he was afraid of the motion of his own shadow.
2. "Ox-head." He died by the Hydaspes (Jhelum) River, in modern Pakistan, in 326 BC, after the battle with Porus.
3. Any three: he let the horse go forward a little (moving releases fear instead of trapping it); he kept the reins in hand (steady contact); he stroked him gently (reassurance); he dropped his cloak softly (nothing flapping to startle); he drew in the bridle little by little (gradual pressure); he curbed him without striking or spurring (no pain added to fear).
4. Doubts: Plutarch wrote over 400 years later; his earlier sources are lost; ancient biographers shaped scenes and speeches to teach character. Reason to accept: several independent ancient writers (Arrian, Curtius, Plutarch) report the horse, and a city, Bucephala, was named for him.
5. $13 \times 6,000 = 78,000$ drachmas. $78,000 \div 300 = 260$ years of work, roughly. (Even at 2 drachmas a day it is 130 years: far beyond one lifetime.)
6. Foaled about 356 BC ($326 + 30$), so about 12 years old in 344 BC. A twelve-year-old horse that no one could ride is surprising for a high-priced sale horse; either the age at death is approximate, Alexander was older at the taming, or the story was simplified. Ancient numbers are often round and must be held loosely.

3.2 HORSES OF THE BIBLE: JOB’S WARHORSE, PHARAOH’S CHARIOTS AND THE WHITE HORSE

OBJECTIVES

- Trace the horse through Scripture: Pharaoh’s chariots, the law for Israel’s kings, Solomon’s stables, Job 39 and Revelation 19.
- Analyze Hebrew parallelism and rhetorical questions in Job 39:19–25.
- Explain why the Bible both praises the horse as God’s creation and warns against trusting in horses.

Warm-up. Before reading, list three things in our own day that a nation might be tempted to trust in for safety, the way ancient kings trusted in chariots. Keep the list; you will come back to it at the end.

Video slot. Video coming. Ancient Egyptian chariots and chariot horses; how the chariot changed warfare in the Bronze Age. Search approved channels (British Museum, Metropolitan Museum of Art, Smithsonian, Bible Project for an overview of Job, previewed by a parent); preview first.

KEY TERMS

chariot

A light two-wheeled war cart with spoked wheels, usually pulled by two horses and carrying a driver and a fighter; the fastest weapon of the ancient world.

parallelism

The main pattern of Hebrew poetry: a second line repeats, sharpens or completes the thought of the first.

rhetorical question

A question asked not for information but to make a point; God’s speeches in Job 38–41 are built of them.

Song of Moses

The hymn of Exodus 15, sung after the crossing of the Red Sea: “the horse and his rider hath he thrown into the sea.”

apocalypse

From the Greek for “unveiling”: the name of the book of Revelation and of writing that reveals God’s purposes through visions.

Faithful and True

The name given to the rider on the white horse in Revelation 19:11, identified in the same chapter as the Word of God and King of kings.

CORE IDEAS

In the world of the Old Testament, oxen pulled the plow and donkeys carried the loads; the horse belonged to kings and armies. Horses spread widely in Egypt and Canaan in the centuries before the Exodus, together with the light **chariot**, for several hundred years the fastest and most feared weapon on earth. The first time Scripture names horses is in Egypt, when the starving people bring Joseph their horses and cattle in exchange for bread (Genesis 47:17). From the start, the horse stands for the wealth and power of Egypt.

That is why the Exodus is told as a contest with chariots. When Pharaoh changed his mind about letting Israel go, “he took six hundred chosen chariots, and all the chariots of Egypt, and captains over every one of them” (Exodus 14:7). An army of slaves on foot, trapped between the desert and the sea, faced the most advanced military machine of its age. The LORD opened the sea, the Egyptians followed, their chariot wheels came off in the sea bed (Exodus 14:25), and the waters returned. Moses and Israel sang: “the horse and his rider hath he thrown into the sea” (Exodus 15:1). The **Song of Moses** does not mock the horse; it declares that the God who made horses is stronger than the kings who drive them.

God’s law then set a limit. Israel’s future king “shall not multiply horses to himself, nor cause the people to return to Egypt, to the end that he should multiply horses” (Deuteronomy 17:16). Solomon broke the spirit of that law. Scripture records 1,400 chariots and 12,000 horsemen (1 Kings 10:26) and a trade in which “a chariot came up and went out of Egypt for six hundred shekels of silver, and an horse for an hundred and fifty” (1 Kings 10:29). Later the prophets made the warning plain: “Woe to them that go down to Egypt for help; and stay on horses, and trust in chariots, because they are many ... but they look not unto the Holy One of Israel, neither seek the LORD!” (Isaiah 31:1).

Yet the Bible’s finest portrait of the horse is a song of praise. In Job 38–41 God answers Job out of the whirlwind, not with explanations but with a tour of His creation: the stars, the storm, the lion, the wild ox, the ostrich, the hawk. Then comes the warhorse (Job 39:19–25, in the **Primary source** box). Each verse is built on **parallelism**: “He mocketh at fear, and is not affrighted; / neither turneth he back from the sword.” The whole speech opens with a **rhetorical question**, “Hast thou given the horse strength?”, whose answer is no. Job can ride a horse, train it, even buy one for 150 shekels, but he did not make its courage. The horse that “smelleth the battle afar off” is God’s handiwork, and the man who questions God is shown how small he is.

Reading Job 39 well takes some care with words. “Clothed his neck with thunder” translates a rare Hebrew word related to thunder; many scholars think it means the quivering, rippling mane, so that the mane seems to shake like thunder. “Canst thou make him afraid as a grasshopper?” may also be read “make him leap like a locust,” the leap and the whirr of the locust being the picture. The King James translators kept close to the Hebrew, which is why the lines sound strange and strong at once.

There are also honest puzzles in the numbers. In the KJV, 1 Kings 4:26 says Solomon had “forty thousand stalls of horses for his chariots,” but the parallel verse, 2 Chronicles 9:25,

says “four thousand stalls.” Most scholars think a copyist’s slip entered one text; with 1,400 chariots at two or three horses each, four thousand fits the record best. Likewise, 1 Kings 10:28 says Solomon’s horses came “out of Egypt, and linen yarn”; most modern scholars read that Hebrew word as Kue, the horse-breeding country of Cilicia in what is now southern Turkey. Admitting a hard reading is part of reading faithfully.

The last horse in the Bible carries the King. “And I saw heaven opened, and behold a white horse; and he that sat upon him was called Faithful and True, and in righteousness he doth judge and make war” (Revelation 19:11). A victorious Roman general rode in his triumph behind white horses; John’s first readers would have known the picture of a white horse as the sign of a conqueror. Here the rider is named, two verses later, the Word of God, and on His robe is written King of kings and Lord of lords. The horse that began as the pride of Pharaoh ends as the mount of Christ. And Zechariah foresaw a day when even “the bells of the horses” would bear the words “HOLINESS UNTO THE LORD” (Zechariah 14:20): the horse itself made holy.

PICTURE STUDY



Horse Frightened by Lightning, Théodore Géricault, About 1813–1814 · Oil on canvas · The National Gallery, London
Wikimedia Commons · CC BY 3.0

Théodore Géricault was a French painter who rode, studied and painted horses all his short life (he died in 1824 at thirty-two, his health broken after riding falls). In this small canvas a lone horse stands under a storm, every muscle braced. It is a fitting picture for Job 39, where God asks, “hast thou clothed his neck with thunder?”

Look closely

- Find the lightning. Where is it, and how does the light fall on the horse?

- Look at the neck and mane. Does the horse look afraid, alert, or ready to run?
- Find any sign of a person, a road or a building. What does their absence do to the feeling of the painting?

Talk about it

1. Job 39 shows a horse that “mocketh at fear.” Géricault paints a horse frightened. Are both true of horses? How?
2. Why might a painter choose a storm, rather than a battle, to show the power of a horse?

HANDS-ON: A PARALLELISM CHART OF JOB 39:19–25

Hebrew poetry rhymes ideas, not sounds. Chart the seven verses of the warhorse to see how each line answers the one before it.

You will need

- The Primary source passage (Job 39:19–25, KJV)
- A sheet of paper turned sideways, ruled into four columns
- Colored pencils
- Optional: a Bible with cross-references or a concordance

Steps

1. Head the columns “Verse,” “Line A,” “Line B,” and “How B relates to A.”
2. Copy each verse, splitting it at the colon, semicolon or question mark into Line A and Line B. (Verse 23 has a list; verse 25 has three parts. Decide how to handle them and say why.)
3. In the last column write one word for each pair: *repeats* (says the same thing another way), *sharpens* (makes it stronger), or *completes* (finishes the thought).
4. Color every word that names a sound in one color and every word that names motion in another. Which sense does the poem appeal to most?
5. At the bottom, write three or four sentences: what is the point of this description in God’s answer to Job (read Job 38:1–4 and 40:1–5 if you can)?
6. Return to your warm-up list. Write one sentence connecting it to Psalm 20:7.

Check your work

- All seven verses are charted, with each pair labeled.
- I marked sound words and motion words and drew a conclusion.
- I explained the purpose of the passage in the book of Job.

FIELD NOTEBOOK

1. **Famous Horses timeline, card 2: Horses of the Bible.** Make one card with four small boxes: Pharaoh’s chariots (Exodus 14), Solomon’s horses (1 Kings 10), Job’s

- warhorse (Job 39), the white horse (Revelation 19). Draw a small symbol in each.
2. Copy Job 39:19 in your best hand, and under it draw the horse's neck and mane "clothed with thunder."
 3. **Narration (one paragraph; the parent keeps it):** Explain how the Bible can praise the horse in Job 39 and also warn against trusting in horses in Psalm 20:7 and Isaiah 31:1, using at least two passages from this stop.

Did you know? Egyptian chariots found in the tomb of Tutankhamun (about 1323 BC) were so light that two men could carry one. Their spoked wheels, wooden frames bent with steam, and leather floors made them fast but fragile, which helps explain why Exodus 14:25 says the LORD "took off their chariot wheels" in the wet sea bed.

Primary source. *The Holy Bible, King James Version (1611), Job 39:19-25: the LORD's description of the warhorse, spoken to Job out of the whirlwind.*

19 Hast thou given the horse strength? hast thou clothed his neck with thunder?
20 Canst thou make him afraid as a grasshopper? the glory of his nostrils is terrible.
21 He paweth in the valley, and rejoiceth in his strength: he goeth on to meet the armed men.
22 He mocketh at fear, and is not affrighted; neither turneth he back from the sword.
23 The quiver rattleth against him, the glittering spear and the shield.
24 He swalloweth the ground with fierceness and rage: neither believeth he that it is the sound of the trumpet.
25 He saith among the trumpets, Ha, ha; and he smelleth the battle afar off, the thunder of the captains, and the shouting.

Go deeper. Matthew Henry, *Commentary on the Whole Bible* (1706-1721), on Job 39 and Exodus 14; public domain and widely available free. The Metropolitan Museum of Art's online pages on Egyptian chariots and horse equipment. The British Museum's Assyrian palace reliefs (the horses of Ashurbanipal), viewable on its collection website. Second video topic: the book of Job as literature (the Bible Project's overview of Job, previewed by a parent).

Goes deeper in. History, "Ancient Egypt and Israel," and Literature, "Hebrew Poetry: Psalms and Job" (coming soon).

For families. All Scripture is quoted from the KJV and checked against a standard KJV text. Readings noted as "many scholars think" (the mane in Job 39:19, the locust in 39:20, Kue in 1 Kings 10:28, and four thousand stalls as the better reading) are the common view in standard commentaries; families may consult their own. The date of the Exodus is debated among believing scholars, so the stop gives no year. Revelation 19 is told plainly as prophecy of Christ; the identity of the white horse in Revelation 6:2 is debated and left aside. The detail about Tutankhamun's light chariots is a general description from

museum sources, not a measured weight. Picture: Géricault, National Gallery London; the Commons file is a gallery photograph of the work, so check the image before printing.

PRACTICE

1. **EASY** How many “chosen chariots” did Pharaoh take in pursuit of Israel, and what happened to them?
2. **EASY** What is the rider on the white horse in Revelation 19:11 called?
3. **MEDIUM** In Job 39:22, label the two halves and say how the second relates to the first.
4. **MEDIUM** Give two reasons Deuteronomy 17:16 told Israel’s kings not to multiply horses.
5. **CHALLENGE** By 1 Kings 10:29, a chariot cost 600 shekels and a horse 150. What did a chariot with a team of two horses cost? If a shekel was about 11.4 grams of silver, about how many kilograms of silver is that? How many horses equal one chariot?
6. **CHALLENGE** 1 Kings 4:26 (KJV) reads forty thousand stalls; 2 Chronicles 9:25 reads four thousand. Use 1 Kings 10:26 (1,400 chariots) to argue which number fits better.

Make it a game · Which Horse Am I? One player reads a clue; the others name the passage. Clues: “I pulled one of six hundred chosen chariots.” (Exodus 14) “I cost 150 shekels in Solomon’s day.” (1 Kings 10) “I say Ha, ha among the trumpets.” (Job 39) “My rider is called Faithful and True.” (Revelation 19) “The people brought me to Joseph for bread.” (Genesis 47) “My bells will say HOLINESS UNTO THE LORD.” (Zechariah 14). Players then write new clues of their own from these chapters and trade.

Scripture. “Some trust in chariots, and some in horses: but we will remember the name of the LORD our God.” (Psalm 20:7, KJV)

David was a king with an army, and Israel did use horses. The psalm does not forbid them; it names what we trust. Job 39 praises the horse; Psalm 20 refuses to worship it.

Practice: answers

1. Six hundred (Exodus 14:7). The LORD took off their chariot wheels and the sea returned over them; “the horse and his rider hath he thrown into the sea.”
2. Faithful and True (and, in the same chapter, the Word of God and King of kings and Lord of lords).
3. A: “He mocketh at fear, and is not affrighted”; B: “neither turneth he back from the sword.” B sharpens A: from not being afraid in general to not turning back from the very sword.
4. Horses meant going back to Egypt (for trade and alliance), which God had forbidden; and great numbers of chariot horses tempt a king to trust his army instead of the LORD (compare Psalm 20:7, Isaiah 31:1). It also guards against the pride and cost of a royal war machine.
5. $600 + 2 \times 150 = 900$ shekels. $900 \times 11.4 \text{ g} = 10,260 \text{ g}$, about 10.3 kg of silver. One chariot = $600 \div 150 = 4$ horses.
6. $1,400 \text{ chariots} \times 2 \text{ horses} = 2,800$; with a spare horse each, 4,200. That is close to 4,000 stalls. Forty thousand would be about 28 horses per chariot, far too many. So four thousand

fits; the difference is most likely a copyist's error in one text, not a contradiction in what Scripture teaches.

3.3 MARENGO AND COPENHAGEN AT WATERLOO

OBJECTIVES

- Describe the two famous chargers of Waterloo (18 June 1815): Napoleon's Marengo and Wellington's Copenhagen.
- Explain the role of horses and cavalry in the battle, including the great French cavalry charges against British squares.
- Separate legend from evidence, using the case of Marengo and Jacques-Louis David's painting of Napoleon crossing the Alps.

Warm-up. Look at the picture study for one full minute before reading anything. Write down three things it tells you about Napoleon. Then ask: which of those things could a painting prove, and which could it only claim?

Video slot. Video coming. The Battle of Waterloo, 18 June 1815: Wellington, Napoleon and Blücher; cavalry charges against infantry squares. Search approved channels (National Army Museum, Smithsonian, Imperial War Museums, Epic History TV, previewed by a parent); preview first.

KEY TERMS

charger

A horse trained to carry an officer in battle: calm under gunfire, quick to answer the rider, and strong enough for a long day.

Hundred Days

Napoleon's return to power in 1815, from his escape from Elba (landing 1 March) to his final abdication after Waterloo.

infantry square

A hollow square of foot soldiers several ranks deep, bayonets outward; horses will not charge into a solid hedge of steel, so a steady square could hold off cavalry.

bottom

An old horseman's word for stamina and toughness: the ability to keep going when tired.

propaganda

Pictures, words or events designed to shape what people believe about a leader or a cause, whether or not they are strictly true.

provenance

The documented history of an object (who owned it, when, and how we know), used to judge whether it is what it claims to be.

CORE IDEAS

On Sunday, 18 June 1815, about twelve miles south of Brussels, two of the most famous commanders in history met for the only time. Napoleon Bonaparte, back in power for the **Hundred Days** after escaping from exile on Elba, led about 72,000 men. The Duke of Wellington held a low ridge near the village of Mont-Saint-Jean with about 68,000 British, Dutch, Belgian and German troops, waiting for the Prussian army of Marshal Blücher, which was marching to join him. Tens of thousands of horses were on that field: cavalry mounts, artillery teams, supply horses and the officers' **chargers**. Two of those chargers became famous.

Wellington rode **Copenhagen**, a dark chestnut stallion about 15 hands high, foaled in 1808. He was bred by General Thomas Grosvenor and named for the British siege of Copenhagen in 1807, where Grosvenor served. His sire, Meteor, was a son of the great racehorse Eclipse, and Copenhagen himself had raced, without much success, before going to the army in Spain, where he became the Duke's favorite. He was not a handsome horse, but he was tough. Wellington spent the whole day at Waterloo riding along his line, often into the most dangerous places, and by tradition he was in the saddle for some seventeen hours. When at last he dismounted that night and gave his horse a pat, Copenhagen lashed out with a hind leg and very nearly kicked the Duke in the head. Wellington later said, in effect, that there might have been faster horses and handsomer ones, but for **bottom** and endurance he never saw his equal.

Napoleon's horse is harder to pin down. By tradition, **Marengo** was a small grey Arabian, only about 14.1 hands, brought from Egypt after the French campaign there in 1799 and named for Napoleon's victory over the Austrians at Marengo in northern Italy on 14 June 1800. The legend says he carried the Emperor at Austerlitz, Jena, Wagram and the retreat from Moscow, was wounded eight times, and was captured at Waterloo by a young English nobleman, Lord Petre. He was then sold to an officer of the Grenadier Guards, John Julius Angerstein, put on show in London, and died in 1831, said to be thirty-eight years old. His skeleton stands today in the National Army Museum in London. One of his hooves was made into a silver-topped snuff box for the officers of the Guards.

Now the evidence. Napoleon owned dozens of horses at a time and changed mounts often in battle. His imperial stable kept careful records, yet no horse named Marengo appears in them. In her book *Marengo: The Myth of Napoleon's Horse* (2000), Jill Hamilton argued that the famous grey was probably a horse recorded under another name, and that the English owners, who had every reason to show off "Napoleon's own charger," built the story larger over the years. The age is a problem too: a horse thirty-eight years old in 1831 would have been twenty-two at Waterloo. That is possible for a well-kept Arabian, but unusual for a war mount. Historians call the documented chain of ownership an object's **provenance**, and Marengo's provenance has gaps. The skeleton is real and is certainly a small Arabian-type horse that came from the field; whether it is the horse of every famous battle is uncertain.

The horses mattered far more than as mounts for generals. In the afternoon, Marshal Ney sent wave after wave of French cavalry, several thousand horsemen at a time, up the slope

against Wellington's center. The British and allied infantry formed **infantry squares**, and the horses, wisely, would not throw themselves onto a solid hedge of bayonets. The cavalry swirled around the squares again and again, losing men and horses to musket and cannon fire, while the squares held. By evening the Prussians were pressing the French flank, the Imperial Guard's last attack was thrown back, and Napoleon's army broke. Some 50,000 men were killed or wounded that day, and thousands of horses died.

Waterloo ended a generation of war in Europe. Napoleon abdicated again and was sent to the island of St. Helena in the South Atlantic, where he died in 1821. Copenhagen retired to Wellington's country house, Stratfield Saye. He died on 12 February 1836, aged twenty-eight, and was buried there with military honors. When the museum that later held Marengo asked to display Copenhagen's skeleton beside him, the Duke is said to have answered that he was not quite sure where the horse was buried. He knew exactly.

The two horses also show two ways of telling history. Napoleon was a master of image: in 1801 he had Jacques-Louis David paint him crossing the Alps on a rearing stallion, though he actually crossed the Great St. Bernard Pass on a sure-footed mule in May 1800, a few weeks before Marengo. Wellington disliked such show and wrote plain, sober reports. Neither the painting nor the legend is worthless; they tell us what people wanted to believe. But the historian's work is to ask, of every famous story, what the evidence actually shows.

PICTURE STUDY



Napoleon Crossing the Alps (Bonaparte at the Great St. Bernard Pass), Jacques-Louis David, 1801 · Oil on canvas · Château de Malmaison, Rueil-Malmaison, France (the first of five versions)
Wikimedia Commons · Public domain

The King of Spain asked for this portrait in 1800, and Napoleon told David he wished to be shown calm on a fiery horse. He would not sit for it; David posed an assistant on a ladder instead. On the rocks at the bottom David carved three names: BONAPARTE, HANNIBAL

and KAROLUS MAGNUS (Charlemagne), the other two great commanders who crossed the Alps. Fifty years later Paul Delaroche painted the same crossing as it happened, with a tired Napoleon on a mule.

Look closely

- Look at the horse's eye, mouth and mane. What do they show, and how does the rider's face differ?
- Find the three names carved in the rock. Why put them there?
- Find the soldiers and cannon. How big are they compared with the horse and rider, and why?

Talk about it

1. What does this painting truthfully tell a historian, if not how Napoleon crossed the Alps?
2. How is the Marengo legend like this painting?

HANDS-ON: LEGEND OR EVIDENCE? A HISTORIAN'S TABLE

Sort the famous claims about Marengo and Copenhagen into what is well documented, what is likely, and what is legend, and defend each choice.

You will need

- Paper ruled into four columns: Claim · Evidence for · Evidence against or gaps · Verdict
- This stop's core ideas and picture study
- Optional: the National Army Museum's online page on Marengo
- Optional: an image of Paul Delaroche's *Bonaparte Crossing the Alps* (1850) for comparison

Steps

1. List at least six claims from the stop. For example: Copenhagen carried Wellington for seventeen hours; Copenhagen kicked at the Duke; Marengo came from Egypt in 1799; Marengo was wounded eight times; Marengo was captured at Waterloo; Marengo died at thirty-eight; Napoleon crossed the Alps on a rearing stallion.
2. For each claim, write what kind of evidence would prove it (a stable record, a letter written that day, a skeleton, a painting) and whether we have it.
3. Give each claim a verdict: *documented*, *likely*, *possible* or *legend*.
4. Compare David's painting with Delaroche's. Write two sentences on why each painter chose his version.
5. Finish with a paragraph answering: why do legends gather around famous horses, and what is lost if we stop caring whether they are true?

Check your work

- At least six claims, each with evidence and a verdict.
- I explained what kind of source would settle each claim.
- My closing paragraph explains why truth matters even in a good story.

FIELD NOTEBOOK

1. **Famous Horses timeline, card 3: Marengo and Copenhagen.** Draw the two side by side to scale: Marengo 14.1 hands, Copenhagen 15 hands. On the back list owner, color, breeding, and fate of each.
2. Sketch a simple battle map of Waterloo: Wellington's ridge, the French line, the farms of Hougoumont and La Haye Sainte, and the direction the Prussians came from.
3. **Narration (one paragraph; the parent keeps it):** Tell the story of Waterloo through the two horses, and explain why historians trust the story of Copenhagen more than the legend of Marengo.

Did you know? Copenhagen's grandsire, Eclipse, was never beaten in eighteen races (1769–1770), and nearly all Thoroughbred racehorses alive today descend from him in the male line. Copenhagen's headstone at Stratfield Saye still stands, and Marengo's skeleton was cleaned and re-mounted by the Natural History Museum in London before going back on display.

Go deeper. Jill Hamilton, *Marengo: The Myth of Napoleon's Horse* (2000). Elizabeth Longford, *Wellington: The Years of the Sword* (1969). Bernard Cornwell, *Waterloo: The History of Four Days, Three Armies and Three Battles* (2014), nonfiction and very readable. The National Army Museum (London) online pages on Marengo and on Waterloo. Second video topic: how infantry squares worked against cavalry.

Goes deeper in. History, "Napoleon and the Age of Revolution," and Art, "Painting History: David and Delaroche" (coming soon).

For families. No primary source box this time: Wellington's remark about Copenhagen is recorded in Philip Henry Stanhope's *Notes of Conversations with the Duke of Wellington* (1888), but we could not check a copy in Project Gutenberg, the Avalon Project or the Library of Congress, so the stop gives it in paraphrase rather than quoting from memory. The army sizes, casualty total and the "seventeen hours" are standard estimates and tradition. The account of Marengo's battles, wounds and age is the traditional one; the stop presents Jill Hamilton's doubts fairly. Napoleon's wish to be shown "calm on a fiery horse" is widely reported from David's circle. War is told plainly, without detail of wounds.

PRACTICE

1. **EASY** Which horse did each commander ride at Waterloo, and what color was each?
2. **EASY** Where are the two horses today?
3. **MEDIUM** Why did the French cavalry charges fail against the British squares?

4. **MEDIUM** In hands and inches, how much taller was Copenhagen than Marengo? (1 hand = 4 inches.)
5. **CHALLENGE** Marengo was said to be 6 when bought in Egypt in 1799 and 38 when he died in 1831. Do these numbers agree? How old would he have been at Marengo (1800) and at Waterloo (1815)? What does this tell you?
6. **CHALLENGE** Explain how David's painting is a reliable source for one thing and an unreliable source for another.

Make it a game · Hold the Square. Four to six players link elbows in a tight square facing outward. One or two "cavalry" players trot around the outside trying to find a gap by tagging a player whose elbows have come unlinked. Every 20 seconds the caller shouts a distraction ("Cannon!" "Rain!" "Prussians!") and the square must take one step together without breaking. Afterward, discuss why discipline, not strength, decided whether a square held.

Scripture. "An horse is a vain thing for safety: neither shall he deliver any by his great strength." (Psalm 33:17, KJV)

Napoleon had the finest cavalry in Europe and some of its most famous horses, and he lost. Copenhagen was brave, but he did not win Waterloo either. The psalm goes on: the eye of the LORD is upon them that fear Him.

Practice: answers

1. Wellington rode Copenhagen, a dark chestnut; Napoleon (by tradition) rode Marengo, a grey Arabian, among other horses.
2. Copenhagen is buried at Stratfield Saye, Wellington's country house. Marengo's skeleton is in the National Army Museum, London.
3. Horses will not run onto a solid wall of bayonets, so the cavalry could only circle the squares while musket and cannon fire wore them down. As long as the infantry stayed steady in square, cavalry alone could not break them.
4. $15.0 - 14.1 = 3$ inches. Copenhagen was 60 inches at the withers, Marengo 57 inches.
5. Foaled 1793 by both numbers ($1799 - 6$; $1831 - 38$), so they agree with each other: 7 at Marengo and 22 at Waterloo. Agreement does not prove them; both may come from the same later story. A 22-year-old in hard campaigning is possible but unusual, which is one reason historians doubt it was the same horse throughout.
6. Unreliable for the event: Napoleon crossed on a mule, in good weather, with a guide. Reliable for intention: it shows exactly how Napoleon wished to be seen (calm, commanding, heir to Hannibal and Charlemagne) and how official art of 1801 shaped his image. A source can be false about its subject and true about its maker.

3.4 THE PONY EXPRESS (1860–1861)

OBJECTIVES

- Explain how the Pony Express relay system worked: stations, riders, horses, the mochila and the schedule.
- Calculate speeds, costs and distances from the real figures, and check Mark Twain's numbers against the record.
- Explain why a famous service lasted only about nineteen months and lost money.

Warm-up. How long does a letter take to cross the country today? An email? In 1859 a letter from Missouri to California went by stagecoach or by ship and took three weeks or more. Guess: how much would a businessman pay to cut that to ten days?

Video slot. Video coming. The Pony Express: route, relay stations, riders and the mochila; the Pony Express National Historic Trail. Search approved channels (National Park Service, Smithsonian National Postal Museum, Smithsonian Channel, PBS American Experience); preview first.

KEY TERMS

relay

A system in which fresh horses (and, less often, fresh riders) take over at fixed points so the mail never stops for long.

swing station

A small Pony Express post, usually 10 to 15 miles apart, where a rider changed horses in a minute or two.

home station

A larger station where a rider ended his run of about 75 to 100 miles, ate and slept, and handed the mail to the next rider.

mochila

Spanish for “knapsack”: a leather cover thrown over the saddle, with four locked pockets for mail, that could be switched to a fresh horse in seconds.

transcontinental telegraph

The wire line completed across the United States on 24 October 1861, which sent messages coast to coast in minutes and ended the need for the Pony Express.

fixed cost

A cost that must be paid whether the business carries one letter or a thousand, such as station keepers, horses and feed.

CORE IDEAS

By 1860 California had been a state for ten years, and about 380,000 people lived there, but news from the East still came slowly: by stagecoach on the long southern route, or by steamship and across the Isthmus of Panama. With a national crisis growing over slavery and union, business and government in California wanted faster word. The freighting firm of **William H. Russell, Alexander Majors and William B. Waddell**, which already hauled army supplies across the plains, proposed a bold answer: a mounted **relay** that would carry letters about 1,966 miles from St. Joseph, Missouri (the western end of the railroad and the telegraph) to Sacramento, California, in ten days.

In about two months the company built or took over some 190 stations across what are now eight states, bought around 400 horses, and hired about 80 riders, plus station keepers and stock tenders. The first riders left St. Joseph and Sacramento on 3 April 1860, and the first westbound mail reached Sacramento on 13 April. The horses were chosen for speed and toughness: Thoroughbred-type horses in the East, and hardy mustangs and other western horses on the desert and mountain stretches. A horse ran hard for 10 to 15 miles to the next **swing station**, where a fresh one stood saddled. The rider threw the **mochila** onto it and was gone in a minute or two. After 75 to 100 miles he reached a **home station** and passed the mail to the next man. The schedule ran day and night, summer and winter, in both directions, at first once a week and then twice.

Speed was costly. Postage began at \$5 for every half-ounce, at a time when a laborer might earn about a dollar a day, so riders carried business letters, government papers and newspaper dispatches written on very thin paper. Riders were small, light young men; many were in their teens or early twenties. Alexander Majors, a devout Christian, required every employee to swear an oath not to curse, not to drink, and not to quarrel or fight, and he gave each one a Bible. The work was hard and dangerous. In May 1860 war broke out with the Paiute people in Nevada (the Pyramid Lake War); stations were burned, some station men and riders were killed, and service on that stretch was stopped for weeks. Even so, the company later claimed that only one mail was ever lost.

The Pony Express proved its worth in the months of crisis. News of Abraham Lincoln's election in November 1860 reached California in about a week from the eastern telegraph line. In March 1861 the text of Lincoln's first inaugural address went from the end of the telegraph in Nebraska to the end of the telegraph in Nevada in about seven days and seventeen hours, the fastest run on record. Californians read the President's appeal for the Union as the nation was dividing.

Yet the Pony Express was a business failure. It had huge **fixed costs**: hundreds of horses to feed with grain hauled hundreds of miles, station keepers to pay, stations to rebuild after raids. Even at \$5 an ounce, mail volume was small; it never carried enough letters to pay its way, and in July 1861 the price was cut to \$1 per half-ounce under a government mail contract. Meanwhile the telegraph was being built from both ends. When the **transcontinental telegraph** was completed on 24 October 1861, a message could cross the continent in minutes. The Pony Express officially ended two days later, after about nineteen

months. Russell, Majors and Waddell went bankrupt soon after; historians estimate the service lost hundreds of thousands of dollars.

Few things so short-lived have left such a large legend, and legends need checking. William “Buffalo Bill” Cody later told of riding for the Pony Express as a teenager, and he made it part of his famous Wild West show; historians have found little evidence for his riding, and many doubt it. A widely printed advertisement (“Wanted: young, skinny, wiry fellows ... orphans preferred”) has never been found in any 1860 newspaper and first appears decades later. Even the name of the first rider out of St. Joseph is disputed. Mark Twain, who crossed the plains by stagecoach in the summer of 1861 and saw a rider pass, wrote his famous description ten years later, from memory and with a humorist’s flair. Read it in the **Primary source** box, then check his numbers against the record.

The Pony Express was not the beginning of fast mail. Persian kings, Roman emperors and Mongol khans all ran mounted relays, and the book of Esther describes letters sent “by posts on horseback” through the whole Persian empire. What made the Pony Express American was that a private company risked its fortune on it and ran it across a wilderness until a better invention made it unnecessary.

PICTURE STUDY



The Coming and Going of the Pony Express, Frederic Remington, 1900 · Oil on canvas · Gilcrease Museum, Tulsa, Oklahoma
Wikimedia Commons · Public domain

Frederic Remington (1861–1909) was born the year the Pony Express ended, so he never saw it. He spent years in the West sketching cowboys, soldiers and horses, and he knew how horses move at speed. Painting forty years after the fact, he shows the moment that made the system work: the change of horses.

Look closely

- Find the fresh horse and the tired one. How has Remington shown the difference?
- Find the rider's position in the saddle. Is he sitting up or leaning forward? Why?
- Look at the land and sky. What season and time of day might it be, and what does the landscape tell you about the route?

Talk about it

1. Remington painted this from imagination and research, not memory. What makes it a useful source, and what makes it a weaker one than Twain's account?
2. Why do you think Remington chose the moment of the exchange rather than a rider alone on the trail?

Safety first. The relay game involves running and handoffs: play on open, level ground, run in one direction only, and pass the "mochila" at a walk until everyone has practiced. If you visit a Pony Express station site with horses, follow the staff's rules and never walk behind a horse.

HANDS-ON: FACT-CHECK MARK TWAIN AND PLAN A RELAY

Use Twain's description as a primary source and the real numbers as a check, then plan a relay of your own.

You will need

- The Primary source excerpt
- A calculator
- A map of the United States (printed or online) and a ruler
- Optional: the National Park Service Pony Express trail map

Steps

1. Make a two-column table: "Twain says" and "The record says." Fill in at least four rows (distance, days, miles between horses, cost per letter, what the bag carried, how the rider dressed).
2. Where Twain and the record differ, write a sentence suggesting why: memory, rounding, a different year, or the humorist's love of a good line.
3. On the map, mark St. Joseph, Missouri, and Sacramento, California, and sketch the route through Nebraska, Wyoming, Utah and Nevada. Measure the straight-line distance with the scale and compare it with 1,966 miles. Why is the trail longer?
4. Plan your own relay for a route you know (for example, a family trip of 300 miles). If each horse runs 12 miles and each rider 75, how many horses and riders do you need for one trip? For a round trip each week?
5. Write a short paragraph, as if to Russell, Majors and Waddell, explaining in plain business terms why the Pony Express could not pay.

Check your work

- My table compares at least four of Twain's claims with the record.
- My relay plan shows the arithmetic for horses and riders.
- My business paragraph names fixed costs, low volume and the telegraph.

FIELD NOTEBOOK

1. **Famous Horses timeline, card 4: The Pony Express.** Draw a rider and horse with the mochila. On the back: 3 April 1860 – 26 October 1861; St. Joseph to Sacramento; about 1,966 miles; 10 days; \$5 per half-ounce at first.
2. Draw and label a mochila from above, showing the four mail pockets and the openings for the saddle horn and cantle.
3. **Narration (one paragraph; the parent keeps it):** Explain how the Pony Express worked and why it ended after about nineteen months, using at least three numbers from this stop.

Did you know? The mochila fit over an ordinary saddle, and the rider sat on it, so the mail could not fall off without the rider falling too. Its four pockets (cantinas) were locked; keys were kept only at the ends of the line and at a few stations along the way. A full mochila might hold 20 pounds of mail, though most carried much less.

Primary source. Mark Twain, *Roughing It* (1872), chapter VIII, describing the pony-rider he saw while crossing the plains by stagecoach in 1861. Text from Project Gutenberg (ebook #8582, Part 1).

He rode fifty miles without stopping, by daylight, moonlight, starlight, or through the blackness of darkness—just as it happened. He rode a splendid horse that was born for a racer and fed and lodged like a gentleman; kept him at his utmost speed for ten miles, and then, as he came crashing up to the station where stood two men holding fast a fresh, impatient steed, the transfer of rider and mail-bag was made in the twinkling of an eye, and away flew the eager pair and were out of sight before the spectator could get hardly the ghost of a look. Both rider and horse went “flying light.” The rider’s dress was thin, and fitted close; he wore a “round-about,” and a skull-cap, and tucked his pantaloons into his boot-tops like a race-rider. He carried no arms—he carried nothing that was not absolutely necessary, for even the postage on his literary freight was worth five dollars a letter. He got but little frivolous correspondence to carry—his bag had business letters in it, mostly.

Go deeper. Christopher Corbett, *Orphans Preferred: The Twisted Truth and Lasting Legend of the Pony Express* (2003), on separating fact from legend. Mark Twain, *Roughing It* (1872), chapters I–VIII, free on Project Gutenberg. The National Park Service pages for the Pony Express National Historic Trail, with maps and station histories. The

Smithsonian National Postal Museum's online exhibits on the Pony Express. Second video topic: how the transcontinental telegraph was built in 1861.

Goes deeper in. History, "The American West," Geography, "Crossing the Continent," and Small Business & Economics, "Fixed Costs and Why Good Ideas Fail" (coming soon).

For families. Sources: National Park Service, Pony Express National Historic Trail; Smithsonian National Postal Museum; Corbett (2003). The 1,966-mile figure, about 190 stations, 10-day schedule and dates are from the NPS. Numbers of riders and horses, the election-news time and the 7 days 17 hours for Lincoln's address are standard figures that vary a little among sources. The postage history (a cut to \$1 per half-ounce in 1861) and the size of the losses are given approximately. The Majors oath and Bibles are from his own memoir. Twain's excerpt was checked phrase by phrase against Gutenberg #8582; Twain wrote of "Indians" in the language of his day. The Pyramid Lake War is told plainly, without detail. Remington's painting is usually listed at the Gilcrease Museum; check its label before printing.

PRACTICE

1. **EASY** Name the two ends of the Pony Express route and the dates it ran.
2. **EASY** What was a mochila, and why was it a clever design?
3. **MEDIUM** The route was about 1,966 miles and the schedule 10 days. What was the average speed in miles per day and in miles per hour, counting the whole 24-hour day?
4. **MEDIUM** Twain says the rider carried mail "nineteen hundred miles in eight days" and changed horses every ten miles. Compare each claim with the record.
5. **CHALLENGE** If each horse ran 12 miles and each rider 80 miles, about how many horse changes and how many riders did one 1,966-mile trip need? If the line ran both directions twice a week, how many one-way trips per week were there?
6. **CHALLENGE** Suppose a mochila carried 10 pounds of mail. At \$5 per half-ounce, what was that load worth in postage? (16 ounces = 1 pound.) Why might the company still lose money?

Make it a game • Mochila Relay. Make a "mochila" from a pillowcase with four envelopes inside. Set up "stations" about 30 yards apart with one player at each. The first rider runs (or rides a stick horse) to the next station, slips the mochila over the next player's shoulders, and that player runs on. Time the whole route with a stopwatch; then try to cut the handoff time without dropping a letter. Add a rule that the mail must arrive with every envelope in its pocket.

Scripture. "So the posts that rode upon mules and camels went out, being hastened and pressed on by the king's commandment. And the decree was given at Shushan the palace." (Esther 8:14, KJV)

More than two thousand years before the Pony Express, the Persian empire ran mounted relays, and God used even the royal post to carry word that saved His people. Fast news can

serve good ends, and every messenger is “hastened” by someone’s command.

Practice: answers

1. St. Joseph, Missouri, and Sacramento, California; 3 April 1860 to 26 October 1861.
2. A leather cover with four locked mail pockets that fit over the saddle. It could be switched to a fresh horse in seconds, and the rider sat on it so the mail could not be lost without him.
3. $1,966 \div 10 = 196.6$ miles per day. $196.6 \div 24 \approx 8.2$ miles per hour, day and night, including every stop.
4. Distance: close (about 1,966 miles). Time: the regular schedule was 10 days; 8 days or less was reached only on the fastest runs. Horses: the record says every 10 to 15 miles, so “ten” is at the short end but fair. Twain is roughly right but rounds in the dramatic direction.
5. Horse stretches: $1,966 \div 12 \approx 164$ (about 163 changes). Riders: $1,966 \div 80 \approx 24.6$, so about 25 riders per trip. Trips: 2 directions $\times$ 2 per week = 4 one-way trips a week, needing about 100 rider-runs and over 650 horse-runs every week.
6. $10 \text{ lb} = 160 \text{ oz} = 320 \text{ half-ounces}$; $320 \times \$5 = \$1,600$ per full trip. But most mochilas carried far less, and every trip required feeding and keeping hundreds of horses and paying riders and keepers at some 190 stations whether the bag was full or not. Large fixed costs and small volume meant loss; when the price fell to \$1, income fell further, and the telegraph took the most valuable business.

3.5 TRAVELLER AND CINCINNATI: LEE'S AND GRANT'S HORSES

OBJECTIVES

- Tell the history of Traveller and Cincinnati, the horses of Robert E. Lee and Ulysses S. Grant, from purchase to burial.
- Read Lee's own description of Traveller as a primary source and identify what it reveals about the horse and about the writer.
- Explain how horses shaped the surrender at Appomattox Court House (9 April 1865) and its terms.

Warm-up. Think of an animal you know well. Without naming its color first, list five things about its body and five about its character. Which list was harder to write? Keep it; you will compare it with Lee's list.

Video slot. Video coming. Traveller and Robert E. Lee; Grant's horse Cincinnati; the surrender at Appomattox Court House. Search approved channels (American Battlefield Trust, National Park Service, Smithsonian); preview first.

KEY TERMS

Saddlebred

An American breed of riding horse, developed in Kentucky and Virginia, known for smooth gaits, stamina and an upright, proud carriage.

quartermaster

An army officer in charge of supplies, food, transport and animals.

Overland Campaign

Grant's campaign of May–June 1864 against Lee in Virginia, from the Wilderness to Cold Harbor, followed by the long siege of Petersburg.

Appomattox Court House

The Virginia village where Lee surrendered the Army of Northern Virginia to Grant on 9 April 1865.

parole

A soldier's sworn promise not to fight again, given in exchange for being released instead of held as a prisoner.

Lexington

A famous American Thoroughbred racehorse and sire (1850–1875), the father of Grant's Cincinnati.

CORE IDEAS

Both great generals of the Civil War were fine horsemen. Ulysses S. Grant grew up in Ohio handling horses almost before he could read; at West Point he set a high-jump record on a big horse named York that stood for years. Robert E. Lee, the son of a famous cavalry commander, “Light-Horse Harry” Lee, had ridden all his life and served as a cavalry officer before the war. In the Civil War a general rode for hours every day to see his lines, and his horse had to be fast, sure-footed and steady under fire. Each man owned several horses, but each had one he loved best.

Traveller was foaled in 1857 near Blue Sulphur Springs in Greenbrier County, Virginia (now West Virginia), of Gray Eagle racing stock, and is usually described as a **Saddlebred** type, about 16 hands, iron grey with a black mane and tail. As a colt he was called Jeff Davis and won ribbons at the county fair. Captain Joseph M. Broun, a Confederate **quartermaster**, bought him for \$175 and renamed him Greenbrier. Lee saw the horse in western Virginia in 1861, admired him, and when they met again in South Carolina bought him in February 1862 for \$200. Lee called him Traveller, spelled the British way. He rode him at Second Manassas, Fredericksburg, Chancellorsville, Gettysburg and through the Overland Campaign. Traveller was not always easy: in August 1862, while Lee stood holding his reins, the horse started at something and pulled Lee to the ground, injuring both of his hands so badly that he rode in an ambulance for some weeks.

Cincinnati was a big chestnut, about 17 hands, a son of the great racehorse **Lexington**. He came to Grant as a gift in early 1864, in the months after the Union victory at Chattanooga, and quickly became his favorite. Grant rarely let anyone else ride him. One exception was Abraham Lincoln, who visited Grant’s headquarters at City Point, Virginia, in the last weeks of the war and rode Cincinnati each day. Grant carried a deep sense of duty toward horses. Horace Porter, one of his staff officers, tells how Grant, seeing a teamster beating a horse during the **Overland Campaign**, had the man tied to a tree for hours as punishment. Grant refused an offer of \$10,000 for Cincinnati.

The war these men fought was about whether the Union would hold together, and at its heart was slavery. The Southern states that left the Union did so above all to protect slavery, a grave wrong, and Lee, though he had served the United States for over thirty years, chose to side with Virginia when it seceded. Grant fought to preserve the Union, and by 1865 the Union also fought to end slavery. More than 600,000 soldiers died. By April 1865 Lee’s starving army had been driven west from Petersburg and surrounded.

On 9 April 1865, Palm Sunday, Lee rode Traveller to the McLean house at **Appomattox Court House** to surrender. Grant rode in on Cincinnati, mud-spattered from the march. Horses were part of the terms themselves. Grant wrote that officers could keep their side arms, baggage and horses, and every soldier would be released on **parole**. Lee then mentioned that in his army many cavalrymen and artillerymen owned their own horses. Grant answered that most of them were small farmers, that they would need their horses to plant a crop and carry their families through the next winter, and that any man who claimed

a horse or mule could take it home. Lee said it would have the best possible effect on his men. Those horses helped the defeated South begin to plow again.

After the war Lee became president of Washington College in Lexington, Virginia, and rode Traveller in the mountains almost every afternoon. Late in 1866 Lee described the horse for an artist cousin who wished to paint him; the letter is in the **Primary source** box. Lee died on 12 October 1870, and Traveller, saddled and draped in black, walked behind the hearse. The next year he stepped on a nail, developed tetanus, and had to be put down. He is buried beside the chapel at the college (now Washington and Lee University). Cincinnati outlived the war by thirteen years and died in 1878 on the Maryland farm of Grant's boyhood friend Daniel Ammen, one of the few men Grant ever allowed to ride him.

There is honest complexity in remembering these horses. Traveller especially became a symbol in the "Lost Cause" memory of the war, which in later years praised the Confederacy while saying little about slavery. A Christian reading of history can honor courage, skill and the faithful care of an animal, and can admire both Lee's gentleness to Traveller and Grant's generosity at Appomattox, while saying plainly what the war was about. Both men's horses show something true: a good man is known in part by how he treats the creature that carries him.

PICTURE STUDY



General Robert E. Lee on Traveller, Michael Miley, 1866 · Photograph (albumen print from a glass-plate negative) · Taken in Lexington, Virginia; prints are held in many collections
Wikimedia Commons · Public domain

Michael Miley was a photographer in Lexington who had served as a Confederate soldier. After the war he photographed Lee several times. In 1866 a camera needed several seconds of perfect stillness, so a horse photographed this clearly had to be very calm. Notice that Lee wears no uniform: he was by then a college president.

Look closely

- Compare the horse with Lee's description in the Primary source: find the deep chest, short back, small head and black mane and tail.
- Look at the reins and Lee's hands. How is he holding the horse?
- Look at the ground and background. Why might Miley have chosen this spot?

Talk about it

1. What can a photograph show that Lee's letter cannot, and what can the letter show that no photograph can?
2. Why do you think this photograph became one of the most copied images of Lee?

HANDS-ON: TWO GENERALS, TWO HORSES: A COMPARISON CHART AND A PORTRAIT IN WORDS

Build a side-by-side chart of Traveller and Cincinnati, then write your own description of an animal in the style of Lee's letter.

You will need

- The Primary source excerpt
- Paper ruled into three columns: Question · Traveller · Cincinnati
- Your warm-up lists
- Optional: Grant's *Personal Memoirs* (1885-1886), on Project Gutenberg, chapter on the surrender

Steps

1. In the chart, answer for each horse: foaled where and when; breeding; color and height; how acquired and for how much; battles; who else rode him; death and burial.
2. Underline every fact in your chart that comes from the horse's owner (Lee's letter, Grant's refusal to sell) and circle any that come from later writers.
3. Read Lee's description aloud. Divide it into two lists: body (proportions, chest, legs ...) and character (endurance, sagacity, affection ...). Count each.
4. Write your own "portrait in words" of an animal you know, about 100 words, following Lee's pattern: a catalog of the body, then what a poet might say of its character, then a plain closing line.
5. Finish with two sentences: what does Lee's letter reveal about Lee himself?

Check your work

- My chart is complete for both horses.
- I separated firsthand facts from later accounts.
- My word portrait follows Lee's three-part pattern.

FIELD NOTEBOOK

1. **Famous Horses timeline, card 5: Traveller and Cincinnati.** Draw both horses at Appomattox on 9 April 1865. On the back give each horse's dates, color, owner and one fact.
2. Sketch a map of Virginia showing Lexington, Richmond, Petersburg, City Point and Appomattox Court House.
3. **Narration (one paragraph; the parent keeps it):** Tell how Traveller and Cincinnati came to stand outside the McLean house on 9 April 1865, and explain the part horses played in Grant's terms of surrender.

Did you know? Cincinnati's sire, Lexington, was blind in his later years yet became the leading sire in America sixteen times. Near the end of the war, after raiders carried off horses from his Kentucky farm, Lexington was sent away for a time to keep him safe. Lee owned other wartime horses too, including a mare named Lucy Long, who outlived him by many years.

Primary source. *Robert E. Lee, describing Traveller for an artist cousin who wished to paint him (late 1866, dictated to his daughter Agnes). From Captain Robert E. Lee, Recollections and Letters of General Robert E. Lee (1904), on Project Gutenberg (ebook #2323).*

If I were an artist like you I would draw a true picture of Traveller—representing his fine proportions, muscular figure, deep chest and short back, strong haunches, flat legs, small head, broad forehead, delicate ears, quick eye, small feet, and black mane and tail. Such a picture would inspire a poet, whose genius could then depict his worth and describe his endurance of toil, hunger, thirst, heat, cold, and the dangers and sufferings through which he passed. He could dilate upon his sagacity and affection, and his invariable response to every wish of his rider. He might even imagine his thoughts, through the long night marches and days of battle through which he has passed. But I am no artist; I can only say he is a Confederate gray.

Go deeper. Ulysses S. Grant, *Personal Memoirs* (1885–1886), the chapters on Appomattox, free on Project Gutenberg. Horace Porter, *Campaigning with Grant* (1897), by an officer who rode beside him. Captain Robert E. Lee, *Recollections and Letters of General Robert E. Lee* (1904), with a chapter on Traveller. Appomattox Court House National Historical Park (National Park Service) online pages on the surrender. Second video topic: the McLean house and the surrender at Appomattox.

Goes deeper in. History, "The Civil War and Reconstruction" (coming soon).

For families. Sources: *Recollections and Letters* (1904); Grant, *Personal Memoirs*; Porter, *Campaigning with Grant*; American Battlefield Trust; Washington and Lee University. Lee's description was checked phrase by phrase as reproduced from the 1904

book at HistoryOfWar.org; our tools could not open the full Gutenberg file, and Gutenberg's plain text prints the dash after "Traveller" as a double hyphen. Heights of both horses, the circumstances of Cincinnati's gift, and the teamster story are as reported by later writers. The chapel at Washington and Lee was called Lee Chapel for most of its history and was renamed in 2021. The stop names slavery plainly as a cause and a wrong and treats both generals by the standards and facts of their own time. Casualty figures are standard estimates.

PRACTICE

1. **EASY** What were Traveller's two earlier names, and how much did Lee pay for him?
2. **EASY** Who was Cincinnati's famous father, and which President rode Cincinnati?
3. **MEDIUM** In Lee's description, how many features of Traveller's body does he list before turning to what a poet might say? Name the qualities of character he lists.
4. **MEDIUM** Why did Grant allow Confederate soldiers to take their horses and mules home, and why did it matter?
5. **CHALLENGE** Traveller was foaled in 1857 and died in 1871; Cincinnati died in 1878. How old was Traveller at purchase, at Appomattox and at death? Broun paid \$175 and Lee \$200: what was Broun's percent profit?
6. **CHALLENGE** Lee ends: "I can only say he is a Confederate gray." Explain two meanings in this sentence and what they show about Lee's purpose in the letter.

Make it a game · Twenty Questions: Whose Horse? One player secretly chooses a horse from this trail so far (Bucephalus, Pharaoh's chariot horses, Job's warhorse, Marengo, Copenhagen, a Pony Express mustang, Traveller or Cincinnati). Others ask yes-or-no questions ("Was he grey?" "Did his rider become a President?" "Is he buried in Virginia?"). Whoever guesses in the fewest questions chooses next. Keep score of questions used.

Scripture. "A righteous man regardeth the life of his beast: but the tender mercies of the wicked are cruel." (Proverbs 12:10, KJV)

Lee's care for Traveller and Grant's anger at a man beating a horse both echo this proverb. So does Grant's order to let farmers take their horses home: mercy to beasts and mercy to people often go together.

Practice: answers

1. Jeff Davis and Greenbrier; \$200, in February 1862.
2. Lexington, the great Thoroughbred racehorse and sire; Abraham Lincoln, at City Point, Virginia, in 1865.
3. Twelve body features (thirteen if mane and tail are counted separately): fine proportions, muscular figure, deep chest, short back, strong haunches, flat legs, small head, broad forehead, delicate ears, quick eye, small feet, and black mane and tail. Character: endurance

of toil, hunger, thirst, heat, cold, dangers and sufferings; sagacity; affection; invariable response to every wish of his rider.

4. Most were small farmers who owned their animals and would need them to plant a crop and get their families through the winter. It eased hunger, showed generosity to a defeated enemy, and helped the South begin to recover; Lee said it would have the best possible effect on his men.
5. About 5 in 1862, 8 at Appomattox (April 1865), and 14 at death (1871). Profit: $\$25 \div \$175 \approx 0.143$, about a 14 percent gain.
6. Literally, Traveller's color is grey. It is also a pun on the grey uniform of the Confederacy: Traveller was a veteran who had shared the army's hardships. After an elaborate list, the short plain line is a modest, humorous ending ("I am no artist"); it shows Lee's affection for the horse and his memory of the war, without boasting.

3.6 SERGEANT RECKLESS, THE KOREAN WAR PACKHORSE

OBJECTIVES

- Tell the history of Reckless, the mare who carried ammunition for the U.S. Marines in Korea, from her purchase in 1952 to her death in 1968.
- Place her service in the Korean War (1950–1953) and the Battle for Outpost Vegas (March 1953).
- Use the real numbers of her work (trips, rounds, pounds, miles) to reason about loads, distance and endurance.

Warm-up. Fill a backpack with books until it weighs about 20 pounds (use a bathroom scale). Walk up and down a flight of stairs five times. Now imagine making that trip fifty-one times in one day, under fire, without a guide. What would you need from your body, your training and your friends?

Video slot. Video coming. Sergeant Reckless, Korean War horse of the U.S. Marines; the Reckless statue at the National Museum of the Marine Corps. Search approved channels (U.S. Marine Corps, National Museum of the Marine Corps, Smithsonian Channel, Kentucky Horse Park); preview first.

KEY TERMS

recoilless rifle

A light anti-tank gun that vents gas out the back when fired so it does not kick; the 75-mm rounds Reckless carried weighed about 24 pounds each.

outpost

A small fortified position on a hill in front of the main line, held to watch and slow the enemy.

pack animal

An animal that carries loads on its back in a pack saddle rather than pulling a wagon.

armistice

An agreement to stop fighting; the Korean armistice was signed on 27 July 1953, and no final peace treaty has ever been signed.

Purple Heart

An American military decoration given to those wounded in action; Marine records credit Reckless with two.

Dickin Medal

A British medal for animal bravery in war, awarded by the charity PDSA; Reckless received it after her death, in 2016.

CORE IDEAS

On 25 June 1950 the army of communist North Korea, armed by the Soviet Union, invaded South Korea. The United Nations sent forces to defend the South, most of them American, and in late 1950 communist China entered the war on the North's side. After a year of great swinging advances and retreats, the front settled near the 38th parallel, the line where the war began. From 1951 to 1953, while diplomats argued over an **armistice**, soldiers fought for steep, rocky hills in a war of trenches and **outposts** much like the First World War. Trucks and jeeps could not climb those hills. Ammunition went up on men's backs.

In October 1952 Lieutenant Eric Pedersen of the Recoilless Rifle Platoon, Anti-Tank Company, 5th Marine Regiment, 1st Marine Division, went to the Seoul racetrack looking for a **pack animal**. His platoon fired 75-mm **recoilless rifles**, and each round weighed about 24 pounds. He found a small chestnut mare with a white blaze and three white stockings, about 14 hands and 900 pounds, of the sturdy Mongolian type. Her Korean name meant "Morning Sun" or "Flame of the Morning." Her owner, a young stableboy named Kim Huk Moon, loved her, but his sister had lost a leg to a land mine and he needed money for an artificial leg. Pedersen paid \$250 of his own money. The Marines named her Reckless, after their nickname for the recoilless rifle.

Platoon Sergeant Joseph Latham trained her, and Private First Class Monroe Coleman cared for her. In what the Marines called "hoof camp," she learned to step over barbed wire, to lie down under fire, and to run for a bunker when someone shouted "Incoming!" She learned a supply route after being led over it once or twice, and then could make it alone. She also became the platoon's pet. She wandered into tents, slept beside the stove on cold nights, and ate nearly anything: scrambled eggs, pancakes, Coca-Cola, even, it is said, a hat and some poker chips.

Her greatest test came in the Battle for Outpost Vegas, 26–28 March 1953, when Chinese forces attacked a group of outposts the Marines had named Reno, Carson and Vegas. On a single day Reckless made **51 trips**, most of them alone, from the ammunition supply point to the firing positions. She carried **386 rounds**, more than 9,000 pounds, and walked more than 35 miles over steep ground, much of it under heavy shellfire. On the way down she sometimes carried wounded Marines to safety. She was hit twice by shell fragments, once above the left eye and once on the flank, and kept working. Marines who saw her said that her steady coming and going lifted their spirits as much as the ammunition did.

Reckless was promoted to corporal in 1953 and to sergeant in April 1954 by General Randolph Pate, who later, as Commandant of the Marine Corps, made her a staff sergeant on 31 August 1959. Marine Corps records credit her with two **Purple Hearts**, the Good Conduct Medal, and the unit decorations of her regiment. The armistice was signed on 27 July 1953, and in April 1954 an article by Andrew Geer, a Marine officer and writer, in the *Saturday Evening Post* made her famous at home. Marines and civilians raised money to bring her to America. She arrived in San Francisco on 10 November 1954, the Marine Corps' birthday, and spent the rest of her life at Camp Pendleton, California. She had four foals;

three of them, named Fearless, Dauntless and Chesty, lived to grow up. She died at Camp Pendleton on 13 May 1968, about twenty years old.

There is honest complexity here too. Military decorations are written for people, not animals, and some of her honors were given by her unit and commanders rather than through the formal process used for Marines; the Corps nonetheless kept her record and promotions like any Marine's. Stories about her appetite and personality grew in the telling, as camp stories do. But her work at Vegas was recorded by the men who were there, and the numbers come from unit accounts. In 1997, it is often reported, *Life* magazine listed her among America's hundred greatest heroes. Statues by Jocelyn Russell now stand at the National Museum of the Marine Corps in Virginia (2013), at Camp Pendleton (2016) and at the Kentucky Horse Park (2018), among other places.

Reckless did not understand the cause she served; she trusted the men who trained and cared for her, and she carried what they needed. The Marines in turn shared their tents, their food and their danger with her. Her story belongs beside the thousands of Korean civilians, like the boy who sold her, whose sacrifices are mostly unrecorded. It is also a story of burden-bearing: soldiers who carried each other down the hill, and a small horse who carried their load up it.

PICTURE STUDY



Reckless with Her Marine Corps Squad, Korea, U.S. Marine Corps photographer, 1953 · Black-and-white photograph · U.S. Marine Corps History Division collection
Wikimedia Commons · CC BY 2.0

This is not a painting but a working photograph, taken in Korea for the Marines' own records. Photographs like this are primary sources: they were made at the time, by people who were there. Notice how small she is beside the men; a Thoroughbred racehorse would stand a head higher.

Look closely

- Find her blaze and white stockings. How tall is she compared with the Marines?
- Look at the men's faces and how they stand around her. What does that tell you?
- Look at the ground and background. What can you learn about the land she worked on?

Talk about it

1. What can this photograph prove about Reckless, and what can it not prove?
2. Why might the Marines have wanted a photograph of the whole squad with her?

Safety first. For the warm-up and game, keep loads to a weight that is comfortable for the child (no more than about 10–15 percent of body weight), carry them on both shoulders, and use stairs only with a handrail. Never try loading a real horse without an experienced adult.

HANDS-ON: THE AMMUNITION RUN: A LOAD-AND-ENDURANCE STUDY

Use the numbers from Outpost Vegas to understand what Reckless did, and compare a horse's working capacity with a person's.

You will need

- A calculator and graph paper
- A bathroom scale
- The core ideas of this stop
- Optional: the National Museum of the Marine Corps' online page on Reckless

Steps

1. From the stop, record: 51 trips, 386 rounds, over 9,000 pounds, over 35 miles, about 900 pounds body weight, 24 pounds per round.
2. Calculate: rounds per trip; pounds per trip; miles per trip (round trip); and her load per trip as a percentage of her body weight.
3. Horsemen often say a pack horse can carry about 20 percent of its weight for a full day. Compare her average load with that rule. What does the result tell you about the distance and climb, rather than the weight, being the hardest part?
4. Weigh yourself. What is 20 percent of your weight? How many 24-pound rounds would that be?
5. Draw a simple side-view diagram of a hill: supply point at the bottom, firing position at the top. Label the trip length and the number of trips. Add a note on what made each trip dangerous.
6. Write a paragraph: what qualities made Reckless valuable, and which were trained and which were natural?

Check your work

- All five calculations are shown with units.
- I compared her load to a working rule and explained the result.
- My paragraph separates training from natural ability.

FIELD NOTEBOOK

1. **Famous Horses timeline, card 6: Sergeant Reckless.** Draw her with a pack saddle and rounds. On the back: about 1948–1968; bought October 1952 for \$250; Outpost Vegas, March 1953; 51 trips, 386 rounds; Staff Sergeant 1959.
2. Sketch a map of the Korean peninsula: mark the 38th parallel, Seoul, and the approximate area of the Marine outposts north of Seoul.
3. **Narration (one paragraph; the parent keeps it):** Tell the story of Reckless at Outpost Vegas and explain why the Marines treated her as one of their own.

Did you know? Reckless learned many supply routes after being led over them only once or twice, a skill horsemen call a good “homing” memory. When she arrived in America, the Marines had planned a ceremony for her at the Marine Corps birthday ball in San Francisco, and she attended; it is said she ate the flowers and part of the cake.

Go deeper. Andrew Geer, *Reckless: Pride of the Marines* (1955), by a Marine officer who knew her unit. Robin Hutton, *Sgt. Reckless: America’s War Horse* (2014). The National Museum of the Marine Corps (Triangle, Virginia) online pages and the Reckless statue in its grounds. The PDSA Dickin Medal page on Reckless. Second video topic: the Korean War from 1950 to the armistice of 1953.

Goes deeper in. History, “The Cold War and the Korean War,” and Arithmetic, “Rates and Percentages” (coming soon).

For families. Sources: U.S. Marine Corps History Division; National Museum of the Marine Corps; PDSA; Geer (1955); Hutton (2014). The Vegas figures (51 trips, 386 rounds, over 9,000 pounds, over 35 miles) come from Marine accounts; some details (the hat, the poker chips, the cake) are camp stories, marked “it is said.” No primary source box this time: the 1954 *Saturday Evening Post* article and Geer’s book are still under copyright, and we could not verify a public-domain Marine document to quote. War is told plainly without detail of wounds. The game uses light loads only; see the safety line.

PRACTICE

1. **EASY** Who bought Reckless, for how much, and why did her Korean owner sell her?
2. **EASY** What rank did Reckless finally hold, and who promoted her to it?
3. **MEDIUM** Why did the Marines need a pack horse in 1952–1953 when they had trucks and jeeps?
4. **MEDIUM** 386 rounds in 51 trips: how many rounds per trip on average? If a round weighed 24 pounds, about how many pounds per trip?

5. **CHALLENGE** Reckless weighed about 900 pounds. Her average load was about 182 pounds. What percentage of her body weight is that? If she walked 35 miles in 51 round trips, how long was each round trip, and what was the total distance she carried a load (uphill half only)?
6. **CHALLENGE** A historian says: "Military medals are meant for people, so the medals given to Reckless prove her story is exaggerated." Write a two- or three-sentence reply that is fair to both the evidence and the objection.

Make it a game • Supply Run. Set a "supply point" at one end of a yard or hall and a "firing position" at the other, with a few cushions as "trenches" to step over. Each player carries two light bags (about 2 pounds each) from supply to firing position, one trip at a time. A caller shouts "Incoming!" at random; carriers must kneel until "All clear." Count how many bags are delivered in five minutes as a team. Then talk about how Reckless made 51 trips alone.

Scripture. "Bear ye one another's burdens, and so fulfil the law of Christ." (Galatians 6:2, KJV)

Reckless bore the Marines' loads up the hill, and they bore their wounded down it. Paul's command is for people, not horses, but a faithful animal can be a picture of it. The law of Christ is fulfilled when we carry what others cannot carry alone.

Practice: answers

1. Lieutenant Eric Pedersen, for \$250, in October 1952. Kim Huk Moon sold her to buy an artificial leg for his sister, who had been injured by a land mine.
2. Staff sergeant, on 31 August 1959, by General Randolph Pate, Commandant of the Marine Corps.
3. The front had settled into a war of outposts on steep, rocky hills where vehicles could not go; ammunition had to be carried up on foot, and a trained horse could carry several times what a man could.
4. $386 \div 51 \approx 7.6$ rounds per trip; $7.6 \times 24 \approx 182$ pounds per trip (often 6 to 8 rounds at a time).
5. $182 \div 900 \approx 0.20$, about 20 percent. $35 \div 51 \approx 0.69$ mile per round trip (about 0.34 mile each way). Loaded distance: about 17.5 miles uphill, carrying roughly 9,000 pounds in all, on steep ground and under fire.
6. Model answer: The objection is right that decorations are written for people and that some of her honors were informal. But the eligibility of a medal does not change the record of what she did: the trips, rounds and wounds at Vegas come from the men who were there. Her honors are better read as the Marines' way of saying she served beside them, not as proof of every detail of every story told about her.

3.7 SEABISCUIT (1938)

OBJECTIVES

- Tell how an undersized, overraced colt became the most famous horse in America in 1938, and name the three men who made him.
- Explain the match race with War Admiral at Pimlico on 1 November 1938: the plan, the start, and the result.
- Connect Seabiscuit's fame to the Great Depression, radio and newspapers, and calculate speeds from the record.

Warm-up. Ask an older relative who the most famous athlete was when they were your age. Then ask: how did people hear about that athlete? In 1938 the answer for millions of Americans was a radio in the kitchen, and the athlete was a horse.

Video slot. Video coming. Seabiscuit and War Admiral match race, Pimlico, 1 November 1938 (newsreel footage); Seabiscuit in the Depression. Search approved channels (PBS American Experience, National Museum of Racing and Hall of Fame, Pimlico/Maryland Jockey Club, Smithsonian); preview first.

KEY TERMS

Great Depression

The worst economic collapse in American history, from 1929 to about 1939; in 1938 nearly one worker in five was out of work.

Triple Crown

Winning the Kentucky Derby, the Preakness Stakes and the Belmont Stakes in one year; War Admiral won it in 1937.

handicap

A race in which better horses are assigned more weight to carry, to even the field; Seabiscuit often carried 130 pounds or more.

match race

A race between only two horses, arranged by their owners as a direct test of which is better.

walk-up start

A start without a starting gate: the horses walk up to the line and are sent off by a flag or bell.

length

The usual way to measure the gap between racehorses: one horse's length, about 8 feet.

CORE IDEAS

Seabiscuit was foaled on 23 May 1933 at Claiborne Farm in Kentucky. On paper he was royalty: his sire, Hard Tack, was a son of Man o' War, the most famous American racehorse of the century. In the flesh he was a disappointment: small, knobby-kneed, lazy in the mornings, and fond of sleeping late. His great trainer, "Sunny Jim" Fitzsimmons, had better horses in the same barn, among them the future Triple Crown winner Omaha, and he used Seabiscuit hard as a workmanlike runner. As a two-year-old, Seabiscuit ran 35 races, an enormous number, and won only five. By the summer of 1936 he looked like an ordinary horse that had been worn down.

Three men changed that. **Charles Howard** had started as a bicycle repairman in San Francisco and built a fortune selling Buick automobiles in California. He bought Seabiscuit in August 1936 for \$8,000. His trainer, **Tom Smith**, was a weathered, silent man who had spent his life breaking mustangs and working horses on western ranges before he trained racehorses. Smith let Seabiscuit sleep, gave him a quiet companion horse in the stall, and slowly rebuilt his confidence. His jockey, **John "Red" Pollard**, was a Canadian who had drifted through tracks as a boxer and rider; he had lost the sight of his right eye after a blow to the head and hid it to keep his job. Horse, owner, trainer and rider were all, in different ways, outsiders. Within a year Seabiscuit was winning major races in California and the East.

Americans in 1937 and 1938 were ready for such a story. The **Great Depression** had lasted eight years; a sharp new slump in 1937–1938 had thrown millions back out of work. Radio had become the center of family life, and newsreels played before every film. Seabiscuit, an underdog with a cast of underdogs around him, crossing the country by train to race, was exactly what reporters wanted. Yet he kept losing by inches the race that Howard most wanted, the rich Santa Anita **Handicap**: in 1937 and again in 1938 he was beaten by a nose. As the best horse in the West, he was given heavy weights to carry, often 130 pounds or more.

In the East, the champion was **War Admiral**, a son of Man o' War and so Seabiscuit's half-uncle. He had won the **Triple Crown** in 1937. War Admiral was fast from the start and loved to lead; Seabiscuit usually came from behind. For two years the public argued which was better. A **match race** was set for Memorial Day 1938 and canceled when Seabiscuit went lame. Then Pollard was badly injured in a fall on another horse, and the great jockey George Woolf took over. At last the two met in the Pimlico Special in Baltimore on Tuesday, 1 November 1938, at a mile and three-sixteenths, carrying equal weights of 120 pounds.

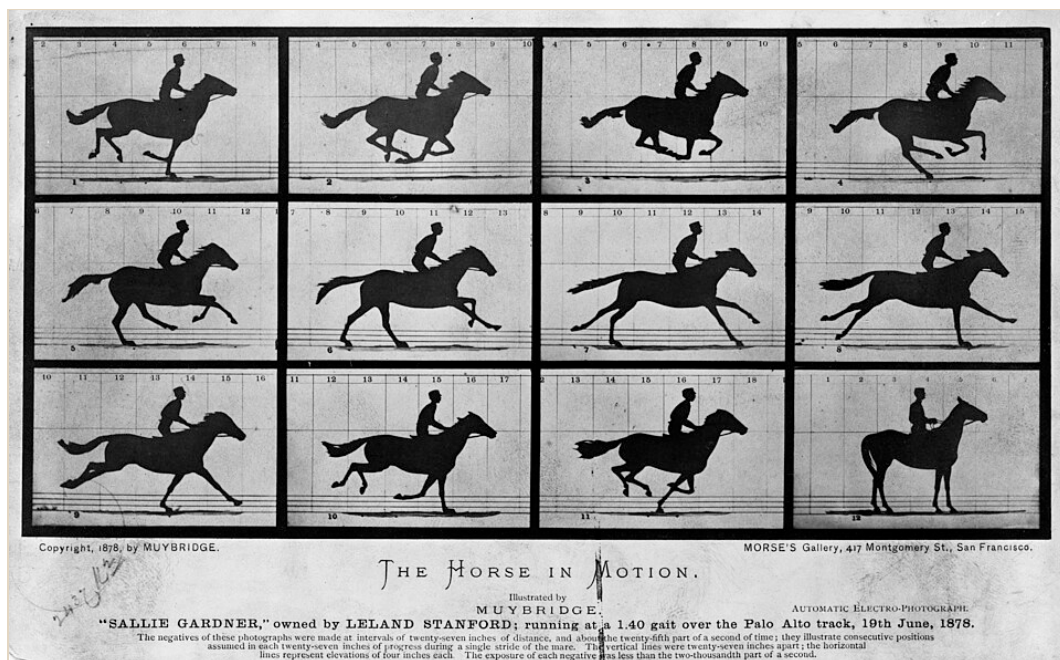
Because there were only two horses, there was no starting gate; it was a **walk-up start**, begun by the starter ringing a hand bell. Tom Smith had secretly taught Seabiscuit to explode from a standstill at the sound of a bell. War Admiral's side expected their horse to take the lead. Instead, at the bell Seabiscuit jumped away first and led into the first turn. Woolf then let War Admiral come up alongside on the backstretch, so the two ran neck and neck, looking each other in the eye. Woolf had learned from Pollard that Seabiscuit fought hardest when a rival drew even. In the final stretch Seabiscuit pulled away and won by four **lengths**, in a track-record time of 1 minute 56 $\frac{3}{5}$ seconds. About 40,000 people were at the

track, and an estimated 40 million listened on radio. Seabiscuit was named 1938 Horse of the Year.

The story did not end there. In early 1939 Seabiscuit tore a ligament in his leg, and Pollard's leg was still shattered. Horse and rider spent the year recovering together at Howard's ranch in northern California. Most people thought both were finished. On 2 March 1940, at age six, with Pollard back in the saddle, Seabiscuit at last won the Santa Anita Handicap. He retired as the leading money winner in the history of racing up to that time, with \$437,730. He lived out his life at Howard's Ridgewood Ranch and died there in 1947.

A few cautions are in order. The 40 million figure is an estimate, and the size of radio audiences in 1938 cannot be measured exactly. Some famous stories about Seabiscuit, such as President Franklin Roosevelt keeping advisers waiting so he could listen to the race, are told in many places but are hard to document. Horse racing in these years was tied closely to gambling, which this stop leaves aside. What is certain is the record: an overworked, written-off horse, rebuilt by patience, beat a Triple Crown champion. Ecclesiastes says that "the race is not to the swift"; sometimes it is not to the one on paper, either.

PICTURE STUDY



The Horse in Motion ("Sallie Gardner," running), Eadweard Muybridge, 1878 · Photographs (twelve frames), printed as a cabinet card · Library of Congress, Washington, D.C.
Wikimedia Commons · Public domain

In 1878 the photographer Eadweard Muybridge set a row of cameras along a track at Leland Stanford's farm in Palo Alto, California, each fired by a thread as a running mare passed. For the first time people could see exactly how a horse's legs move at a gallop. The cameras that judged close racing finishes in Seabiscuit's day (the "photo finish") were great-grandchildren of this experiment.

Look closely

- Find the frame or frames where all four hooves are off the ground. Where are the legs: stretched out or gathered under the body?
- Count how many frames show only one hoof on the ground.
- Look at the jockey. Does his position change as much as the horse's?

Talk about it

1. Painters before 1878 often showed galloping horses with all four legs stretched out like a rocking horse. What did Muybridge prove?
2. How would close-up photographs like these change the way people judged races decided "by a nose"?

HANDS-ON: CALL THE RACE: A 1938 RADIO SCRIPT

Radio made Seabiscuit a hero. Write and perform a two-minute radio call of the Pimlico Special, accurate to the record.

You will need

- Paper and pencil
- A timer or stopwatch
- A phone or recorder (optional)
- Optional: newsreel footage of the race (preview first) to check your details

Steps

1. Make a fact list first: date, track, distance, weights, jockeys (Woolf on Seabiscuit, Charles Kurtsinger on War Admiral), the bell start, who led at the first turn, the duel on the backstretch, the margin, the time.
2. Divide your script into four parts: the crowd and the start; the first turn; the backstretch duel; the stretch and finish.
3. Use only facts from your list. Make it exciting with verbs and pace, not by inventing events.
4. Time it. The race itself took under two minutes; your call should too.
5. Perform it for your family. Afterward, explain in two sentences why a radio call, with no pictures, could make the race feel more exciting to listeners than a photograph.

Check your work

- Every event in my script matches the record.
- My call is under two minutes and has all four parts.
- I explained what radio added to the story.

FIELD NOTEBOOK

1. **Famous Horses timeline, card 7: Seabiscuit.** Draw Seabiscuit and War Admiral neck and neck. On the back: 1933–1947; owner Charles Howard; trainer Tom Smith; jockeys Red Pollard and George Woolf; beat War Admiral by four lengths, 1 November 1938.
2. Draw a simple diagram of the Pimlico oval and mark where Seabiscuit led, where War Admiral drew even, and where Seabiscuit pulled away.
3. **Narration (one paragraph; the parent keeps it):** Explain why a horse became the most famous figure in America in 1938, giving at least two reasons rooted in the times and two in the horse and his team.

Did you know? Tom Smith trained Seabiscuit to break at the bell by ringing one at odd moments during morning workouts, so the horse learned to bolt forward at the sound. Seabiscuit also had a stable companion, a quiet horse named Pumpkin, and for a time a dog and a spider monkey, to calm him.

Go deeper. Laura Hillenbrand, *Seabiscuit: An American Legend* (2001), a careful and gripping history; it discusses gambling and the rough life of jockeys, so a parent may wish to preview. The National Museum of Racing and Hall of Fame (Saratoga Springs, New York) online pages on Seabiscuit and War Admiral. Ridgewood Ranch (Willits, California), where Seabiscuit lived and is buried, has a history page. Second video topic: Eadweard Muybridge and the first motion photographs (1878).

Goes deeper in. History, “The Great Depression and the New Deal,” Arithmetic, “Speed, Distance and Time,” and Life Science, “How Animals Move” (coming soon).

For families. Sources: National Museum of Racing and Hall of Fame; Keeneland Library; PBS *American Experience*, “Seabiscuit”; Hillenbrand (2001). The 40,000 at the track and 40 million listeners are contemporary estimates. The Roosevelt story is widely told but hard to document and is marked as such. No primary source box this time: 1938 newspaper and radio accounts may still be under copyright, and we could not verify a public-domain text to quote. Racing in this era was bound up with betting; the stop does not discuss odds or wagers. The 1937 and 1938 Santa Anita Handicap losses by a nose (to Rosemont and Stagehand) are from racing records.

PRACTICE

1. **EASY** Name Seabiscuit’s owner, trainer, and his two famous jockeys.
2. **EASY** When and where did Seabiscuit beat War Admiral, and by how much?
3. **MEDIUM** How was Seabiscuit related to War Admiral, and why does that make the match interesting?
4. **MEDIUM** What was Tom Smith’s secret preparation for the start, and why did it matter so much in this race?

5. **CHALLENGE** The race was $1 \frac{3}{16}$ miles in $1:56 \frac{3}{5}$ (116.6 seconds). Find Seabiscuit's average speed in miles per hour and in feet per second. (1 mile = 5,280 feet.)
6. **CHALLENGE** Four lengths is about 32 feet. At Seabiscuit's average speed (about 54 feet per second), how many seconds behind was War Admiral? In 1938 the U.S. population was about 130 million: what share of Americans is 40 million listeners? Why should we treat that share with caution?

Make it a game • Break at the Bell. Two players stand side by side at a starting line. A caller rings a bell (or claps) at a random moment, sometimes after a long pause, sometimes almost at once. The first to step over the line on the sound wins the start; anyone who moves before the bell goes back two steps. Then race to a mark 20 yards away with a rule that the leader must let the other draw even at the halfway cone before the final sprint, just as Woolf did.

Scripture. "I returned, and saw under the sun, that the race is not to the swift, nor the battle to the strong, neither yet bread to the wise, nor yet riches to men of understanding, nor yet favour to men of skill; but time and chance happeneth to them all." (Ecclesiastes 9:11, KJV)

The Preacher does not say speed and skill are worthless; Seabiscuit was fast and his team was skilled. He says that no one controls the outcome. Seabiscuit lost races he should have won and won the one he was supposed to lose, and the men around him learned patience through injury and loss.

Practice: answers

1. Owner Charles Howard; trainer Tom Smith; jockeys Red Pollard and George Woolf (who rode the match race).
2. 1 November 1938, in the Pimlico Special at Pimlico Race Course, Baltimore; by four lengths.
3. Seabiscuit's sire, Hard Tack, was a son of Man o' War; War Admiral was also a son of Man o' War, so War Admiral was Seabiscuit's half-uncle. Both carried the same famous blood, yet one was a Triple Crown winner and the other had been written off.
4. He trained Seabiscuit to burst forward at the sound of a bell. With a walk-up start by bell, Seabiscuit jumped first and took the lead, which upset War Admiral's plan to lead from the front.
5. $1 \frac{3}{16} = 1.1875$ miles. $1.1875 \div 116.6 \times 3,600 \approx 36.7$ mph. In feet: $1.1875 \times 5,280 = 6,270$ ft; $6,270 \div 116.6 \approx 53.8$ feet per second.
6. $32 \div 54 \approx 0.6$ second. $40 \div 130 \approx 0.31$, about 31 percent, nearly one in three Americans. Caution: 40 million was an estimate; radio audiences could not be counted exactly, and the figure may include people hearing replays or news summaries.

3.8 SECRETARIAT'S BELMONT (1973)

OBJECTIVES

- Tell the story of Secretariat, from the coin toss that decided his owner to the Triple Crown of 1973.
- Analyze the official quarter-mile times of the 1973 Belmont Stakes and explain why the race is called the greatest ever run.
- Separate the measured record (2:24, 31 lengths) from the estimates and legends (the size of his heart).

Warm-up. Run (or walk fast) four laps of a set course and have someone time each lap. Was your fastest lap the first or the last? Most runners slow down. Keep your times; you will compare them with Secretariat's.

Video slot. Video coming. Secretariat, 1973 Belmont Stakes (the original CBS broadcast is widely available); Secretariat's Triple Crown. Search approved channels (NYRA / Belmont Stakes, Kentucky Derby Museum, National Museum of Racing and Hall of Fame, Secretariat.com official); preview first.

KEY TERMS

Triple Crown

The Kentucky Derby (1¼ miles), Preakness Stakes (1 3/16 miles) and Belmont Stakes (1½ miles), all for three-year-olds within about five weeks.

fraction

In racing, the official time at each quarter-mile point of a race, used to judge pace.

furlong

One-eighth of a mile (220 yards); the Belmont is 12 furlongs.

syndicate

A group of breeders who each buy a share in a stallion's future offspring; Secretariat was syndicated for a record \$6.08 million before he won the Triple Crown.

pedigree

A horse's recorded ancestry; every Thoroughbred traces back to a few stallions imported to England around 1700.

laminitis

A painful, often fatal inflammation inside the hoof; it ended Secretariat's life in 1989.

CORE IDEAS

In 1969 two horse owners settled a breeding agreement with a coin toss. Ogden Phipps, one of the richest men in American racing, and Penny Chenery, who had taken charge of her ailing father's Virginia farm, Meadow Stable, had agreed to share the foals of two Meadow

mares bred to Phipps's great stallion Bold Ruler. Phipps won the toss and chose first. Chenery received, among others, the unborn foal of the mare Somethingroyale. That chestnut colt was foaled on 30 March 1970 and was named **Secretariat** by the stable's secretary, Elizabeth Ham. Grooms called him Big Red.

He was trained by Lucien Laurin, a French-Canadian, and ridden by Ron Turcotte, a former lumberjack from New Brunswick. He was big, about 16.2 hands and some 1,175 pounds, with a deep chest, powerful hindquarters, and three white socks and a star. As a two-year-old in 1972 he won seven of nine races and was named Horse of the Year, which almost never happens to a two-year-old. Early in 1973 Chenery, facing heavy estate taxes after her father's death, **syndicated** him for a record \$6.08 million: thirty-two shares at \$190,000 each. The horse had not yet won a Triple Crown race.

No horse had won the **Triple Crown** since Citation in 1948, twenty-five years earlier, and many said it could no longer be done. On 5 May 1973 Secretariat won the Kentucky Derby in 1:59 2/5, a record that still stands, and he ran each quarter-mile faster than the one before. On 19 May he won the Preakness, with a final time officially corrected in 2012 to 1:53, also a record. In both races the second-place horse was Sham, a fine colt who would have been a champion in almost any other year. The week before the Belmont, Secretariat was on the covers of *Time*, *Newsweek* and *Sports Illustrated* at once.

The Belmont Stakes, run on 9 June 1973 in New York, is 1½ miles, twelve **furlongs**, the longest of the three. Only five horses ran. Sham's camp decided to go with Secretariat from the start and try to wear him down. For three-quarters of a mile the two raced side by side at a blistering pace: the first quarter in 23 3/5 seconds, the half in 46 1/5, six furlongs in 1:09 4/5. Such a pace should have exhausted both horses. Sham broke and dropped back to finish last. Secretariat did not. He reached the mile in 1:34 1/5 and a mile and a quarter in 1:59, faster than his own Derby record, and kept going. Turcotte, looking back under his arm in the stretch, saw no one near him. Secretariat won by **31 lengths**, more than 240 feet, in **2:24 flat**.

That time broke the Belmont record by more than two seconds and set a world record for 1½ miles on dirt that still stands, more than fifty years later. Racing writers had a hard time finding words. The CBS announcer, Chic Anderson, called him moving "like a tremendous machine." More than 67,000 people at the track roared for almost the whole last quarter-mile, and millions watched on television. Experts who study the race point to the **fractions**: after running the fastest early pace in the race's history, Secretariat ran each later quarter in about 24 to 25 seconds, slowing far less than any horse should have.

Why could he do it? His **pedigree** combined speed (Bold Ruler) and stamina (Somethingroyale's family), and his size and stride, about 24 feet at full gallop, were exceptional. When Secretariat died in 1989, the veterinarian who examined him, Dr. Thomas Swerczek, reported that his heart was about two and a half times the size of a normal horse's, and estimated it at about 22 pounds. Here a careful reader must notice the word *estimated*: the heart was not weighed. A large heart pumps more blood and oxygen, which

fits the record, but the 22-pound figure is a veterinarian's judgment, not a measurement. The race itself is the measurement.

Secretariat raced a few more times in 1973, including two wins on grass, and retired to Claiborne Farm in Kentucky, where he sired many good horses (among them the champion filly Lady's Secret and the Preakness and Belmont winner Risen Star), though none quite like himself. In the autumn of 1989 he developed **laminitis** and was put down on 4 October, at nineteen. He is buried whole at Claiborne, an honor usually given only to the greatest. Bucephalus carried a conqueror, Traveller and Cincinnati carried generals, and Reckless carried ammunition; Secretariat carried only a jockey, and showed what God built into the horse when it is bred, trained and allowed to run.

PICTURE STUDY



Whistlejacket, George Stubbs, About 1762 · Oil on canvas · The National Gallery, London
Wikimedia Commons · Public domain

George Stubbs spent eighteen months dissecting and drawing horses to learn their anatomy before he painted racehorses for English noblemen. Whistlejacket was a chestnut racehorse owned by the Marquess of Rockingham, and a grandson of the Godolphin Arabian, one of the three stallions from which every Thoroughbred descends. Secretariat descends from that same small founding family, two centuries later. The painting is nearly 10 feet tall, and the horse is life-size.

Look closely

- Find the muscles of the neck, shoulder and hindquarters. How did Stubbs's study of anatomy show here?
- Look at the background. What is missing, and what does that do to the horse?
- Look at the eye and nostril. Is this horse calm, excited or wild?

Talk about it

1. Whistlejacket and Secretariat were both chestnut Thoroughbreds. What has changed in two hundred years of breeding, and what has not?
2. Why might a nobleman want a life-size portrait of a horse, with no rider at all?

HANDS-ON: GRAPH THE GREATEST RACE

Use the official fractions of the 1973 Belmont to build a pace graph and prove for yourself why the race was extraordinary.

You will need

- Graph paper or a spreadsheet
- A calculator
- The official fractions: 1/4 mile 0:23 $\frac{3}{5}$; 1/2 mile 0:46 $\frac{1}{5}$; 3/4 mile 1:09 $\frac{4}{5}$; 1 mile 1:34 $\frac{1}{5}$; 1 $\frac{1}{4}$ miles 1:59; 1 $\frac{1}{2}$ miles 2:24
- Your warm-up lap times

Steps

1. Convert each time to seconds with decimals ($\frac{3}{5} = 0.6$, $\frac{1}{5} = 0.2$, $\frac{4}{5} = 0.8$).
2. Subtract to find the time for each separate quarter-mile (six quarters).
3. Graph the six quarter-mile times as a bar chart. Draw a horizontal line at 24.0 seconds, the average.
4. Find the speed in miles per hour for the fastest and slowest quarters. (A quarter mile in t seconds is $0.25 \times 3,600 \div t$ mph.)
5. Compare: in the Derby, Secretariat ran each quarter faster than the last. In the Belmont he started much faster and slowed. Write a paragraph explaining what the Belmont graph shows about the early duel with Sham and about Secretariat's stamina.
6. Graph your own warm-up laps beside his. Did you slow down more or less, in percentage, than Secretariat did from his fastest to his slowest quarter?

Check your work

- All six quarter times are correct and add up to 144 seconds.
- My bar chart is labeled, with an average line.
- My paragraph uses the numbers to explain the race.

FIELD NOTEBOOK

1. **Famous Horses timeline, card 8: Secretariat.** Draw Secretariat in full stride with Ron Turcotte. On the back: 1970–1989; Bold Ruler $\times$ Somethingroyale; owner Penny Chenery; trainer Lucien Laurin; Triple Crown 1973; Belmont 2:24, by 31 lengths.
2. Lay your eight timeline cards in order from Bucephalus (about 356 BC) to Secretariat (1973). Draw a line under them and mark the centuries. Which gap between cards is the longest?

3. **Narration (one paragraph; the parent keeps it):** Explain why the 1973 Belmont Stakes is called the greatest race ever run, using at least three of its numbers, and say which famous claim about Secretariat is an estimate rather than a measurement.

Did you know? Secretariat's 2:24 in the Belmont is still the American record for 1½ miles on dirt, his 1:59 2/5 in the Kentucky Derby is still the Derby record, and since 2012 his Preakness time of 1:53 has been the official Preakness record. Very few athletes, human or horse, still hold records in all three of their greatest races half a century later.

Go deeper. William Nack, *Secretariat: The Making of a Champion* (1975; revised as *Secretariat*, 2010), by a reporter who followed the horse daily. The Kentucky Derby Museum (Louisville) and the National Museum of Racing and Hall of Fame (Saratoga Springs, New York), each with online pages on Secretariat. Claiborne Farm (Paris, Kentucky) welcomes visitors to the graves of Secretariat and other champions by appointment. Second video topic: how a Thoroughbred's stride and heart work at a gallop.

Goes deeper in. Arithmetic, "Speed, Distance and Time," Life Science, "The Heart and Circulation," and Small Business & Economics, "Shares and Syndicates" (coming soon).

For families. Sources: New York Racing Association (Belmont Stakes history); National Museum of Racing and Hall of Fame; *Sports Illustrated* race report (18 June 1973); Nack (1975). The fractions and final time are from the official chart. The heart size is the examining veterinarian's estimate, not a weight. Height, weight and stride length are typical published figures and vary a little. The Chic Anderson phrase is a well-known three-word excerpt from the broadcast. No primary source box: the broadcast and 1973 press accounts are under copyright, so the official race data serve as the source for the project. The stop says nothing about betting, which was part of the sport.

PRACTICE

1. **EASY** What are the three races of the Triple Crown, and what was the gap in years before Secretariat won it?
2. **EASY** What was Secretariat's time and winning margin in the 1973 Belmont?
3. **MEDIUM** Find Secretariat's average speed for the whole Belmont in miles per hour.
4. **MEDIUM** Why is "his heart weighed 22 pounds" not quite accurate? Rewrite the claim correctly.
5. **CHALLENGE** From the official fractions, find the time of each of the six quarter-miles. Which was fastest and which slowest, and what was his speed in each?
6. **CHALLENGE** A length is about 8 feet. How far ahead was Secretariat at the finish? At his final-quarter speed (36 mph $\approx$ 52.8 feet per second), how many seconds behind was Twice a Prince? The syndication sold 32 shares at \$190,000: check the total.

Make it a game • Pace Judge. Mark a short course (about 50 yards). Each player tries to run it four times as evenly as possible without looking at a watch, while a partner times

each run. Score by the difference between your fastest and slowest runs: smallest difference wins. Then try the “Sham strategy”: sprint the first run all-out and see what happens to the others. Talk about why Secretariat’s Belmont amazed horsemen.

Scripture. “Know ye not that they which run in a race run all, but one receiveth the prize? So run, that ye may obtain.” (1 Corinthians 9:24, KJV)

Paul wrote to Corinth, home of the Isthmian Games, and used the race to teach discipline in the Christian life. The next verse adds: “Now they do it to obtain a corruptible crown; but we an incorruptible.” Secretariat’s records still stand, but every earthly crown fades; Paul calls us to run for one that does not.

Practice: answers

1. The Kentucky Derby, the Preakness Stakes and the Belmont Stakes. Twenty-five years: no horse had won since Citation in 1948.
2. 2:24 flat for $1\frac{1}{2}$ miles, by 31 lengths.
3. $1.5 \text{ miles} \div 144 \text{ seconds} \times 3,600 = 37.5 \text{ mph}$.
4. The heart was never weighed; the veterinarian estimated it. Correct form: “The veterinarian who examined him estimated his heart at about 22 pounds, roughly two and a half times normal.”
5. Quarters: 23.6, 22.6, 23.6, 24.4, 24.8, 25.0 seconds (sum 144.0). Fastest: the second quarter, $22.6 \text{ s} \approx 39.8 \text{ mph}$ ($0.25 \times 3,600 \div 22.6$). Slowest: the last, $25.0 \text{ s} = 36.0 \text{ mph}$. He slowed by only about 10 percent from his fastest quarter to his last, after a pace that broke every other horse.
6. $31 \times 8 = 248 \text{ feet}$. $248 \div 52.8 \approx 4.7 \text{ seconds}$ behind (an estimate; Twice a Prince was slowing too, and the exact gap depends on his speed, not Secretariat’s). Syndication: $32 \times \$190,000 = \$6,080,000$, the reported \$6.08 million.

TRAIL 3 BADGE QUIZ

The badge quizzes are optional and may be written or oral. Answers should be in complete sentences, and calculations should show their work. Four right out of five earns the first badge; five right out of six earns the second. Badges and the certificate are earned by doing the stops, not by scores.

Badge quiz 1 (Stops 1-5)

1. How did the young Alexander tame Bucephalus, and why did the method work on a prey animal?
2. Name two passages of Scripture about horses and explain how one praises the horse and the other warns about it.
3. Give one reason historians trust the story of Copenhagen at Waterloo more than the legend of Marengo.
4. The Pony Express route was about 1,966 miles and the schedule 10 days. Find the average speed in miles per hour, and give two reasons the service lost money.
5. What part did horses play in the terms of surrender at Appomattox Court House?

Badge quiz 2 (Stops 6-8)

6. Reckless made 51 trips and carried 386 rounds of about 24 pounds each at Outpost Vegas. About how many pounds did she carry in all, and on average per trip?
7. Why did the Marines need a pack horse in 1952-1953, and why did she sell for \$250?
8. Give two reasons Seabiscuit became a national hero in 1938, one about the horse and his team and one about the times.
9. What was Tom Smith's secret preparation for the match race, and why did it work?
10. Secretariat ran the 1½-mile Belmont in 2:24. Find his average speed in mph, and say which famous claim about him is an estimate rather than a measurement.
11. Put these in order from earliest to latest: Copenhagen at Waterloo; Bucephalus at the Hydaspes; the Pony Express; Reckless at Outpost Vegas; Traveller at Appomattox; Seabiscuit's match race; Secretariat's Belmont.

TRAIL CERTIFICATE: MY FAMOUS HORSES TIMELINE AND HISTORIAN'S NOTEBOOK

Mount your eight timeline cards in order on a long strip of paper or across two notebook pages, from Bucephalus (about 356-326 BC) to Secretariat (1973), with a scale line marking the centuries.

Gather your eight narration paragraphs and your best project (a chart, a graph, a fact-check table or a script). Add a one-page essay: "Which famous horse's story is best supported by evidence, and which is most surrounded by legend?" Quote at least one primary source exactly and name it.

When the portfolio is done, a parent reviews it with the rubric and signs the Trail C certificate.

- **Accuracy:** Dates, names and numbers are correct; estimates are labeled as estimates; calculations show their work.
- **Use of sources:** Primary sources are quoted exactly and named; the student explains what each source can and cannot prove.
- **Reasoning:** The essay separates documented fact from legend with specific evidence, and judges people by the facts and standards of their own time.
- **Narration and presentation:** Eight clear narration paragraphs in the student's own words; timeline cards are neat, illustrated and in order.

Answer key

1. He turned the horse toward the sun, because he had noticed it was afraid of its moving shadow; then he calmed it, mounted quietly, and gathered the reins without whip or spur. Facing the sun put the shadow behind the horse, removing the "predator" that set off its flight instinct.
2. Example: Job 39:19-25 praises the warhorse as God's creation ("Hast thou given the horse strength?"); Psalm 20:7 warns, "Some trust in chariots, and some in horses: but we will remember the name of the LORD our God." (Also acceptable: Exodus 14-15, Deuteronomy 17:16, Isaiah 31:1, Psalm 33:17, Revelation 19:11.)
3. Copenhagen's breeding, ownership and burial are well documented, and Wellington himself spoke of him; no horse named Marengo appears in Napoleon's carefully kept stable records, and the story of his battles and age was built up later by his English owners.
4. $1,966 \div 240 \text{ hours} \approx 8.2 \text{ mph}$. Reasons (any two): huge fixed costs (horses, feed, about 190 stations, riders and keepers); small mail volume even at high prices; the price cut to \$1 per half-ounce; the telegraph replaced it in October 1861.
5. Grant allowed Confederate officers to keep their horses, and, when Lee mentioned that many cavalrymen and artillerymen owned theirs, agreed that any man who claimed a horse or mule could take it home to plant a crop. Lee said it would have the best possible effect on his men.
6. $386 \times 24 = 9,264$ pounds (over 9,000). $9,264 \div 51 \approx 182$ pounds per trip.
7. The war had become a fight for steep hill outposts where vehicles could not go, so ammunition had to be carried up by hand or by animal. Her owner, Kim Huk Moon, sold her to buy an artificial leg for his sister, who had been injured by a land mine.
8. Horse and team (any one): an undersized, overraced colt rebuilt by a patient trainer, ridden by a half-blind jockey, who beat the Triple Crown winner War Admiral by four lengths. Times (any one): the Great Depression and the 1937-1938 slump made people love an underdog; radio and newsreels brought the races into every home (about 40 million listened to the match race).
9. He trained Seabiscuit to bolt forward at the ring of a bell. The match had a walk-up start by bell, so Seabiscuit took the lead at once, upsetting War Admiral's plan to lead from the front.
10. $1.5 \div 144 \times 3,600 = 37.5 \text{ mph}$. The size of his heart (about 22 pounds) was the examining veterinarian's estimate; it was never weighed.
11. Bucephalus at the Hydaspes (326 BC); Copenhagen at Waterloo (1815); the Pony Express (1860-1861); Traveller at Appomattox (1865); Seabiscuit's match race (1938); Reckless at Outpost Vegas (1953); Secretariat's Belmont (1973).

HORSES TRAIL D: HORSES IN GREAT STORIES

The fourth trail of the Horses track reads the great horse books and the true stories behind them: Anna Sewell and why she wrote *Black Beauty* (1877); Ginger, Merrylegs and the bearing rein; the Bible's teaching on kindness to animals in Proverbs 12:10; Marguerite Henry's *Misty of Chincoteague* (1947), Pony Penning and the real Misty; *King of the Wind* and the Godolphin Arabian; Walter Farley's *The Black Stallion* (1941); and finally a horse story of the student's own, written and illustrated.

This is the ● **Expert** level, for ages 14 and up. Each stop takes 35 to 50 minutes and stands by itself. The student reads the stop, studies a public-domain primary source where one exists (four stops quote *Black Beauty* from Project Gutenberg), works the practice problems, including challenge problems with numbers and reasoning, and writes one narration paragraph that a parent keeps. The copyrighted novels are summarized, not quoted; reading them alongside the trail is encouraged but not required. The trail ends with an illustrated story of 1,200 to 2,000 words.

Five stops earn the **Horse Expert badge, Trail D part 1**; all eight stops earn part 2 and the **Trail D certificate**. The optional badge quizzes below check understanding; badges are earned by doing the stops.

BEFORE YOU BEGIN

- Read a chapter of a classic novel independently and write a paragraph summarizing it.
- Work with percentages, powers of 2 and unit rates (miles per hour, feet per second).

MASTERY CHECKLIST

- ☐ I can explain why Anna Sewell wrote *Black Beauty*, how the bearing rein harmed horses, and how the book answered it, quoting the primary source.
- ☐ I can explain Proverbs 12:10 and the Bible's wider teaching on animals, and judge an animal's care using the Five Freedoms.
- ☐ I can separate fact from fiction in *Misty of Chincoteague* and *King of the Wind*, and describe how Pony Penning manages the Assateague herd.
- ☐ I can explain the three foundation sires of the Thoroughbred and use pedigree arithmetic to show why they appear in every pedigree.
- ☐ I have written, illustrated, revised and bound an original horse story with a clear point of view and conflict.

GO DEEPER: BOOKS, MUSEUM PAGES AND RESOURCES

- **Anna Sewell, *Black Beauty* (Project Gutenberg, ebook #271)**
(<https://www.gutenberg.org/ebooks/271>): The full text, free. Used for the primary sources in Stops D1, D2, D3 and D8.

- **Chincoteague Volunteer Fire Company: Pony Penning** (<https://www.cvfc3.com>): History of Pony Penning, the swim and the auction, for Stops D4 and D5.
- **Chincoteague National Wildlife Refuge (U.S. Fish and Wildlife Service)** (<https://www.fws.gov/refuge/chincoteague>): Facts on the ponies, the refuge and the herd limit for Stop D5.
- **The National Gallery, London: George Stubbs, *Whistlejacket*** (<https://www.nationalgallery.org.uk/paintings/george-stubbs-whistlejacket>): Picture study and background for Stop D6, the Godolphin Arabian's grandson painted life-size.
- **Marguerite Henry, *Misty of Chincoteague* and *King of the Wind*; Walter Farley, *The Black Stallion*** (<https://www.worldcat.org>): Copyrighted novels, widely available at public libraries. Search WorldCat for a nearby copy.

4.1 ANNA SEWELL AND WHY SHE WROTE *BLACK BEAUTY*

OBJECTIVES

- Trace the events of Anna Sewell's life (1820–1878) that led her to write *Black Beauty*, and explain her stated purpose for it.
- Explain how working horses were treated in Victorian Britain and what early animal-welfare laws and societies were trying to change.
- Analyze why Sewell chose a horse as a first-person narrator, using a passage from Chapter 1 as evidence.

Warm-up. Think of a book that changed how people acted, not just how they felt. What does a book need to do to change behavior? Write three ideas in the margin of your notebook, then test them against *Black Beauty* at the end of the stop.

Video slot. Video coming. Anna Sewell's life in Norfolk and the writing of *Black Beauty*; Victorian working horses and cab horses. Search approved channels (Norfolk Museums, Norfolk Record Office, BBC archive or a literature-teaching channel such as Crash Course Literature or an English-heritage channel); preview first.

KEY TERMS

Quaker

A member of the Religious Society of Friends, a Christian body known in Sewell's day for plain living, honesty in trade and practical works of mercy. Anna was raised a Quaker; later in life her family attended Anglican and other churches as well.

first-person narrator

A storyteller who speaks as "I" from inside the story. In *Black Beauty* the narrator is the horse himself.

humane

Showing kindness and mercy, especially to the weak and to animals. The word gave its name to "humane societies."

RSPCA

The Royal Society for the Prevention of Cruelty to Animals. It was founded in London in 1824 as the SPCA and received the royal title in 1840.

outright sale

Selling a book's rights for one payment, with no royalties later. Sewell sold *Black Beauty* to Jarrold & Sons of Norwich for £40.

author's purpose

What a writer means a book to do: to inform, persuade, delight, or change behavior. Sewell said her aim was to change how people treated horses.

CORE IDEAS

Anna Sewell was born on 30 March 1820 in Great Yarmouth, a fishing port on the Norfolk coast of England. Her parents, Isaac and Mary Sewell, were Quakers of modest means, and the family moved several times as Isaac tried one business after another. Her mother taught Anna and her brother Philip at home in their early years. Mary Sewell later became a writer herself; her moral ballads for working families, such as *Mother's Last Words* (1860), sold in enormous numbers. Anna grew up in a household where writing was a tool for doing good, not mainly a way to become famous.

When Anna was about fourteen, she fell while hurrying home from school in the rain and badly hurt her ankles. The injury was poorly treated and never healed properly. For the rest of her life she could walk only short distances, and long stretches of illness kept her indoors. Her lameness tied her closely to horses: she depended on a pony carriage to get about, and she often drove her father to and from the railway station. Those who knew her remembered that she drove with a light hand on the reins and talked to her horse rather than using the whip. She learned horses the way a careful driver must: by watching ears, mouths, feet and moods every day.

Her England ran on horses. Before motor cars, horses pulled cabs, omnibuses, coal carts, brewers' drays, fire engines and farm wagons. Tens of thousands worked the streets of London alone. Many owners were careful, but overwork, harsh bits, heavy loads, lame horses kept in harness and the sale of worn-out animals to the cheapest buyers were common. Reformers had begun to push back. In 1822 Parliament passed "Martin's Act" against cruelty to cattle and horses, and in 1824 a group that included the clergyman Arthur Broome and the anti-slavery leader William Wilberforce founded the society that became the RSPCA. Laws, however, cannot see into every stable. Sewell wanted to reach the people who held the reins.

She began the book around 1871, when she was in her early fifties and often confined to her sofa at the family's home, the White House at Old Catton near Norwich. Writing went slowly. In the last stages she was too weak to write for long, so she dictated parts to her mother or wrote in pencil on slips of paper that her mother copied out. It took about six years. According to her mother's biographer, Mary Bayly, Anna described the book's "special aim" as being "to induce kindness, sympathy, and an understanding treatment of horses." It was written, in other words, less for children than for grooms, coachmen and cab drivers.

Sewell's great decision was to let the horse tell his own story. The first edition's title page called the book *Black Beauty: His Grooms and Companions. The Autobiography of a Horse*, "translated from the original equine." The joke has a serious point. A pamphlet tells a cab driver that a tight rein is cruel; a horse narrator lets him feel the ache in his own neck. The **first-person narrator** turns the reader from the driver's seat to the shafts. Because Beauty passes from owner to owner, Sewell can show many kinds of masters, kind and careless and cruel, and let the reader judge each one.

Jarrold & Sons of Norwich bought the book outright for £40, and it was published on 24 November 1877. Anna Sewell lived just long enough to hear that it was being read; she died on 25 April 1878, five months later, aged 58. She never earned another penny from it. The book's second life came in America. In 1890 George T. Angell of the Massachusetts Society for the Prevention of Cruelty to Animals printed a cheap edition and spread hundreds of thousands of copies, calling it "the *Uncle Tom's Cabin* of the horse." It has never been out of print since.

Was the book effective? Honest historians give a mixed answer. Fashions such as the tight bearing rein declined after the 1870s, and the book is widely credited with helping; but campaigns by the RSPCA and others, new laws, and finally the motor car all did their part, and no one can measure a book's share exactly. What is certain is that millions of readers learned to look at a horse and ask, "What is this like for him?" That question comes straight from Scripture's teaching that a righteous man regards the life of his beast, and it is the question Sewell wanted every driver to ask.

PICTURE STUDY



The Shoeing, Sir Edwin Landseer, 1844 · Oil on canvas · Tate Britain, London
Wikimedia Commons · Public domain

Sir Edwin Landseer was the most popular animal painter in Victorian Britain, a favorite of Queen Victoria. He painted *The Shoeing* in 1844, when Anna Sewell was twenty-four. The mare was a real horse who belonged to one of Landseer's friends. Like Sewell, Landseer asks the viewer to notice the animal's point of view; the scene is quiet, trusting work, not drama.

Look closely

- Study the mare's ears, eye and weight. What do they tell you about how she feels while her hoof is held?
- Look at the blacksmith's posture and hands. How does he show skill and care rather than force?
- Find the donkey and the hound. Why might Landseer include other animals in a picture about a horse?

Talk about it

1. How does this painting show the "understanding treatment of horses" that Sewell hoped to teach? Point to two details.
2. In Victorian Britain, paintings like this were reproduced as cheap prints and hung in ordinary homes. How might art and books together have shaped public feeling about animals?

HANDS-ON: AUTHOR'S PURPOSE DOSSIER

Build a short dossier (a folder of evidence) that answers the question: *Why did Anna Sewell write *Black Beauty*, and why as a horse?* You will use the primary source from Chapter 1 as your main evidence.

You will need

- Notebook paper or the Field Notebook
- A printed or copied version of the Chapter 1 passage in the Primary source box
- Two colored pencils or highlighters
- A copy of *Black Beauty* (Project Gutenberg, ebook #271, or a library copy), optional

Steps

1. Make a timeline with at least eight dates: Sewell's birth (1820), Martin's Act (1822), the SPCA (1824), her injury (about 1834), the royal title for the RSPCA (1840), beginning the book (about 1871), publication (24 November 1877) and her death (25 April 1878).
2. Copy the primary source passage. In one color, mark every habit or virtue the mother asks for. In a second color, mark every reason she gives.
3. Below it, list the four or five habits in your own words. Next to each, write how a horse with that habit would make a driver's life easier or safer.
4. Write a short paragraph explaining what a reader learns from hearing this advice in a horse's voice that he would not learn from a printed rule such as "Do not use the whip on a willing horse."
5. Finish with a one-sentence thesis: "Sewell wrote *Black Beauty* in order to ... , and she chose a horse narrator because"

Check your work

- My timeline has at least eight correct dates in order.

- I marked both the virtues and the reasons in the passage.
- My thesis names both Sewell's purpose and the reason for the horse narrator.

FIELD NOTEBOOK

1. **Narration (keep this page).** In one written paragraph of 8–10 sentences, tell the story of how *Black Beauty* came to be written, from Anna Sewell's injury to her death five months after publication. Include at least three dates. A parent dates and keeps the page.
2. Sketch Sewell's pony carriage and label the parts a driver handles: reins, whip, shafts, harness.
3. Copy her stated aim ("to induce kindness, sympathy, and an understanding treatment of horses") in your best handwriting at the top of your Trail D notebook.

Did you know? *Black Beauty* is often called one of the best-selling books ever written, though no one kept exact counts across all its editions and translations. Sewell wrote nothing else for publication. Her mother, Mary, outlived her by six years and was the more famous writer during their lifetimes.

Primary source. Anna Sewell, *Black Beauty* (1877), Chapter 1, "My Early Home." Project Gutenberg, ebook #271.

One day, when there was a good deal of kicking, my mother whinnied to me to come to her, and then she said: "I wish you to pay attention to what I am going to say to you. The colts who live here are very good colts, but they are cart-horse colts, and of course they have not learned manners. You have been well-bred and well-born; your father has a great name in these parts, and your grandfather won the cup two years at the Newmarket races; your grandmother had the sweetest temper of any horse I ever knew, and I think you have never seen me kick or bite. I hope you will grow up gentle and good, and never learn bad ways; do your work with a good will, lift your feet up well when you trot, and never bite or kick even in play."

Go deeper. Adrienne E. Gavin, *Dark Horse: A Life of Anna Sewell* (2004), the standard modern biography (for older readers and parents). Anna Sewell, *Black Beauty*, free at Project Gutenberg (ebook #271). The Norfolk Record Office blog has an article on Anna Sewell with pictures of her Norwich home. Second video topic: "Victorian London cab horses and omnibuses."

Goes deeper in. Literature, "The Victorian Novel," and History, "Victorian Britain" (coming soon).

For families. Sources: Britannica, "Anna Sewell"; Gavin, *Dark Horse*; Norfolk Record Office. Dates of birth, publication and death and the £40 sale are well documented. The exact circumstances of the ankle injury vary slightly between accounts, so the stop keeps

them general. The “special aim” quotation is from Sewell as reported by Mary Bayly in *The Life and Letters of Mrs. Sewell* (1889); it is quoted here as reported, not from a Gutenberg text. The Gutenberg edition’s title page shows only “The Autobiography of a Horse”; the longer first-edition title, with “translated from the original equine,” is recorded in bibliographies. Picture: Landseer, *The Shoeing*, Tate.

PRACTICE

1. **EASY** When and where was Anna Sewell born, and what injury shaped her life?
2. **EASY** How much did Sewell receive for *Black Beauty*, and from whom?
3. **MEDIUM** How old was Sewell when *Black Beauty* was published, and how many months did she live afterward?
4. **MEDIUM** Name two efforts to protect animals in Britain that came before *Black Beauty*.
5. **CHALLENGE** In the primary source, the mother appeals to the colt’s good breeding. Is she saying that good birth by itself makes a good horse? Use words from the passage to support your answer.
6. **CHALLENGE** Sewell wrote mainly for adults who worked with horses. Give two reasons a novel told by a horse might persuade a cab driver better than a law or a pamphlet, and one limit of that method.

Make it a game · Driver’s Seat or Shafts?. One player reads a situation aloud (“The driver jerks the reins at a corner,” “The groom checks the hooves before a long trip,” “A cab waits two hours in the rain”). The others answer twice: first as the driver, then in the voice of the horse, in one sentence each. Score a point for each answer that names a specific detail a horse would feel. The player with the most points chooses the next situation.

Scripture. “The LORD is good to all: and his tender mercies are over all his works.” (Psalm 145:9, KJV)

God’s care reaches to everything He made, including the animals. Anna Sewell’s book asked readers to let their own mercy follow the same pattern, so that a horse in a man’s hands would meet something of the goodness of its Maker.

Practice: answers

1. 30 March 1820, in Great Yarmouth, Norfolk. At about fourteen she badly injured her ankles in a fall; they never healed properly, and she was lame for life.
2. £40, in one outright payment from Jarrold & Sons of Norwich.
3. She was 57 (born March 1820, published November 1877). She died on 25 April 1878, five months later, aged 58.
4. Martin’s Act (1822), the first British law against cruelty to cattle and horses, and the founding of the SPCA in 1824 (royal title, RSPCA, in 1840).
5. No. She names his good family (“well-bred and well-born,” a grandmother with “the sweetest temper”) as an example to live up to, but every instruction is a habit he must choose and

practice: “grow up gentle and good,” “never learn bad ways,” “do your work with a good will,” “lift your feet up well,” “never bite or kick even in play.” Even the cart-horse colts are “very good colts” who simply “have not learned manners.” Character is learned and practiced, not inherited.

6. Reasons (any two): it makes the reader feel the horse’s pain and fear from the inside; it shows the results of kind and cruel handling in a story he can remember; it portrays good drivers as heroes he can copy rather than only scolding him; a story is passed on and read aloud to people who would never read a pamphlet. A limit: a story cannot be enforced, so it changes only those willing to read and listen; laws and inspection were still needed (and some critics call it sentimental because real horses do not think in words).

4.2 BLACK BEAUTY: GINGER, MERRYLEGS AND THE BEARING REIN

OBJECTIVES

- Outline the plot of *Black Beauty* as a series of owners, and explain why Sewell built the book that way.
- Compare Ginger and Merrylegs as character foils and explain how their treatment shaped their temperaments.
- Explain how the bearing rein works, why it was fashionable, and what harm it did, using Ginger's own words as evidence.

Warm-up. Sit straight and tilt your head back until you are looking at the ceiling. Hold it there for thirty seconds (stop at once if you feel dizzy). Now imagine holding it for two hours while pulling a carriage. Write one sentence about what you felt. That is the beginning of this stop.

Video slot. Video coming. What a bearing rein or check rein is on a carriage horse, and how driving harness works. Search approved channels (Carriage Association of America, the Royal Mews or a heavy-horse or driving-club channel, an RSPCA history clip); preview first.

KEY TERMS

bearing rein

A strap running from the bit up to a hook on the harness that holds a carriage horse's head high. Americans usually called it a **check-rein**.

bit

The metal bar in a horse's mouth to which the reins attach. Some fashionable harnesses used two bits at once, one of them sharp.

harness

The straps and collar by which a horse pulls a vehicle, as opposed to the saddle and bridle of a riding horse.

temperament

A horse's settled way of reacting to people and work: calm, nervous, willing, sour. It is shaped partly by nature and partly by handling.

foil

A character placed beside another to show the differences between them more clearly.

episodic plot

A story told as a chain of fairly separate episodes, linked by one main character. Beauty's series of owners gives the book this shape.

CORE IDEAS

Black Beauty has 49 short chapters in four parts, and its plot is a chain of homes. Beauty is born on Farmer Grey's farm, broken gently, and sold to Squire Gordon at Birtwick Park, where the coachman John Manly and the stable lads James Howard and Joe Green care for him. When the Gordons must move abroad, he is sold to Earlshall, the house of an earl, then passes through hired-horse stables to London, where he pulls a cab for the kind Jerry Barker and later for the hard master Nicholas Skinner. He collapses, is nursed back by Farmer Thoroughgood and his grandson Willie, and ends in a peaceful last home where the groom turns out to be Joe Green, now grown. This **episodic plot** lets Sewell show nearly every kind of horse work and every kind of master.

Ginger is a tall chestnut mare whom Beauty meets at Birtwick. She snaps and lays her ears back, and the grooms say she bites. In two chapters of her own story she explains why: she was taken from her mother too young, broken roughly by a man who forced her into submission, and then sold to a fashionable London owner. Sewell is careful here. Ginger's bad temper is real, and it is dangerous; but it has causes. When Ginger is handled patiently at Birtwick, she begins slowly to soften. The lesson is not that bad behavior does not matter, but that much of it is made by people and can be unmade by people.

Merrylegs is Ginger's **foil**: a little gray pony, fat and good-humored, beloved of Squire Gordon's daughters and the vicar's children. He has been treated well all his life, and he is patient with children because, as he says, he has no wish to repay kindness with harm. Yet even Merrylegs admits that he once let some boys who were riding him too hard and too long slide off backward, to teach them that a pony can tire. Sewell gives the reader two horses with two histories, and invites the question: how much of Ginger would have been Merrylegs, had she been raised as he was?

The **bearing rein** sits at the center of the book's argument. A short strap ran from the bit up over the head or along the neck to a hook on the harness saddle, holding the head high. Owners liked it because a high head and arched neck looked proud and stylish in the park. But a horse pulls with its whole body. To lean into the collar on a hill it needs to lower and stretch its head; the tight rein forbade that. Horsemen and veterinarians of the time described strained necks, sore mouths from the bit being pulled upward for hours, difficulty breathing and exhaustion. Ginger tells Beauty what it felt like in the passage in the Primary source box.

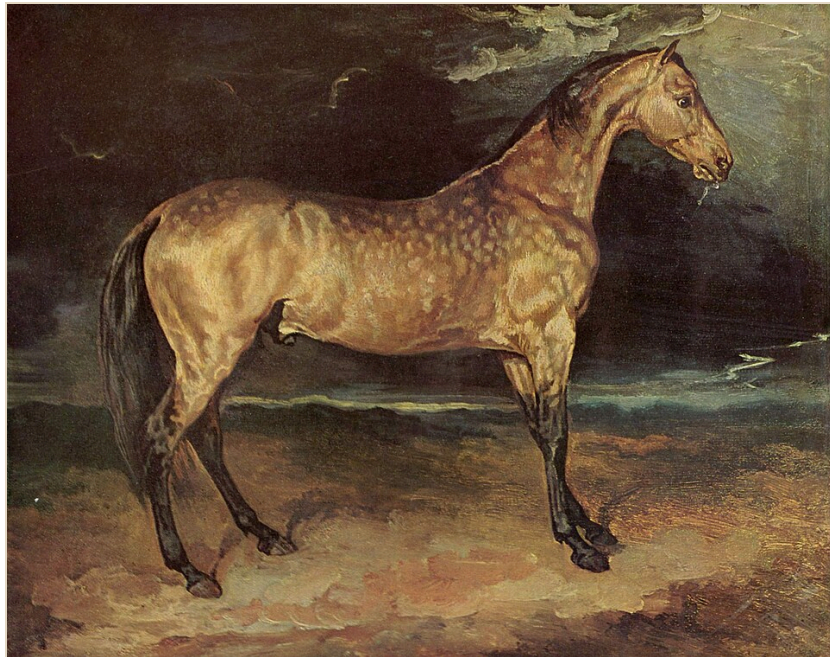
At Earlshall the countess insists the horses' heads be held "up." The coachman, York, knows the rein is cruel but obeys, shortening it one hole at a time. Beauty bears it for months, sore in mouth and neck. Ginger cannot. When the rein is tightened past bearing, she rears and kicks herself free of the carriage, an episode Sewell calls "A Strike for Liberty." Notice the honest complexity: Ginger's rebellion is understandable but makes her unsafe for carriage work, and York, though decent, shares the blame by choosing his job over his conscience.

Sewell does not give Ginger a rescue. Years later, in London, Beauty meets a worn-out chestnut cab horse with a thin neck and dull eyes; it is Ginger, who tells him she wishes she

were dead. Soon after he sees a dead chestnut horse carried past on a cart and hopes it was Ginger, because then her troubles were over. This is one of the hardest scenes in children's literature, and it is meant to be. Sewell wanted readers to know that a worn-out horse sold to the cheapest buyer was a real end for real animals.

The bearing rein went out of fashion in the decades after 1877, helped by the RSPCA, by veterinarians and by Sewell's readers. Some driving sports still use a check rein, normally set loose enough to let the horse lower its head somewhat, and horsemen still debate where the line falls. The principle Sewell taught remains: fashion is no excuse for pain.

PICTURE STUDY



Horse Frightened by Lightning, Théodore Géricault, about 1813–1814 · Oil on canvas · The National Gallery, London

Wikimedia Commons · Public domain

Théodore Géricault was a French painter who loved horses and rode them recklessly. He painted many studies of horses alone and in motion. This small, dramatic picture shows a horse caught in the moment of fear, every muscle ready to flee. It is a good portrait of the kind of nerves Ginger describes: a strong animal, frightened, with nowhere to go.

Look closely

- Study the horse's head, eye and nostril. What details show alarm?
- Look at the legs and weight. Is the horse about to stand, wheel or bolt?
- Compare the dark land with the light in the sky. How does Géricault use contrast to create tension?

Talk about it

1. Ginger says the bearing rein was “enough to drive one mad.” How does this painting help you imagine a horse at the edge of its endurance?
2. A frightened horse is dangerous to itself and to people. Why is understanding fear, not only punishing it, part of good horsemanship?

Safety first. If you visit a carriage or driving stable to see harness, stay with the owner, never touch a horse in harness or step behind one, and keep clear of the vehicle’s wheels and shafts.

HANDS-ON: THE CASE AGAINST THE BEARING REIN

Prepare a short illustrated brief (a persuasive report) that a Victorian RSPCA speaker could have used, with a diagram, Ginger’s testimony and a cause-and-effect chart.

You will need

- Plain paper and a pencil
- Colored pencils
- A copy of the Primary source passage
- A ruler

Steps

1. Draw a carriage horse’s head and neck in side view. Draw the bit, the cheek strap and the bearing rein running from the bit up to a hook on the harness saddle. Label each part.
2. On a second, smaller sketch, draw the same horse leaning into its collar on a hill with its head lowered and neck stretched. Add an arrow showing where the tight rein would pull against it.
3. Copy two phrases from Ginger’s testimony that describe pain, and one that describes the fashion behind it. Mark each with a P (pain) or F (fashion).
4. Make a three-column chart: Cause (what people did) → Effect on the horse → Effect on the owner (for example, a ruined horse, a dangerous carriage).
5. Write a closing paragraph of four or five sentences addressed to a fashionable carriage owner, persuading him to loosen the rein. Use at least one fact and one quotation.

Check your work

- My diagram labels the bit, cheek strap, bearing rein and hook.
- I quoted Ginger accurately and showed both pain and fashion.
- My chart shows effects on both horse and owner, and my paragraph uses a fact and a quotation.

FIELD NOTEBOOK

1. **Narration (keep this page).** In one written paragraph, tell Ginger's life from her breaking to her last meeting with Beauty, explaining at each stage how people's choices shaped her. A parent dates and keeps the page.
2. Draw Ginger and Merrylegs side by side. Under each, list three words for temperament and one reason for it from the book.
3. List Beauty's homes in order as a "road map" of the plot, with one word for each master (kind, careless, cruel).

Did you know? The Project Gutenberg text of *Black Beauty* uses "check-rein," the American word, where English editions say "bearing rein." American publishers adjusted the wording for their readers. Both names describe the same strap.

Primary source. Anna Sewell, *Black Beauty* (1877), Chapter 8, "Ginger's Story Continued." Ginger speaks. Project Gutenberg, ebook #271.

"After my breaking in," she said, "I was bought by a dealer to match another chestnut horse. For some weeks he drove us together, and then we were sold to a fashionable gentleman, and were sent up to London. I had been driven with a check-rein by the dealer, and I hated it worse than anything else; but in this place we were reined far tighter, the coachman and his master thinking we looked more stylish so. We were often driven about in the park and other fashionable places. You who never had a check-rein on don't know what it is, but I can tell you it is dreadful.

I like to toss my head about and hold it as high as any horse; but fancy now yourself, if you tossed your head up high and were obliged to hold it there, and that for hours together, not able to move it at all, except with a jerk still higher, your neck aching till you did not know how to bear it. Besides that, to have two bits instead of one—and mine was a sharp one, it hurt my tongue and my jaw, and the blood from my tongue colored the froth that kept flying from my lips as I chafed and fretted at the bits and rein. It was worst when we had to stand by the hour waiting for our mistress at some grand party or entertainment, and if I fretted or stamped with impatience the whip was laid on. It was enough to drive one mad.

Go deeper. Read Chapters 7–9 ("Ginger," "Ginger's Story Continued," "Merrylegs") and Chapters 22–23 ("Earlshall," "A Strike for Liberty") in *Black Beauty*, free at Project Gutenberg (ebook #271). For the history of carriage driving, see the Carriage Association of America's website. Second video topic: "How a carriage horse pulls: collar, traces and harness."

Goes deeper in. Literature, "Character and Plot," and Gardening & Animals, "Caring for Animals" (coming soon).

For families. Sources: Sewell, *Black Beauty* (Project Gutenberg #271); RSPCA history pages; Gavin, *Dark Horse*. The primary source mentions blood in a horse's mouth from a sharp bit; Chapter 40, "Poor Ginger," describes her decline and a dead horse on a cart. Both are told plainly and briefly; read ahead if you have a sensitive reader. The claim that the bearing rein declined after the 1870s is well supported; how much the book itself caused that decline cannot be measured. Picture: Géricault, *Horse Frightened by Lightning*, National Gallery, London.

PRACTICE

1. **EASY** Name Beauty's first good home with a squire and the coachman who cared for him there.
2. **EASY** What does a bearing rein (check-rein) do?
3. **MEDIUM** Why did fashionable owners use a tight bearing rein, according to the primary source?
4. **MEDIUM** How is Merrylegs a foil to Ginger?
5. **CHALLENGE** List three separate harms Ginger names in the primary source, and explain why the hours of waiting made them worse.
6. **CHALLENGE** York, the Earlshall coachman, knew the rein was cruel but tightened it on orders. Was he to blame? Give a reasoned answer that weighs both sides.

Make it a game · Who Said It?. Write short lines on cards in the voice of Beauty, Ginger, Merrylegs, John Manly or York (paraphrases are fine, such as "Patience did more than the whip ever could"). Shuffle and draw. Name the speaker and the home where it happened for two points; one point for the speaker alone.

Scripture. "Behold, we put bits in the horses' mouths, that they may obey us; and we turn about their whole body." (James 3:3, KJV)

James uses the bit to teach that a small thing, like the tongue, steers a whole life. The picture works because a bit is a real power over a horse. That power is a trust: it is given for guiding, not for tormenting, and the bearing rein abused it for the sake of fashion.

Practice: answers

1. Birtwick Park, the home of Squire Gordon; the coachman was John Manly.
2. It runs from the bit up to a hook on the harness and holds the horse's head high, so the horse cannot lower or stretch its neck.
3. Because "the coachman and his master" thought the horses "looked more stylish so," especially when driven "in the park and other fashionable places."
4. Merrylegs has been treated kindly all his life and is good-humored and patient; Ginger was handled roughly and is nervous and quick to bite. Placing them side by side shows how treatment shapes temperament.
5. (1) Her neck ached from being held high with no rest ("not able to move it at all"); (2) the sharp second bit hurt her tongue and jaw until it bled; (3) she was whipped when she fretted

or stamped. Waiting “by the hour” outside a party meant the strain lasted long after any work was done, with no movement to relieve it and punishment for showing distress.

6. A strong answer notes that York was a servant who could lose his place, that he only asked to bring the horses up to the rein gradually and that the countess gave the order; but he still chose to carry out a cruelty he knew was wrong, and his knowledge made him responsible. Proverbs 12:10 and Sewell’s whole book point to the person holding the reins. A good answer concludes that York shared the blame, though less than the one who gave the order, and could have refused or warned more firmly.

4.3 KINDNESS TO ANIMALS: PROVERBS 12:10

OBJECTIVES

- Explain Proverbs 12:10 as Hebrew poetry, including the meaning of “regardeth” and the contrast in the second line.
- Trace the Bible’s teaching on animals from Genesis through the Law and the Gospels, and show how it shaped laws and societies against cruelty in Britain and America.
- Use the Five Freedoms to judge how well an animal is cared for, and distinguish true kindness from sentimentality.

Warm-up. Write down three things a horse needs every day and one thing it does not need, even though people like to give it. Keep the list; you will test it against the Five Freedoms later in the stop.

Video slot. Video coming. What good horse welfare looks like: daily needs of a horse, signs of a healthy or unhappy horse. Search approved channels (The Horse Trust, World Horse Welfare, a university equine extension service such as Penn State Extension or UK Ag Equine Programs); preview first.

KEY TERMS

regardeth

King James English for “pays attention to, cares for.” The Hebrew word behind it means “knows.” The righteous man knows what his animal needs.

antithetic parallelism

A form of Hebrew poetry in which the second line states the opposite of the first, so each line sharpens the other. Proverbs 10–15 is full of it.

stewardship

Caring for something that belongs to another. Man’s dominion over the animals (Genesis 1:28) is held under God, the true Owner.

Five Freedoms

A widely used checklist of animal welfare first set out in Britain in 1965 and later refined: freedom from hunger and thirst; from discomfort; from pain, injury and disease; to express normal behavior; and from fear and distress.

sentimentality

Feeling that serves the person rather than the animal, such as overfeeding treats or never training a horse because it seems unkind.

Martin’s Act

The British law of 1822, carried through Parliament by Richard Martin, that made cruelty to horses and cattle a punishable offense.

CORE IDEAS

Proverbs 12:10 is two lines of Hebrew poetry: “A righteous man regardeth the life of his beast: but the tender mercies of the wicked are cruel.” The form is **antithetic parallelism**. The first line shows the righteous man; the second shows his opposite. The word translated “regardeth” means “knows.” The righteous man knows his ox or donkey: when it is thirsty, when it is lame, when it has worked enough. The second line is sharper than it looks. Not only are the wicked cruel; even their “tender mercies,” the best kindness they can manage, are cruel. Righteousness reaches all the way down to how a man treats an animal that cannot speak or complain.

The verse sits inside a whole biblical pattern. In Genesis 1:28 God gives man dominion over the animals, and in Genesis 2:15 He sets Adam in the garden “to dress it and to keep it”: rule as **stewardship**, not ownership without limits. The Law of Moses gives the ox and the ass a Sabbath rest (Exodus 23:12), commands Israel not to muzzle the ox treading out grain (Deuteronomy 25:4), and requires a man to help lift his neighbor’s fallen animal even if he dislikes the neighbor (Exodus 23:5). God spares Nineveh partly for its “much cattle” (Jonah 4:11). Jesus says that not one sparrow falls to the ground without the Father (Matthew 10:29), and He assumes His hearers would pull an ox out of a pit on the Sabbath (Luke 14:5).

The Bible also keeps a clear order. Man alone is made in the image of God (Genesis 1:27), and after the Flood God permits animals as food (Genesis 9:3). Animals may be owned, worked, bought, sold and eaten. Scripture does not make them equal to people. It forbids cruelty, not use. That balance protects against two errors: treating animals as mere machines, and treating them as people.

Christians in Britain and America drew on this teaching when they began to write it into law. The Massachusetts Body of Liberties of 1641 is often cited as one of the first legal codes to forbid tyranny or cruelty toward domestic animals kept for man’s use. In Britain, Richard Martin carried his act against cruelty to cattle and horses through Parliament in 1822. Two years later, in 1824, the Anglican clergyman Arthur Broome gathered a meeting in a London coffee house that founded the Society for the Prevention of Cruelty to Animals; William Wilberforce, who fought the slave trade, was among its founders. In New York, Henry Bergh founded the ASPCA in 1866 after seeing a cart horse beaten in the street. These reformers believed that a man who learns to be cruel to a beast will find it easier to be cruel to people.

Anna Sewall put the same conviction into the mouth of the coachman John Manly in Chapter 13 of *Black Beauty*, “The Devil’s Trade Mark.” A farmer’s boy had been forcing his pony over a gate with a whip; his schoolmaster had once taught the stable lad James that cruelty is the devil’s own mark. John’s answer, in the Primary source box, ties kindness to animals directly to true religion.

What does regarding the life of a horse look like today? Welfare scientists use the **Five Freedoms**. A horse drinks roughly 5 to 10 gallons of water a day, more in heat or hard work. It needs forage (grass or hay) of about 1.5 to 2 percent of its body weight daily; for a 1,000-pound horse, that is 15 to 20 pounds. Its hooves need trimming about every six to eight

weeks; its teeth should be checked at least once a year. It is a herd animal and a grazer, built to move and to have company; a horse kept alone in a stall all day is fed but not free to be a horse.

Honest kindness also means resisting **sentimentality**. Handfuls of sugar and treats can cause colic and laminitis, a painful hoof disease. A horse never taught to lead, stand and pick up its feet becomes dangerous to handle and harder to care for. Training, routine and firm boundaries are kindness. The righteous man of Proverbs 12:10 knows his animal, and knowing it means giving it what it needs, not merely what pleases its owner.

PICTURE STUDY



Ploughing in the Nivernais, Rosa Bonheur, 1849 · Oil on canvas · Musée d'Orsay, Paris
Wikimedia Commons · Public domain

Before she painted *The Horse Fair*, Rosa Bonheur made her name with this great picture of oxen ploughing in central France. It was ordered by the French government and shown at the Paris Salon of 1849. Bonheur studied animal anatomy with great care. Here she gives working cattle the dignity usually given to kings in paintings: they fill the canvas, and the men are small beside them.

Look closely

- Count the animals in the nearest team. How are they yoked together?
- Find the men. What are they doing, and how close are they to the animals?
- Look at the soil and the slope. How does Bonheur show how heavy this work is?

Talk about it

1. Deuteronomy 25:4 says, “Thou shalt not muzzle the ox when he treadeth out the corn.” How does this painting show that working animals earn and deserve care?
2. Does the painting show the animals as machines, as people, or as something else? Use details to explain.

Safety first. When observing an animal for the project, ask the owner’s permission first, stay outside the stall or fence unless the owner is with you, approach a horse at its shoulder where it can see you, and never stand directly behind it.

HANDS-ON: A FIVE FREEDOMS WELFARE REPORT

Observe one animal (a family pet, backyard hens, a neighbor’s horse with permission, or a horse at a riding stable) and write a short, honest welfare report using the Five Freedoms and Proverbs 12:10.

You will need

- Notebook and pencil
- A watch or phone timer
- A ruler for a simple chart
- Permission from the animal’s owner

Steps

1. Make a five-row chart, one row for each freedom. Add columns for “What I saw,” “Score (1–3),” and “What would improve it.”
2. Observe the animal quietly for at least fifteen minutes. Note water, food, shelter, bedding, signs of injury or lameness, company, room to move, and signs of fear or calm (ears, tail, posture).
3. Ask the owner two questions: how often the animal sees a vet or farrier, and what its daily routine is. Record the answers.
4. Score each freedom and suggest one realistic improvement, even for a well-kept animal.
5. Write a closing paragraph that uses Proverbs 12:10 and the primary source from *Black Beauty* to explain why this care matters, and name one way true kindness differs from sentimentality for this animal.

Check your work

- My chart covers all five freedoms with observations, not guesses.
- I asked the owner about vet or farrier care and routine.
- My paragraph uses both the verse and the primary source, and names a difference between kindness and sentimentality.

FIELD NOTEBOOK

1. **Narration (keep this page).** In one written paragraph, explain what Proverbs 12:10 means, line by line, and give one example from Scripture and one from history that shows people applying it. A parent dates and keeps the page.
2. Copy Proverbs 12:10 and draw a line between the two halves. Above the first half write “the righteous”; above the second, “the wicked.” Under each, list two behaviors toward animals.
3. Sketch a horse and label six things you would check in a daily welfare look-over (eyes, nostrils, coat, legs, hooves, water).

Did you know? The Five Freedoms grew out of a British government report on farm animals in 1965 (the Brambell Report) and were set out in their familiar five-part form by the Farm Animal Welfare Council in 1979. They are now used by horse charities, vets and inspectors around the world.

Primary source. *Anna Sewell, Black Beauty (1877), Chapter 13, “The Devil’s Trade Mark.” The coachman John Manly answers the stable lad James Howard. Project Gutenberg, ebook #271.*

“Your master never taught you a truer thing,” said John; “there is no religion without love, and people may talk as much as they like about their religion, but if it does not teach them to be good and kind to man and beast it is all a sham—all a sham, James, and it won’t stand when things come to be turned inside out.”

Go deeper. Read Chapter 13 of *Black Beauty* (Project Gutenberg #271) and Chapter 37, “The Golden Rule.” World Horse Welfare and The Horse Trust both publish free guides to a horse’s daily needs. C. S. Lewis, *The Problem of Pain* (1940), chapter 9, “Animal Pain,” for older readers who want a careful Christian treatment of animal suffering. Second video topic: “Signs of a healthy horse: a daily check.”

Goes deeper in. Gardening & Animals, “Caring for Animals,” and History, “Reformers of the Nineteenth Century” (coming soon).

For families. Sources: KJV text of Proverbs 12:10 and the passages cited; RSPCA history; ASPCA history; University of Kentucky and Penn State equine extension guides for water and forage figures (these vary with size, weather and work, so they are given as ranges). The Massachusetts Body of Liberties (1641) wording is described rather than quoted, since an exact public-domain text was not checked for this stop. The note that Paul applies Deuteronomy 25:4 to paying ministers (1 Corinthians 9:9) is worth discussing with older students; the command still applied to real oxen. Picture: Bonheur, *Ploughing in the Nivernais*, Musée d’Orsay.

PRACTICE

1. **EASY** Quote Proverbs 12:10 exactly (KJV).
2. **EASY** List the Five Freedoms.
3. **MEDIUM** A horse weighs 1,100 pounds. Using 1.5 to 2 percent of body weight, how much forage does it need per day? How much over a 30-day month at the higher rate?
4. **MEDIUM** Name three commands in the Law of Moses that protect animals.
5. **CHALLENGE** Explain the second line of Proverbs 12:10. Why does it say the “tender mercies” of the wicked are cruel, not only their anger?
6. **CHALLENGE** In the primary source, John says religion that does not teach people to be kind “to man and beast” is “a sham.” Using the Bible’s order of creation, explain why caring for animals and caring for people go together, but are not the same.

Make it a game · Kind or Just Nice?. A caller reads a short scene (“A girl gives her pony a whole bag of apples,” “A farmer works his horse on Sunday morning so it can rest all afternoon,” “An owner lets his horse barge into him because correcting it feels mean”). Players hold up a card marked KIND or JUST NICE and must name which of the Five Freedoms is helped or harmed. A correct card and freedom scores two points.

Scripture. “A righteous man regardeth the life of his beast: but the tender mercies of the wicked are cruel.” (Proverbs 12:10, KJV)

To “regard” is to know. Righteousness is not only for church and courtroom; it shows in the barn, at the water trough and at the end of a long day’s work, when a man thinks first of the animal that cannot ask.

Practice: answers

1. “A righteous man regardeth the life of his beast: but the tender mercies of the wicked are cruel.”
2. Freedom from hunger and thirst; freedom from discomfort; freedom from pain, injury and disease; freedom to express normal behavior; freedom from fear and distress.
3. 16.5 to 22 pounds per day. At 22 pounds a day, $30 \text{ days} \times 22 = 660$ pounds a month.
4. Any three: Sabbath rest for the ox and ass (Exodus 23:12); helping a fallen or overloaded animal even of an enemy (Exodus 23:5; Deuteronomy 22:4); not muzzling the ox treading grain (Deuteronomy 25:4); sparing the mother bird (Deuteronomy 22:6-7).
5. The line is the opposite (antithetic) of the first. The righteous man truly knows and cares for his animal; the wicked man does not, so even what he calls kindness serves himself and ends in harm. His best is still cruel because his heart is turned toward himself. Examples: a fashionable owner who “cares” for his horses’ looks with a tight bearing rein, or an owner who feeds treats instead of proper food.
6. Both come from the same source: love for God shows itself in care for what He made, and Scripture commands mercy to both (Proverbs 12:10; Exodus 23:5). Cruelty to beasts also hardens the heart toward people, as the reformers argued. But only man is made in God’s

image (Genesis 1:27), and animals may be worked and eaten (Genesis 9:3), so people come first; kindness to animals is part of righteousness, not a replacement for love of neighbor.

4.4 MARGUERITE HENRY'S *MISTY OF CHINCOTEAGUE* (1947)

OBJECTIVES

- Summarize the plot of *Misty of Chincoteague* and identify its central conflict between owning and freeing.
- Explain Marguerite Henry's research method and her partnership with the illustrator Wesley Dennis.
- Separate fact from fiction in the book, and judge why an author might change real events.

Warm-up. Find Chincoteague and Assateague on a map of the Atlantic coast where Virginia and Maryland meet. Which island faces the open ocean? Which faces the mainland? Write one sentence predicting how life on each island would differ for a pony.

Video slot. Video coming. Marguerite Henry and the making of *Misty of Chincoteague*; the Museum of Chincoteague Island and *Misty's* story. Search approved channels (Museum of Chincoteague Island, Virginia Tourism, PBS or a Virginia public-television station, a library author-study channel); preview first.

KEY TERMS

barrier island

A long, narrow island of sand lying parallel to a coast, protecting the mainland from the ocean. Assateague is a barrier island; Chincoteague lies behind it.

realistic fiction

An invented story set in the real world, with events that could happen. *Misty* mixes real people and places with invented scenes.

Newbery Honor

A recognition given each year by the American Library Association to runners-up for the Newbery Medal, the leading American prize for children's books. *Misty* received one in 1948.

central conflict

The main struggle that drives a plot. In *Misty* it is the struggle between wanting to own a wild horse and letting her be free.

on-location research

Gathering material by going to the real place, meeting the people and watching the events, rather than only reading.

legend

A traditional story about the past that may contain some truth but cannot be proved. The Spanish-shipwreck tale of the ponies' origin is a legend.

CORE IDEAS

Marguerite Henry was born Marguerite Breithaupt in Milwaukee, Wisconsin, in 1902 and sold her first piece of writing to a magazine as a child. She became the best-loved American horse writer of the twentieth century, with dozens of books. In 1946, looking for a new story, she and the illustrator Wesley Dennis traveled to Chincoteague, a small fishing and oyster town on an island off Virginia's Eastern Shore, to watch Pony Penning, the yearly roundup of the wild ponies from neighboring Assateague. There she met the Beebe family, who raised ponies on their ranch, and two of the Beebe grandchildren, Paul and Maureen. She also met a newborn pinto filly. The book that came out of that visit, *Misty of Chincoteague*, was published in 1947.

The story opens with a legend: a Spanish ship wrecked off Assateague long ago, and the ponies aboard swam ashore and went wild. Then it moves to Paul and Maureen, who live with their grandparents on Chincoteague and have one dream: to buy the Phantom, a wild mare so wily that the roundup men have never been able to bring her in. The children save money, earned by hard work, through the spring. On Pony Penning Day Paul, riding with the men for the first time, brings in the Phantom at last, and with her a new foal. The children buy both. They gentle the Phantom, and Paul rides her to victory in the island's race.

The **central conflict** then turns inward. The Phantom has been tamed but not changed. She grows restless; when the wild stallion who leads her old band calls from across the water, Paul understands that she belongs to Assateague. In the climax he lets her go, and she swims back to freedom. The children keep Misty, the foal who was born to the wild but grew up among people. Henry does not tell readers that owning animals is wrong. She shows that loving an animal sometimes means giving up what you wanted, and that a wise owner knows the difference between a creature made for the barn and one made for the marsh.

Henry's method was **on-location research**. She watched the swim and the auction, rode in the Beebes' truck, listened to the island's speech and stories, and used real names: Grandpa and Grandma Beebe, Paul and Maureen. Wesley Dennis sketched beside her, and his drawings are woven into the pages rather than placed apart; the two worked as a team on many later books. The result feels like a real place because it is one. Readers who visit Chincoteague today still find the streets, the channel and the ranch from the book.

The book is not a documentary, though. The real Misty was not born wild on Assateague; she was foaled on the Beebe ranch on Chincoteague in July 1946. The Phantom was a real mare, but the long chase and the release are storytelling. The Spanish-galleon origin is a legend; many historians think the ponies more likely descend from horses that colonial settlers turned out to graze on the island in the 1600s, partly to avoid fencing laws and taxes. Henry shaped real material into a story with a clear rise and fall, a test of character and a satisfying end. Writers of **realistic fiction** do this all the time; the honest question is whether the changes serve the truth of the story or distort it.

Misty received a **Newbery Honor** in 1948 and has never been out of print. A film, *Misty*, followed in 1961. Henry wrote several sequels, including *Sea Star* (1949) and *Stormy*,

Misty's Foal (1963). The book also changed the island itself. Visitors began arriving by the thousands to see Pony Penning, and the crowds grew year after year; the money they brought helped the volunteer fire company that runs the event, and it also brought traffic, crowds and new pressures to a small town.

Why has the book lasted? It respects children's work and saving, it treats animals as real animals rather than people in fur, and it asks a hard question honestly: when should you hold on, and when should you let go?

PICTURE STUDY



Mares and Foals in a River Landscape, George Stubbs, about 1763–1768 · Oil on canvas · Tate Britain, London

Wikimedia Commons · Public domain

George Stubbs, the English painter who studied horse anatomy by dissecting horses for eighteen months, painted a series of “mares and foals” pictures for noble owners in the 1760s. They show no riders, no action and no drama: only mothers and young together. It is the kind of bond Henry describes between the Phantom and her foal before people come into their story.

Look closely

- How many mares and how many foals can you find? How does Stubbs arrange them across the canvas?
- Find a foal standing close to its mother. What does its posture tell you?
- Look at the background. Why might Stubbs keep it simple and quiet?

Talk about it

1. In *Misty*, the Phantom and her foal are taken from the wild together. How does this painting help you understand why the mare's bond with her foal mattered to the story?
2. Stubbs painted carefully observed, accurate horses. How is his method like Marguerite Henry's on-location research?

HANDS-ON: FACT OR FICTION LEDGER

Make a two-column ledger comparing *Misty of Chincoteague* with the historical record, then judge each change an author made.

You will need

- A library copy of *Misty of Chincoteague* (or a summary if you have not read it yet)
- Notebook paper ruled into three columns
- Access to the Museum of Chincoteague Island or Chincoteague Volunteer Fire Company websites (with a parent)

Steps

1. Head three columns: "In the book," "What really happened," and "Why the author might have changed it."
2. Fill in at least six rows. Include: where Misty was born; the origin of the ponies; who Paul and Maureen were; whether the Phantom was real; the Pony Penning race; the release of the Phantom.
3. For each change, write one sentence on whether it serves the story's truth (for example, it shows a real feeling or problem) or bends the facts in a misleading way.
4. Choose the single most important change and write a paragraph defending or criticizing it.
5. Copy one Wesley Dennis-style sketch of a pony from your own imagination (do not trace the book) to head the page.

Check your work

- My ledger has at least six rows with all three columns filled.
- I used a real source for the "What really happened" column.
- My paragraph gives a reason, not just an opinion.

FIELD NOTEBOOK

1. **Narration (keep this page).** In one written paragraph, retell the plot of *Misty of Chincoteague* from the children's dream to the Phantom's release, and explain the central conflict in your own words. A parent dates and keeps the page.
2. Draw a sketch map of Chincoteague and Assateague with the channel between them, the ocean side, the town and the Beebe ranch (approximate).
3. Write two lines of dialogue that you imagine Paul might say as he lets the Phantom go. Keep them short; Henry's style is plain and direct.

Did you know? The real Misty was bought from the Beebes for \$150, paid by Henry's publisher, and lived with Marguerite Henry in Wayne, Illinois, for about ten years. She made appearances at schools and libraries and was made an honorary member of the American Library Association before returning to Chincoteague.

Go deeper. Marguerite Henry, *Misty of Chincoteague* (1947) and *Stormy, Misty's Foal* (1963), illustrated by Wesley Dennis. Marguerite Henry, *Album of Horses* (1951). The Museum of Chincoteague Island's website and the Smithsonian Magazine article "The True Story of Misty of Chincoteague." Second video topic: "Wesley Dennis and how horse illustrators draw from life."

Goes deeper in. Literature, "American Children's Classics," and Geography, "The Atlantic Coast" (coming soon).

For families. Sources: Smithsonian Magazine; Museum of Chincoteague Island; American Library Association Newbery records; Chincoteague Volunteer Fire Company. *Misty of Chincoteague* is still under copyright, so this stop summarizes and does not quote it; there is no public-domain primary source for this stop. The plot summary follows the book closely but some readers' editions differ in small details; check against your copy. The ponies' origin is genuinely uncertain, and the stop presents both the legend and the more likely colonial explanation. Picture: Stubbs, *Mares and Foals in a River Landscape*, Tate.

PRACTICE

1. **EASY** Who wrote and who illustrated *Misty of Chincoteague*, and in what year was it published?
2. **EASY** Which island do the wild ponies live on, and which island holds the town and Pony Penning?
3. **MEDIUM** Name two facts the book changes about the real Misty or the ponies.
4. **MEDIUM** What is the central conflict of the book, and how is it resolved?
5. **CHALLENGE** The real Misty sold for \$150 in 1946. If prices in general have risen roughly sixteen to eighteen times since then, about how much would that be today? Why is a simple multiplication only an estimate?
6. **CHALLENGE** Is Marguerite Henry honest in changing real events? Build a short argument with one point on each side and a conclusion.

Make it a game · Hold On or Let Go?. Players take turns describing a situation in which someone must decide whether to keep or release something they love (a pet, a wild bird found injured, a race they want to win, a favorite toy that a younger sibling needs). The others vote "hold on" or "let go" and the speaker must give the best reason for the side that loses the vote. A thoughtful reason earns a point.

Scripture. “Who hath sent out the wild ass free? or who hath loosed the bands of the wild ass?” (Job 39:5, KJV)

In Job 39 God reminds Job that He made some creatures for the wilderness, not for the stable. Paul’s choice to free the Phantom fits this truth: wise people learn the nature God has given an animal and act in keeping with it.

Practice: answers

1. Marguerite Henry wrote it; Wesley Dennis illustrated it; it was published in 1947.
2. The ponies live on Assateague; the town of Chincoteague is on Chincoteague Island, where the ponies are brought for Pony Penning.
3. Any two: the real Misty was born on the Beebe ranch, not in the wild on Assateague; the Phantom’s capture and release are storytelling; the Spanish-shipwreck origin is a legend, while colonial grazing is the more likely history.
4. Paul and Maureen long to own the wild Phantom, but she belongs to the wild. It is resolved when Paul lets the Phantom return to Assateague and the children keep her foal, Misty.
5. About \$2,400 to \$2,700 ($\$150 \times 16 = \$2,400$; $\$150 \times 18 = \$2,700$). It is only an estimate because inflation is an average across many goods; the price of ponies, feed and land may have risen faster or slower than the average, and a famous pony’s value is not set by inflation at all.
6. For: she wrote realistic fiction, not history; she used real people with permission and real places, and her changes (a wild birth, the Phantom’s release) express true things about the ponies and about love and freedom. Against: many readers, especially children, believe the story happened exactly as told, and the shipwreck legend has been repeated as fact. A good conclusion: her changes are honest for a novel, but readers should learn the real history alongside it, as this story does.

4.5 PONY PENNING DAY AND THE REAL MISTY

OBJECTIVES

- Describe how Pony Penning works: the roundup, the swim, the auction and the return, and who manages the herd.
- Use simple population arithmetic to explain why the herd is limited and how the foal auction keeps it in balance.
- Tell the real Misty's life after the book, from Illinois to the 1962 storm to her death in 1972, and explain why her story still draws visitors.

Warm-up. Suppose an island can feed 150 ponies without the marsh being overgrazed, and the mares bear about 60 foals a year. Without any change, how many ponies would there be next year? In five years? Jot your guess; the stop will show how the islanders solve this problem.

Video slot. Video coming. The Chincoteague pony swim across Assateague Channel; Pony Penning week and the foal auction; the Chincoteague ponies on the wildlife refuge. Search approved channels (Chincoteague Volunteer Fire Company, U.S. Fish and Wildlife Service, Assateague Island National Seashore (NPS), Virginia public television); preview first.

KEY TERMS

Pony Penning

The yearly roundup of the Virginia herd of Assateague ponies, ending in a swim to Chincoteague and a foal auction, held in the last week of July.

saltwater cowboys

The volunteer riders, mostly fire-company members, who round up the ponies on Assateague and drive them across the channel.

slack tide

The short period between tides when the water barely moves. The swim is timed for slack tide so the current does not sweep the ponies away.

carrying capacity

The largest population a habitat can support year after year without being damaged. The permit for the Virginia herd allows about 150 adult ponies.

buy-back pony

A foal bought at auction and then given back to the fire company to return to the wild herd, keeping it healthy and its numbers steady.

wildlife refuge

Land set aside by the government to protect wild animals and their habitat. The Virginia ponies graze on the Chincoteague National Wildlife Refuge.

CORE IDEAS

Assateague is a barrier island about 37 miles long, split by the Maryland–Virginia line. A fence near the state line divides its ponies into two herds. The Maryland herd belongs to the National Park Service at Assateague Island National Seashore and is kept in balance mainly by contraception, with no roundup or sale. The Virginia herd, the one in *Misty*, belongs to the Chincoteague Volunteer Fire Company. It grazes on the Chincoteague National Wildlife Refuge under a permit from the U.S. Fish and Wildlife Service that allows about 150 adult ponies. The ponies are owned by a fire company and live on federal land: an unusual arrangement that works only because everyone keeps to the rules.

Islanders held penning long before the fire company. For generations, owners rounded up livestock that ranged freely on the islands and marked their animals; the days became festivals with food and games. Pony Penning in its modern form began in the 1920s. After fires damaged the town, Chincoteague's new volunteer fire company needed equipment, and in 1925 the town let it run a carnival during Pony Penning to raise money. The fire company later bought the ponies and made the event its main fundraiser. It has run it ever since, with only a few interruptions, for about a century.

The event follows the same pattern each year. In the days before, the **saltwater cowboys** ride the marshes of Assateague and drive the scattered bands into corrals, where veterinarians examine every pony. On the last Wednesday of July, at **slack tide**, they push the herd into Assateague Channel. The ponies swim a few hundred yards to Chincoteague, usually in just a few minutes, while thousands of people watch from the shore and from boats. The first foal to come ashore is named King or Queen Neptune and is given away in a raffle. The herd is walked down Main Street to the carnival grounds.

On Thursday comes the auction. Most of the year's foals are sold to bidders from all over the country, and the money pays for the ponies' veterinary care for the rest of the year and supports the fire company. Some buyers purchase **buy-back ponies**: they pay for a foal, often naming it, and return it to the wild herd. On Friday the adults and the buy-back foals swim back to Assateague. The auction is the herd's management tool. Without it, the herd would outgrow the marsh within a few years; with it, the refuge keeps its grass and the ponies stay healthy.

The ponies themselves are shaped by the island. They live on salt-marsh grasses, poison ivy, seaweed and whatever else they can find, and they drink large amounts of fresh water because of the salt in their diet, which can make them look round-bellied. Most stand about 12 to 13 hands, pony size, though foals raised on rich pasture away from the island often grow taller. The harsh life selects hardy animals: tough hooves, thick winter coats and good sense around water.

And Misty? After the book made her famous, she lived with Marguerite Henry in Wayne, Illinois, for about ten years, visiting schools and libraries, before returning to the Beebe ranch on Chincoteague to have foals of her own. In March 1962 a great storm, now called the Ash Wednesday Storm, flooded the islands and drowned many ponies. Misty, close to

foaling, was brought into the Beebe family's kitchen to ride it out. Soon afterward she gave birth to a filly named Stormy, the subject of Henry's *Stormy, Misty's Foal* (1963). Ponies bought by the public and returned helped rebuild the herd. Misty died in her sleep on 16 October 1972, at age 26. Her preserved body is displayed today at the Museum of Chincoteague Island.

Honest complexity remains. The swim draws many tens of thousands of visitors to a town of a few thousand; that brings money and fame and also traffic, heat, trash and stress on the ponies, which the fire company and the refuge work hard to manage. Some people question whether wild horses belong on a wildlife refuge at all, since they graze the same marsh that shorebirds need. The present answer, a capped herd checked by vets and kept in number by the auction, is a careful compromise.

PICTURE STUDY



The Horse Fair, Rosa Bonheur, 1852-1855 · Oil on canvas · The Metropolitan Museum of Art, New York
Wikimedia Commons · Public domain

Rosa Bonheur painted the horse market in Paris, on a tree-lined boulevard near the Salpêtrière hospital, where draft horses were shown and sold. She sketched there twice a week for about a year and a half. The canvas is more than 16 feet wide. Like Pony Penning, a horse fair was work and festival at once: animals were examined, shown off, bought and sold in front of a crowd.

Look closely

- Find a horse that is resisting its handler. How does the handler respond?
- Follow the curve of the horses from left to right. How does Bonheur create a sense of a moving parade?
- Look at the people on the edges. Who is watching, and what might they be judging?

Talk about it

1. Compare this market with the Pony Penning auction. What does a careful buyer need to look for in both?
2. Bonheur makes these working horses the heroes of a huge painting. What does that say about how she valued them?

Safety first. At Pony Penning or on Assateague, never approach, feed or pet the wild ponies; they kick and bite. The National Park Service asks visitors to stay at least 40 feet (about a bus length) away. Watch the swim from a safe spot on shore, drink plenty of water in the July heat, and stay with your family in the crowds.

HANDS-ON: MANAGING THE HERD: A FIVE-YEAR MODEL

Build a simple population table to see how the auction keeps the herd near its limit. The numbers are rounded for practice, not exact counts.

You will need

- Graph paper or a spreadsheet
- A calculator
- Colored pencils

Steps

1. Use these practice numbers: the herd starts at 150 adults; about 40 percent of adults bear a foal each year (round to whole ponies); about 4 percent of adults are lost each year to age, storms or illness.
2. Make a table with columns: Year, Adults at start, Foals born, Adults lost, Foals sold, Foals returned (buy-back), Adults at end.
3. Model A, "No auction": keep every foal. Fill in five years. Assume each year's foals count as adults the next year.
4. Model B, "Auction": sell all but 6 foals each year (6 are kept or returned as buy-backs). Fill in five years.
5. Graph both models on the same axes. Write three sentences comparing them and explaining why the permit cap of about 150 matters for the marsh.

Check your work

- My tables use the same rules every year.
- My graph has labeled axes and two lines.
- I explained the result in terms of carrying capacity.

FIELD NOTEBOOK

1. **Narration (keep this page).** In one written paragraph, explain the whole Pony Penning week from roundup to return swim, and tell why the auction is good for the

herd. A parent dates and keeps the page.

2. Draw a map of Assateague showing the Maryland–Virginia line, the fence, the refuge, Assateague Channel and Chincoteague town, with an arrow for the swim route.
3. Write a short timeline of the real Misty’s life: 1946, 1947, about 1957, 1962, 1972.

Did you know? The fire company owns the Virginia herd, but it does not own the land. The ponies graze on the refuge only by federal permit, which limits their numbers to about 150 adults. Each pony is checked by vets during Pony Penning week, and the herd is rounded up for vet care at other times of the year as well.

Go deeper. Chincoteague Volunteer Fire Company, “Pony Penning History” (cvfc3.com). U.S. Fish and Wildlife Service, Chincoteague National Wildlife Refuge pages on the ponies. Assateague Island National Seashore (National Park Service), “Horses” pages, for how the Maryland herd is managed differently. Marguerite Henry, *Stormy, Misty’s Foal* (1963). Second video topic: “Barrier islands and how storms reshape them.”

Goes deeper in. Small Business & Economics, “Auctions and Prices,” and Life Science, “Populations and Habitats” (coming soon).

For families. Sources: Chincoteague Volunteer Fire Company; U.S. Fish and Wildlife Service, Chincoteague National Wildlife Refuge; National Park Service, Assateague Island National Seashore; Smithsonian Magazine, “The True Story of Misty of Chincoteague.” Accounts differ on whether the first official fire-company Pony Penning was 1924 or 1925; the stop gives 1925 for the carnival. The swim time and distance vary with tide and weather. Foaling rates, losses and the “keep 6” rule in the project are practice numbers, not official counts. There is no public-domain primary source for this stop. Auction prices vary widely year to year and are not given. Picture: Bonheur, *The Horse Fair*, Metropolitan Museum of Art.

PRACTICE

1. **EASY** Who owns the Virginia herd of Assateague ponies, and who manages the land they live on?
2. **EASY** Why is the swim held at slack tide?
3. **MEDIUM** What is a buy-back pony, and why does it help the herd?
4. **MEDIUM** What happened to Misty during the storm of March 1962, and what came of it?
5. **CHALLENGE** Using the project’s practice numbers (start 150 adults; foals = 40% of adults; losses = 4% of adults; no auction; foals become adults next year), how many adults will there be at the start of Year 2 and Year 3?
6. **CHALLENGE** The Maryland herd is controlled by contraception; the Virginia herd by roundup and auction. Give one advantage of each method and say which better fits the purpose of each landowner.

Make it a game · Saltwater Cowboy Roundup. Mark a “marsh” in the yard with scattered “ponies” (bean bags or cones) and a “corral” (a rope circle). Teams of two link arms as riders and must gently herd a rolling ball “pony” into the corral using only their feet, without kicking it hard or touching it with hands. Then each team must explain one real Pony Penning rule that keeps the ponies safe. The fastest safe roundup wins.

Scripture. “For every beast of the forest is mine, and the cattle upon a thousand hills.” (Psalm 50:10, KJV)

A fire company owns the ponies, a government owns the refuge and buyers own the foals they take home; yet God says every beast is His. Human owners are stewards, and good management of a herd, its numbers, its health and its land, is one way of honoring the true Owner.

Practice: answers

1. The Chincoteague Volunteer Fire Company owns the ponies; the U.S. Fish and Wildlife Service manages the Chincoteague National Wildlife Refuge where they graze.
2. Because the water is barely moving between tides, so the current will not sweep the ponies away.
3. A foal bought at auction and returned to the wild herd. It keeps young, healthy ponies coming into the herd while the auction keeps total numbers near the permit limit.
4. She was close to foaling and was brought into the Beebe family’s kitchen to shelter from the Ash Wednesday Storm. She then gave birth to Stormy, the subject of *Stormy, Misty’s Foal* (1963).
5. Year 1: 150 adults, 60 foals, 6 lost $\rightarrow 150 - 6 + 60 = 204$ at the start of Year 2. Year 2: 204 adults, about 82 foals (81.6), about 8 lost (8.16) $\rightarrow 204 - 8 + 82 = 278$ at the start of Year 3. Without an auction the herd almost doubles in two years, far above the 150 the marsh is allowed to carry.
6. Contraception: no roundup or sale stress, and the herd stays fully wild, which fits a national seashore meant to preserve natural scenes. Auction: it pays for vet care and the fire company, gives foals good homes, and keeps an old community tradition, which fits a herd owned by a fire company on a refuge that requires a firm cap. Each method suits its owner’s purpose; a good answer may note costs on both sides (contraception must be given by trained staff; the auction depends on buyers and stresses young foals).

4.6 KING OF THE WIND AND THE GODOLPHIN ARABIAN

OBJECTIVES

- Summarize Marguerite Henry's *King of the Wind* (1948) and its themes of faithfulness and hidden worth.
- Separate the documented history of the Godolphin Arabian (about 1724–1753) from the legends attached to him.
- Explain how the three foundation sires shaped the Thoroughbred, and use pedigree arithmetic to show why every modern Thoroughbred descends from them many times over.

Warm-up. Draw a family tree for yourself going back three generations: parents, grandparents, great-grandparents. How many ancestors are in the third generation back? How many would there be in the tenth? Keep the answer for the challenge problems.

Video slot. Video coming. The three foundation sires of the Thoroughbred (Byerley Turk, Darley Arabian, Godolphin Arabian); Newmarket and the history of English racing. Search approved channels (National Horseracing Museum, Newmarket; Kentucky Horse Park; the National Gallery on Stubbs's Whistlejacket); preview first.

KEY TERMS

Thoroughbred

The racing breed developed in England in the late 1600s and 1700s by crossing imported Eastern stallions with English mares.

foundation sire

One of the stallions from which a whole breed descends. The Thoroughbred has three: the Byerley Turk, the Darley Arabian and the Godolphin Arabian.

sire and dam

A horse's father and mother. Breeders write a pedigree as "by" the sire and "out of" the dam.

pedigree

A written record of an animal's ancestors. The first *General Stud Book* of English Thoroughbreds was published in 1791.

Barb

A hardy horse breed of North Africa's Barbary Coast. Some writers of the 1700s called the Godolphin Arabian "the Godolphin Barb," and his exact origin is debated.

pedigree collapse

When the same ancestors appear many times in a pedigree because the family tree doubles each generation but the real population was small.

CORE IDEAS

In 1948 Marguerite Henry published *King of the Wind*, again illustrated by Wesley Dennis, and in 1949 it won the Newbery Medal, the highest American prize for a children's book. Henry had found her subject in the pedigrees of famous American racehorses: again and again they traced back to one small stallion of the 1700s, the Godolphin Arabian. She set out to imagine his life. The book opens with a short prologue at an American race and then travels back two centuries to Morocco.

In the novel, a mute stable boy named Agba cares for a bay colt named Sham in the sultan's stables. Sham bears a mark on his chest shaped like a wheat ear, which the grooms think unlucky, and a white spot on one heel, a sign of swiftness. When the sultan sends six horses as a gift to the young King Louis XV of France, Agba goes with Sham. The French court despises the thin, travel-worn horses, and Sham ends up pulling a cart through the streets. Agba never leaves him. They reach England and endure prison, hardship and banishment to the fens, until at last Sham's foals begin to win races and his worth is recognized. The themes are clear: faithfulness through humiliation, and true worth hidden under poor appearances.

How much of this is true? The documented record is thinner than the novel. The horse was foaled around 1724, probably in Yemen or elsewhere in the Arab world; some contemporaries called him a Barb, from North Africa. He reached England from France around 1729, bought by a young Derbyshire gentleman, Edward Coke. When Coke died in 1733 the horse passed to Francis, 2nd Earl of Godolphin, whose name he took. He spent the rest of his life at the Earl's stud at the Gog Magog Hills near Cambridge, died on Christmas Day 1753, and was buried in a stable gateway at Wandlebury, where a stone still marks the spot.

Two famous parts of the story are best treated as legend. The tale that he pulled a water cart in Paris was popularized in the 1800s and has no reliable evidence behind it. The tale that he was kept only as a "teaser" (a stallion used to test whether a mare was ready for breeding) for a more valued stallion, Hobgoblin, and was bred to the mare Roxana only when Hobgoblin refused, appears in early accounts and may contain truth, but it cannot be proved. What is certain is the result: Roxana's colt Lath, foaled in 1732, became the best racehorse of his day, and her later colt Cade and another son, Regulus, were outstanding too. Henry built her plot on the records and filled the gaps with imagination, which is exactly what historical fiction does.

The Godolphin Arabian is one of three **foundation sires** of the Thoroughbred. The Byerley Turk came to England in the 1680s and the Darley Arabian in 1704. Crossed with English mares bred for speed, their offspring produced a new kind of horse: taller and faster than the Eastern stallions, tougher than the English mares. Every Thoroughbred alive today descends from all three. In the direct line from sire to son to grandson, most modern Thoroughbreds trace to the Darley Arabian through the great racehorse Eclipse (1764); the Godolphin Arabian's male line survives through his grandson Matchem (by Cade), and the

American champion Man o' War belonged to it. Eclipse himself had the Godolphin Arabian in his pedigree, through his dam's sire, Regulus.

Why do all three appear in every pedigree? Because a pedigree doubles with each generation. Ten generations back, a horse has 1,024 places in its family tree; twenty generations back, over a million. The Thoroughbred has passed through perhaps 25 to 30 generations since the 1730s, which gives hundreds of millions of places in the tree, far more than the few thousand horses that existed then. The same ancestors must fill those places over and over. This is **pedigree collapse**, and it is why one small stallion appears thousands of times in the ancestry of a modern racehorse.

Henry's novel teaches what the historical record cannot: what it might have meant to love an animal no one else valued. The Godolphin Arabian was real; Agba is invented. But faithfulness, patience and the slow vindication of hidden worth are real virtues, and the book makes them memorable.

PICTURE STUDY



Whistlejacket, George Stubbs, about 1762 · Oil on canvas · The National Gallery, London
Wikimedia Commons · Public domain

Whistlejacket was a racehorse owned by the Marquess of Rockingham, foaled in 1749. His sire was Mogul, a son of the Godolphin Arabian, so Whistlejacket was the Godolphin Arabian's grandson. Stubbs painted him life-size, more than 9 feet tall, on a plain background with no rider and no scenery, which was very unusual. Stubbs knew horse anatomy better than any painter of his time from eighteen months of careful dissection.

Look closely

- Look at the head. Can you see signs of Eastern ancestry, such as large eyes, fine skin and flared nostrils?
- Study the muscles of the neck and hindquarters. How does Stubbs show strength without showing motion across a landscape?
- Why might Stubbs leave out the background, the rider and the saddle?

Talk about it

1. How does this painting help you imagine the Godolphin Arabian, whom Stubbs could not have painted from life?
2. Henry's Sham was mocked for his looks. What would an eighteenth-century nobleman see in Whistlejacket that made him worth painting life-size?

HANDS-ON: THE GODOLPHIN ARABIAN PEDIGREE CHART

Build a descendants chart showing how the Godolphin Arabian's blood reached famous horses, and test it with pedigree arithmetic.

You will need

- A large sheet of paper (or two taped together)
- A ruler, pencil and colored pencils
- A calculator

Steps

1. Put the Godolphin Arabian (about 1724–1753) at the top. Below him draw lines to four sons: Lath (1732), Cade (1734), Regulus (1739) and Mogul.
2. Under Cade, add his son Matchem (1748). Under Mogul, add Whistlejacket (1749). Under Regulus, add his daughter Spilletta, and under her, her son Eclipse (1764).
3. Color the sire lines (father to son) in one color and any line through a mare in a second color. Label which line leads toward Man o' War (through Matchem).
4. In a corner, make a table of generations 1 to 10 and the number of places in a pedigree for each (2, 4, 8 ... 1,024).
5. Write a three-sentence caption explaining why one horse can appear thousands of times in a modern pedigree.

Check your work

- My chart shows the Godolphin Arabian, his four sons, and Matchem, Whistlejacket and Eclipse in the right places.
- I colored sire lines and dam lines differently.
- My doubling table reaches 1,024, and my caption explains pedigree collapse.

FIELD NOTEBOOK

1. **Narration (keep this page).** In one written paragraph, tell the true history of the Godolphin Arabian, from his foaling to his grave at Wandlebury, and name one legend about him and why historians doubt it. A parent dates and keeps the page.
2. Make a T-chart: “Henry’s novel” on one side and “The historical record” on the other, with at least four rows.
3. Sketch the Godolphin Arabian as you imagine him: small, bay, arched neck, high crest. Label the white heel spot from Henry’s story.

Did you know? Tradition says the Godolphin Arabian had a close friend in a stable cat, and an eighteenth-century portrait of him by David Morier is said to show the cat at his feet. Whether or not every detail is true, the story has been told about him since the 1700s.

Go deeper. Marguerite Henry, *King of the Wind* (1948), illustrated by Wesley Dennis. The National Horseracing Museum in Newmarket, England, has pages on the foundation sires. The National Gallery, London, has a page and short film on Stubbs’s *Whistlejacket*. Second video topic: “Eclipse, the eighteenth-century racehorse.”

Goes deeper in. History, “Georgian England,” and Life Science, “Heredity and Breeding” (coming soon).

For families. Sources: Britannica, “Godolphin Arabian” and “Thoroughbred”; the National Gallery on *Whistlejacket*; American Library Association Newbery records. The horse’s birthplace, his Arab-or-Barb identity and the exact year he reached England are all debated; the stop gives the common view with hedges. The water-cart and Hobgoblin stories are presented as legend. *King of the Wind* is under copyright and is summarized, not quoted; there is no public-domain primary source for this stop. The cat-and-portrait detail is tradition and is labeled as such. Generation counts are estimates (about 10–12 years per Thoroughbred generation). Picture: Stubbs, *Whistlejacket*, National Gallery, London.

PRACTICE

1. **EASY** Name the three foundation sires of the Thoroughbred.
2. **EASY** What prize did *King of the Wind* win, and in what year?
3. **MEDIUM** How did the horse come to be called the Godolphin Arabian?
4. **MEDIUM** Name one legend about the Godolphin Arabian and explain why it should be treated as legend.
5. **CHALLENGE** If one Thoroughbred generation is about 11 years, about how many generations separate a horse foaled in 2026 from the Godolphin Arabian’s first foals in the early 1730s? How many places would that many generations create in a pedigree, and what does the answer show?

6. **CHALLENGE** Most modern Thoroughbreds trace in the direct male line to the Darley Arabian, not the Godolphin Arabian. Does that mean the Godolphin Arabian matters less to the breed? Explain using the word “pedigree.”

Make it a game · Sire or Dam?. One player reads a pair such as “Lath and the Godolphin Arabian,” “Spilletta and Eclipse,” “Mogul and Whistlejacket,” “Roxana and Cade.” The others say “sire,” “dam,” or “son” or “daughter” for each horse in the pair. A correct answer earns a point; a correct answer that also names the right century earns two.

Scripture. “Seest thou a man diligent in his business? he shall stand before kings; he shall not stand before mean men.” (Proverbs 22:29, KJV)

In Henry’s story, a voiceless stable boy faithfully keeps his horse through mockery, poverty and exile, and at last both stand where kings and nobles see their worth. Diligence in humble work is never wasted, even when no one is watching.

Practice: answers

1. The Byerley Turk, the Darley Arabian and the Godolphin Arabian.
2. The Newbery Medal, in 1949.
3. Edward Coke brought him to England from France around 1729; when Coke died in 1733 the horse passed to Francis, 2nd Earl of Godolphin, and took the Earl’s name.
4. That he pulled a water cart (or bread cart) in Paris: it was popularized in the 1800s, long after his death, and no records from his own time support it. (Or: the Hobgoblin and Roxana story, which appears in early accounts but cannot be confirmed.)
5. About $2026 - 1732 = 294$ years; $294 \div 11 \approx 27$ generations. 2 to the 27th power = 134,217,728, about 134 million places. Since only a few thousand Thoroughbreds existed in the 1700s, the same ancestors must fill those places many times (pedigree collapse), so the Godolphin Arabian appears in the pedigree thousands of times.
6. No. The male line is only one thread of a pedigree: the father’s father’s father and so on. The rest of the pedigree, through dams and other sires, is full of the Godolphin Arabian’s descendants (for example, Eclipse’s dam was by Regulus, his son). Each foundation sire appears many times in every modern pedigree, so all three matter; the male line just shows which one happens to be at the top of the father’s side.

4.7 WALTER FARLEY'S *THE BLACK STALLION* (1941)

OBJECTIVES

- Tell how a high-school student, Walter Farley, came to write *The Black Stallion*, and summarize its two-part plot.
- Identify the two genres the book joins (the castaway survival story and the sports story) and explain how each part tests Alec.
- Audit the book's realism with facts about horse training and racing speed, and weigh what a story may exaggerate.

Warm-up. List three things you would need to survive alone on a small desert island, and one thing that would make it harder: being responsible for a wild, hungry stallion. Would the horse be a burden or a help? Write two sentences either way.

Video slot. Video coming. How horse trainers gentle an untrained horse step by step; racehorse training and match races. Search approved channels (Kentucky Horse Park, a university equine extension program, a Pony Club or 4-H channel, the National Museum of Racing and Hall of Fame); preview first.

KEY TERMS

castaway story

A tale of a person shipwrecked or stranded who must survive alone, in the tradition of Daniel Defoe's *Robinson Crusoe* (1719).

sports story

A story built around training for and winning a contest, with a mentor, obstacles and a climactic race or game.

gentling

Teaching a wild or untrained horse to accept people by patience, routine and trust rather than force.

mentor

An experienced guide who trains and advises a younger person. In the book, the old horseman Henry Dailey is Alec's mentor.

match race

A race between a few specially invited horses, rather than an ordinary race open to many entries.

suspension of disbelief

A reader's willingness to accept unlikely events for the sake of a story, as long as the story stays true to its own world.

CORE IDEAS

Walter Farley was born in Syracuse, New York, on 26 June 1915 and grew up mostly in New York City. His uncle was a professional horseman, and the boy spent as much time around horses and racetracks as he could. He began writing *The Black Stallion* while still a student at Erasmus Hall High School in Brooklyn, kept at it at Mercersburg Academy in Pennsylvania, and finished it at Columbia University. Random House published it in 1941, the same year he graduated. He was about twenty-six; most of the book had been written by a teenager.

The plot falls into two halves. In the first, a boy named Alec Ramsay is sailing home from a visit to India on the steamer *Drake*. At a port on the coast of Arabia, a wild black stallion is dragged aboard, rearing and screaming. Alec secretly brings him sugar. A storm wrecks the ship; Alec, holding on to the stallion's rope, is towed through the sea to a small, empty island. There boy and horse must survive. Alec finds water and food, the stallion saves him from a cobra, and slowly Alec wins the horse's trust until, one day, he rides him.

In the second half, Alec and the stallion, called simply "the Black," are rescued and brought to Alec's home in New York. A retired jockey and trainer next door, Henry Dailey, recognizes what the horse could be. Training at night to stay secret, they prepare him for a match race against the two greatest racehorses in America. The Black wins. The first half is a **castaway story**; the second is a **sports story**. Farley joins them with one idea: the bond between Alec and the horse, earned on the island, is what makes victory possible.

The book's heart is **gentling**. Alec does not break the Black by force. He feeds him, talks to him, keeps still and lets the stallion come to him. The lesson is sound. Real horse trainers teach that a frightened horse fights because it thinks it is fighting for its life, and that patience, routine and calm build the trust that force cannot. Farley's Alec is brave not because he is fearless but because he keeps returning to a horse that could kill him, trusting a little more each day.

Readers should still audit the book's realism. A stallion wild enough to scream and strike would almost certainly take weeks or months, not days, to accept a rider, and an experienced adult would normally do the first riding. Arabians are prized for endurance, but in a short race on a track, a top Thoroughbred is generally faster. A real racehorse also needs papers, registration and years of conditioning. Farley knew racing well; he chose drama over strict likelihood. That is a fair choice for a novel, so long as the reader knows it is one. Critics in 1941 called the writing plain and youthful, and they were right; children loved it anyway because the story moves and the horse feels alive.

The book was an immediate success. Farley went on to write about twenty more novels about the Black, his foals and a second stallion named Flame, the "Island Stallion," between 1941 and 1989; he also served in the army during the Second World War. His son Steven later continued the series. In 1979 a widely praised film, *The Black Stallion*, brought the island half of the story to the screen with almost no dialogue in its first part. Farley died in Venice, Florida, on 16 October 1989.

Why does the book endure? Because it gives a young reader a picture of courage that is quiet and patient, of a mentor who helps without taking over, and of a horse whose strength is a gift to be respected. As God asks Job, “Hast thou given the horse strength?” The answer is no: we only learn to work with what God has made.

PICTURE STUDY



The Bronco Buster, Frederic Remington, 1895 (model); cast many times · Bronze sculpture · Casts in many museums, including the Amon Carter Museum of American Art, Fort Worth, and the Metropolitan Museum of Art, New York

Wikimedia Commons · Public domain

Frederic Remington was an American painter and illustrator of the Old West who taught himself to sculpt. *The Bronco Buster*, his first bronze, shows a cowboy staying on a bucking horse. Remington balanced the whole statue on the horse's two hind legs, a daring feat in metal. It is the opposite of Alec's method: the moment of contest, not of trust.

Look closely

- Walk around the sculpture (or study photos from several sides). Where does the weight rest?
- Find the rider's hands. What is he holding on to?
- Look at the horse's ears, eye and mouth. What is the horse feeling?

Talk about it

1. How does this scene differ from Alec's way of gentling the Black? Is there ever a place for the cowboy's way?
2. Remington froze a single second of action in bronze. Why is that harder than painting it?

Safety first. Never try to tame, catch or ride a loose or unfamiliar horse, and never feed a horse you do not know. Training young or wild horses is work for experienced adults; young riders work only with quiet horses under supervision and wear an approved riding helmet.

HANDS-ON: REALISM AUDIT AND TRAINING PLAN

Write a short “realism audit” of *The Black Stallion*, then draw up a realistic gentling plan for an untrained horse, to compare with Alec’s.

You will need

- A library copy of *The Black Stallion* (or a summary)
- Notebook and pencil
- A university extension or Pony Club guide to handling young horses (with a parent’s help online or at the library)

Steps

1. List six events from the book (for example: towed ashore by the horse; the cobra; first ride; secret night training; the match race).
2. Rate each event as Likely, Possible or Unlikely, with one sentence of reasoning drawn from a real fact about horses.
3. Using your guide, write a realistic gentling ladder of six to eight steps for an untrained horse (approach, touch, halter, lead, pick up feet, saddle, first ride), with an estimated number of weeks for each.
4. Compare your timeline with Alec’s. Which steps did Farley skip or shorten, and why might he have done so?
5. Close with a paragraph: does the book’s exaggeration weaken its truth about patience and trust, or not?

Check your work

- My audit rates six events with reasons based on real facts.
- My gentling ladder has at least six steps and time estimates.
- My closing paragraph takes a clear position and supports it.

FIELD NOTEBOOK

1. **Narration (keep this page).** In one written paragraph, tell the story of *The Black Stallion* in two halves, the island and the race, and explain how the first half makes the second possible. A parent dates and keeps the page.
2. Sketch a map of the imagined island: the beach where Alec washed up, his shelter, water and the place of the first ride. Label it as invented.
3. Write a short note about Walter Farley as a young writer: when he started, where he finished, how old he was at publication.

Did you know? Walter Farley began the novel that made his name as a schoolboy and published it in the same year he graduated from college. He kept writing about the Black for nearly fifty years; his last books appeared in 1989, the year he died.

Go deeper. Walter Farley, *The Black Stallion* (1941) and *The Black Stallion Returns* (1945). Daniel Defoe, *Robinson Crusoe* (1719), free at Project Gutenberg, the model for every castaway story. A university equine extension guide on handling and training young horses (for example, from Penn State Extension). Second video topic: “How racehorses are trained: gallops, breezes and conditioning.”

Goes deeper in. Literature, “Genre: Adventure and Survival Stories,” and Gardening & Animals, “Caring for Animals” (coming soon).

For families. Sources: Britannica, “Walter Farley”; Random House author pages; Library of Congress catalog records. *The Black Stallion* is under copyright and is summarized, not quoted; there is no public-domain primary source for this stop. The book includes a shipwreck with loss of life told briefly and without detail, and a snake killed by the horse. Exact numbers of books in the series vary by how the Island Stallion books and later titles are counted, so the stop says “about twenty.” The 1979 film is rated G; preview if you plan to watch it. Picture: Remington, *The Bronco Buster*.

PRACTICE

1. **EASY** Who wrote *The Black Stallion*, and when was it published?
2. **EASY** Who is Alec’s mentor, and what was his former job?
3. **MEDIUM** Name the two genres the book combines and the event that joins them.
4. **MEDIUM** How does Alec’s method of gentling differ from force, and why does it work better?
5. **CHALLENGE** A racehorse runs 1¼ miles in 2 minutes. What is its average speed in miles per hour? If an endurance horse averages 10 miles per hour over 50 miles, how long does it take? What does the comparison tell you about speed and endurance?
6. **CHALLENGE** Farley was a teenager when he started the book, and critics called the writing amateurish. Give two reasons the book succeeded anyway, and one lesson a young writer can draw from Farley’s example.

Make it a game · Likely, Possible or Unlikely?. Players take turns reading or inventing a horse-story event (“A horse swims a mile towing a boy,” “A horse follows a girl home because she fed it once,” “A trained horse comes when its name is called”). Everyone holds up one, two or three fingers for Likely, Possible or Unlikely, then the reader gives a real fact that settles it. The closest guessers score a point.

Scripture. “Hast thou given the horse strength? hast thou clothed his neck with thunder? Canst thou make him afraid as a grasshopper? the glory of his nostrils is terrible.” (Job 39:19–20, KJV)

God asks Job whether he made the horse's strength or could frighten it at will. Alec could do neither; he could only learn the horse and earn its trust. Every rider meets a strength he did not make, and the right response is respect, patience and thanks to its Maker.

Practice: answers

1. Walter Farley, in 1941.
2. Henry Dailey, a retired jockey and horse trainer.
3. The castaway (survival) story and the sports (racing) story. The rescue from the island, which brings Alec and the Black to New York, joins them; the bond formed on the island makes the race possible.
4. He feeds the horse, talks to him, stays calm and lets the horse approach, building trust over time. A frightened horse fights because it feels its life is threatened; patience removes the fear, while force increases it.
5. $1.25 \text{ miles} \div (2/60 \text{ hour}) = 1.25 \times 30 = 37.5 \text{ miles per hour}$. $50 \div 10 = 5 \text{ hours}$. The racehorse is nearly four times as fast but only for two minutes; the endurance horse goes forty times farther at a slower pace. Breeds and training are suited to one or the other, which is why an Arabian, bred for endurance, beating top Thoroughbreds in a short race is unlikely.
6. Reasons (any two): the story moves quickly with a strong two-part plot; the horse feels real because Farley knew horses; the friendship between boy and horse gives readers someone to love; the island survival and the secret race are exciting situations. Lesson: write about what you know and love, finish what you start (Farley kept working through high school and college), and remember that a good story can carry plain prose.

4.8 WRITE AND ILLUSTRATE YOUR OWN HORSE STORY

OBJECTIVES

- Choose a point of view, a central conflict and a plot shape for an original horse story, learning from Sewell, Henry and Farley.
- Use accurate horse knowledge and sensory detail so the story is true to real horses.
- Plan and make illustrations that show horses in correct motion, using what Muybridge's photographs revealed in 1878.

Warm-up. Reread the opening of *Black Beauty* in the Primary source box. Underline every word that appeals to a sense: sight, sound, touch, smell, taste. How many did you find? Now write the first sentence of a horse story of your own that uses at least two senses.

Video slot. Video coming. Eadweard Muybridge's 1878 photographs of a galloping horse and how they changed art; how to draw a horse in motion. Search approved channels (Library of Congress, Smithsonian, the National Gallery of Art, a drawing-instruction channel such as Draw Mix Paint or Proko); preview first.

KEY TERMS

point of view

Who tells the story. *Black Beauty* uses first person (the horse says "I"); *Misty* and *The Black Stallion* use third person, following the children.

conflict

The problem or struggle that drives a story: against nature (a storm), another person (a cruel owner), or oneself (fear, pride).

sensory detail

Words that let a reader see, hear, feel, smell or taste a scene, such as "shady trees" or "clear water."

storyboard

A row of small sketches planning the key scenes and pictures of a story before drawing them in full.

revision

Re-seeing and improving a draft: cutting, adding, reordering and sharpening, not only fixing spelling.

flying gallop

The old way of painting a galloping horse with front legs stretched forward and back legs stretched behind, all off the ground at once. Muybridge's photographs proved that real horses never hold that position.

CORE IDEAS

Every great horse story on this trail began with a choice of **point of view**. Anna Sewell let the horse speak, so her readers felt the harness from inside. Marguerite Henry followed two children, so readers shared their longing and their hard decision. Walter Farley followed one boy, so readers felt both his fear and his courage. Before you write a word, decide who will tell your story, and why that teller lets the reader see what matters most. A horse narrator can show suffering or loyalty that people overlook; a human narrator can show what a person learns from a horse.

Next comes **conflict**. Sewell's conflict is between kind and cruel masters; Henry's is between owning and freeing; Farley's is survival and then a race. A story without a real problem is only a description. Good conflicts for a horse story include a storm or a fire (conflict with nature), a careless or cruel owner (conflict with a person), and a rider's fear or pride (conflict within). The best stories add an inner conflict to the outer one: Paul must catch the Phantom, but he must also learn to let her go.

Shape the plot in five movements: an opening that shows the ordinary world, a turning point that starts the trouble, rising action that tests the main character, a climax where the main choice is made, and a resolution that shows what has changed. Keep your first story short, about 1,200 to 2,000 words, so you can finish and revise it. Farley started his novel in high school, but he also spent years finishing it; a short story you complete teaches more than a long one you abandon.

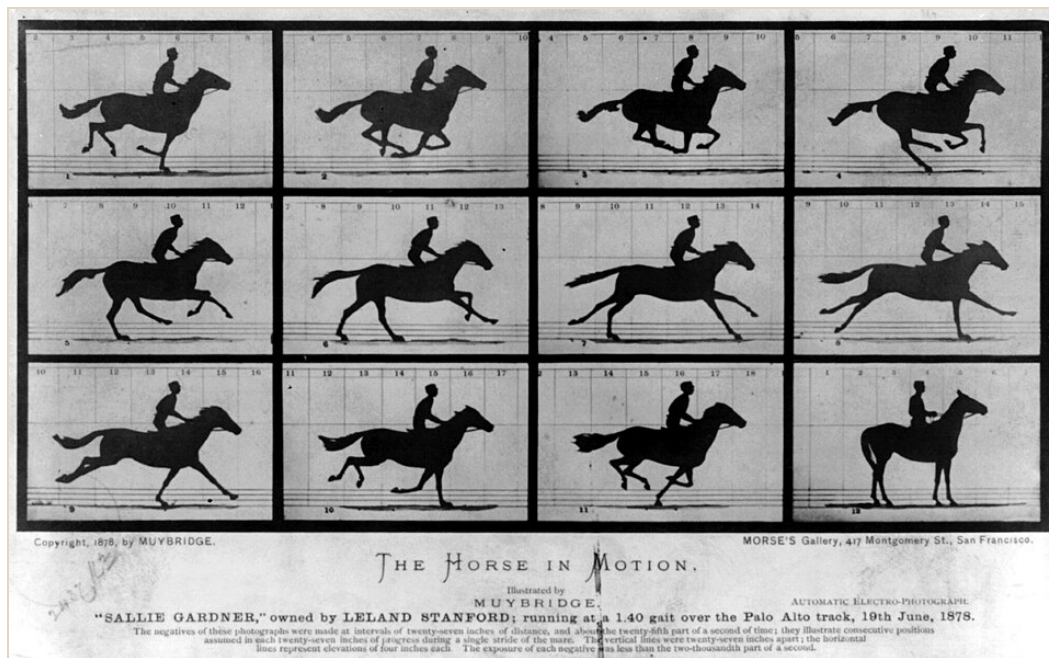
Be true to horses. Readers who know horses will close a book that gets them wrong. Use what you have learned: a horse is measured in hands at the withers; it walks, trots, canters and gallops; it shows its mood with its ears, eyes, nostrils and tail; it drinks gallons of water a day and needs hay or grass; its hooves need a farrier. Henry went to Chincoteague to watch; Sewell drove a pony for decades. If you can, watch a real horse for half an hour and write down twenty exact details before you draft. Use **sensory detail**: Sewell's first paragraph alone gives a meadow, a pond, shady trees, rushes and water-lilies, a plowed field, a gate, a grove of firs and a running brook.

Illustrate with the same care. For most of history, painters showed a galloping horse in the "flying gallop," legs stretched fore and aft like a rocking horse. In June 1878 the photographer Eadweard Muybridge, working for the California railroad builder Leland Stanford, set up a row of cameras along a track at Palo Alto and photographed the mare Sallie Gardner at full gallop. His pictures, published as *The Horse in Motion*, showed that a galloping horse does lift all four feet off the ground, but only when its legs are gathered beneath its body, never when they are stretched out. Artists had to relearn the horse. Wesley Dennis, who illustrated Henry's books, drew from life and from careful study; so should you. Plan your pictures on a **storyboard** first: four to six scenes that show the key moments.

Finally, **revise**. Read your draft aloud. Cut any sentence that does not move the story or reveal a character. Check each horse fact. Ask whether the ending grows out of the characters' choices rather than luck. Sewell worked on her book for about six years; Farley

on his for several. Christian writers have always treated good work as an offering, and a story told truthfully and carefully is a gift to its readers. Your story need not preach; it should show what is good, as these authors did, and let readers see it for themselves.

PICTURE STUDY



The Horse in Motion, Eadweard Muybridge, 1878 · Photographs printed as a series of small frames on a card · Library of Congress, Washington, D.C. (and other collections)
Wikimedia Commons · Public domain

Eadweard Muybridge was an English-born photographer working in California. Leland Stanford, a former governor and racehorse owner, asked whether a galloping horse ever has all four feet off the ground. Muybridge answered with a row of cameras and very fast shutters. These frames settled the question and changed how artists, scientists and later filmmakers saw motion.

Look closely

- Find the frame or frames in which no hoof touches the ground. Where are the legs?
- Follow one front leg through the series. Describe its path in your own words.
- Compare the rider's position across the frames. Does the rider move much?

Talk about it

1. How would you use these frames to draw a galloping horse correctly in your story?
2. Muybridge's pictures are a kind of evidence. How is careful observation part of telling the truth in art and in writing?

HANDS-ON: AN ILLUSTRATED HORSE STORY

Write, illustrate and bind an original horse story of 1,200 to 2,000 words with four to six illustrations. This project spans several sessions; this stop launches it with planning and a first scene.

You will need

- Notebook and pencil; a computer if you prefer to type the draft
- Drawing paper, a soft pencil (2B), an eraser and colored pencils or watercolors
- A copy of Muybridge's *The Horse in Motion* (Library of Congress or Wikimedia Commons)
- Card stock and a stapler, ribbon or binding clips for the finished book

Steps

1. **Session 1 (this stop): Plan.** Choose your point of view and your horse (breed, color, markings, height in hands). Write one sentence each for the opening, turning point, rising action, climax and resolution. Name the outer conflict and the inner conflict.
2. Imitate the primary source: write an opening paragraph of four to six sentences in your narrator's voice, with at least six sensory details, as Sewell does.
3. **Session 2: Draft.** Write the whole story straight through without stopping to polish. Aim for 1,200 to 2,000 words.
4. **Session 3: Storyboard and sketch.** Plan four to six pictures on a storyboard. For any running horse, check leg positions against Muybridge's frames. Make final drawings with care for ears, eyes and proportions.
5. **Session 4: Revise.** Read aloud to a parent. Check every horse fact. Cut at least ten percent of the words. Make sure the ending comes from a choice, not chance.
6. **Session 5: Bind.** Make a title page with your name and the date, a short dedication to someone who helped you, and bind the pages. Read it aloud to your family.

Check your work

- My story has a clear point of view, an outer and an inner conflict, and five plot movements.
- Horse facts are accurate, and my running horses follow Muybridge's evidence.
- I revised, cut words and bound a finished book with a title page and dedication.

FIELD NOTEBOOK

1. **Narration (keep this page).** In one written paragraph, explain how Sewell, Henry and Farley each chose a point of view and a conflict, and which one you will follow in your own story and why. A parent dates and keeps the page.
2. Copy three of Muybridge's frames in pencil, then draw one galloping horse of your own from imagination using what you learned.

3. Make a “horse facts bank” of at least twenty true details you can use in your story (gaits, markings, tack, sounds, smells, care).

Did you know? Muybridge later made more than 20,000 motion photographs of people and animals at the University of Pennsylvania, published in 1887 as *Animal Locomotion*. His spinning-disc projector, the zoopraxiscope, showed his frames as moving pictures years before the first films.

Primary source. Anna Sewell, *Black Beauty* (1877), Chapter 1, “My Early Home,” first paragraph. Project Gutenberg, ebook #271.

The first place that I can well remember was a large pleasant meadow with a pond of clear water in it. Some shady trees leaned over it, and rushes and water-lilies grew at the deep end. Over the hedge on one side we looked into a plowed field, and on the other we looked over a gate at our master’s house, which stood by the roadside; at the top of the meadow was a grove of fir trees, and at the bottom a running brook overhung by a steep bank.

Go deeper. Marguerite Henry, *Album of Horses* (1951), illustrated by Wesley Dennis, for accurate breed details. The Library of Congress online collection of Muybridge’s *The Horse in Motion*. Anna Sewell, *Black Beauty*, free at Project Gutenberg (#271), as a model of first-person narration. Second video topic: “How to draw a horse: basic shapes and proportions.”

Goes deeper in. Literature, “Writing Narrative,” and Art, “Drawing Animals from Life” (coming soon).

For families. Sources: Library of Congress, Muybridge collection; Stanford University history pages; Sewell, *Black Beauty* (Project Gutenberg #271). The project is designed for four or five sessions beyond this stop; the time given covers planning and the first scene. Ten percent cutting is a revision exercise, not a rule. The Gutenberg text spells “plowed” in the American way; English editions use “ploughed.” For a writer who struggles with length, 800 words with the same five plot movements is a fine goal. Picture: Muybridge, *The Horse in Motion* (1878), Library of Congress.

PRACTICE

1. **EASY** What point of view does *Black Beauty* use, and what point of view do *Misty* and *The Black Stallion* use?
2. **EASY** What did Muybridge’s 1878 photographs prove about a galloping horse?
3. **MEDIUM** List at least six sensory details in the primary source.
4. **MEDIUM** Name the five plot movements and give an example of each from *Misty of Chincoteague*.
5. **CHALLENGE** Rewrite the first sentence of the primary source in third person (“Black Beauty’s first memory ...”). Then explain what is gained and what is lost by the change.

6. **CHALLENGE** A horse gallops at 30 miles per hour. How many feet per second is that? If cameras are set 2 feet apart and each fires as the horse passes, about how much time passes between photographs?

Make it a game • Story Relay. Sit in a circle. The first player gives a horse (name, breed, color, markings) and a place. Each player in turn adds one sentence, but the third player must introduce a conflict, the fifth must raise the stakes, and the seventh must bring a climax by a character's choice. Anyone who states a wrong horse fact (such as a pony at 16 hands) must fix it before the story continues.

Scripture. "My heart is inditing a good matter: I speak of the things which I have made touching the king: my tongue is the pen of a ready writer." (Psalm 45:1, KJV)

"Inditing" means bubbling up or composing. The psalmist writes from a full heart, with skill and readiness, for his King. A Christian writer works the same way: with a full heart, a ready pen and the care to tell the truth well.

Practice: answers

1. *Black Beauty* is told in first person by the horse; *Misty* and *The Black Stallion* are told in third person, following the children.
2. That a galloping horse does have all four feet off the ground at one moment, but with its legs gathered under its body, not stretched out fore and aft as in the old "flying gallop" paintings.
3. Any six: a large pleasant meadow; a pond of clear water; shady trees leaning over it; rushes; water-lilies at the deep end; the hedge; a plowed field; a gate; the master's house by the roadside; a grove of fir trees; a running brook; a steep bank.
4. Opening: the children dream of the Phantom on Chincoteague. Turning point: Pony Penning, when Paul brings in the Phantom and her foal. Rising action: buying, gentling and racing the Phantom. Climax: Paul lets the Phantom go back to the wild. Resolution: the children keep Misty and life goes on, changed.
5. Example: "Black Beauty's first memory was of a large pleasant meadow with a pond of clear water in it." Gained: a narrator can tell things the horse could not know and can step back to comment. Lost: the closeness of hearing the horse remember for himself; the reader no longer sees through his eyes, which was Sewell's main tool for building sympathy.
6. $30 \text{ miles per hour} \times 5,280 \text{ feet per mile} \div 3,600 \text{ seconds per hour} = 44 \text{ feet per second}$. $2 \text{ feet} \div 44 \text{ feet per second} \approx 0.045 \text{ second}$, about one-twentieth of a second between pictures, which is why Muybridge needed shutters far faster than ordinary cameras of his day.

TRAIL 4 BADGE QUIZ

The badge quizzes are optional and may be written or answered aloud. Answers should be in full sentences with reasons where asked. Four right out of five earns the first badge; five right out of six earns the second. Badges and the certificate are earned by doing the stops, not by scores.

Badge quiz 1 (Stops 1-5)

1. When was *Black Beauty* published, how much was Anna Sewell paid for it, and what did she say its “special aim” was?
2. What is a bearing rein, why was it used, and name two harms Ginger describes.
3. Quote Proverbs 12:10 and explain what “regardeth” means.
4. Name one way the real Misty’s story differs from the novel, and explain why an author might make such a change.
5. Why is the Virginia herd limited to about 150 adult ponies, and how does the auction keep it near that number?

Badge quiz 2 (Stops 6-8)

6. Name the three foundation sires of the Thoroughbred and explain how the Godolphin Arabian got his name.
7. How many places are there in a pedigree 10 generations back? Explain why the answer means one 1700s stallion appears many times in a modern pedigree.
8. Who wrote *The Black Stallion*, when, and how old was he when he started it? Name its two halves.
9. A horse runs $1\frac{1}{4}$ miles in 2 minutes. Find its average speed in miles per hour.
10. What did Muybridge’s *The Horse in Motion* (1878) show, and how should it change the way you draw a galloping horse?
11. Choose one of the trail’s three novels and explain how its point of view helps its purpose.

TRAIL CERTIFICATE: MY ILLUSTRATED HORSE STORY AND TRAIL D CERTIFICATE

Gather the eight narration paragraphs from the trail into a folder titled “Horses in Great Stories,” with your name and the dates.

Add your finished, bound horse story (1,200 to 2,000 words, four to six illustrations) from Stop D8, together with your planning page and one marked-up draft to show revision.

Include one project from Stops D1-D7 that you are proudest of (for example, the bearing-rein brief, the herd model or the pedigree chart).

When the folder is complete, read your story aloud to the family; then a parent signs the Trail D certificate.

- **Understanding:** Narrations explain each author's purpose, the history behind each book, and the difference between fact and fiction, with correct dates and names.
- **Use of sources:** Primary sources are quoted accurately and used as evidence; Scripture is quoted exactly from the KJV and applied thoughtfully.
- **Story craft:** The original story has a clear point of view, outer and inner conflict, five plot movements and accurate horse details, and shows real revision.
- **Illustration and presentation:** Illustrations are planned on a storyboard, horses are drawn in correct proportion and motion, and the book is neatly bound with a title page.

Answer key

1. 24 November 1877; £40 in one outright payment from Jarrold & Sons; its aim was "to induce kindness, sympathy, and an understanding treatment of horses."
2. A strap from the bit to the harness that holds a horse's head high. It was used because owners thought it looked stylish. Harms (any two): an aching neck from being held up for hours; a sharp bit that cut her tongue and jaw; being whipped for fretting while waiting.
3. "A righteous man regardeth the life of his beast: but the tender mercies of the wicked are cruel." "Regardeth" means knows and cares for: the righteous man pays attention to what his animal needs.
4. The real Misty was born on the Beebe ranch on Chincoteague, not in the wild on Assateague (or: the Phantom's capture and release are invented). An author makes such changes to give the story a clear conflict and climax that express a true theme, here love and freedom.
5. The refuge permit sets the limit so the marsh is not overgrazed (its carrying capacity). Most foals are sold each year at the auction, with a few buy-back foals returned, so the herd does not grow beyond the limit.
6. The Byerley Turk, the Darley Arabian and the Godolphin Arabian. Edward Coke brought him to England around 1729; after Coke died in 1733 the horse passed to Francis, 2nd Earl of Godolphin, and took his name.
7. 2 to the 10 th power = 1,024. Over 25 to 30 generations the number reaches hundreds of millions, far more than the few thousand horses alive in the 1700s, so the same ancestors fill many places (pedigree collapse).
8. Walter Farley, published in 1941; he began it as a high-school student (a teenager). The halves are the castaway survival story on the island and the sports story of the match race.
9. $1.25 \div (2/60) = 37.5$ miles per hour.
10. It showed that a galloping horse has all four feet off the ground only when its legs are gathered under its body, never in the stretched-out "flying gallop." Draw galloping legs from the photographs, gathered or in true stride positions, not stretched fore and aft.
11. Example: *Black Beauty's* first-person horse narrator lets readers feel harness, bits and treatment from the horse's side, which serves Sewell's aim of making drivers kinder. (Or: *Misty's* third-person view of the children lets readers share their longing and their hard choice to free the Phantom.)