

SCHOOL LAUNCH · EXPLORE TRACKS

EXPLORE TRACKS · TRAIL D

The fourth trail of three interest tracks for curious Scouts: Animals (ocean life), Dinosaurs (dinosaurs and the Bible) and Great Battles of the Nineteenth Century. Short, self-paced stops with true stories, great pictures, hands-on projects and games.

First edition

O LORD, how manifold are thy works! in wisdom hast thou made them all: the earth is full of thy riches. So is this great and wide sea, wherein are things creeping innumerable, both small and great beasts.
Psalm 104:24-25 (KJV)

COURSE GUIDE

Explore Tracks are for children who want more of what they love. Each track is a trail of short stops. At every stop the child hears a true story, studies a great picture, does something with his or her hands, plays a game and adds a page to a Field Notebook. Each stop also points to the matching lesson in a School Launch course, so the child can go deeper.

Trail D is the fourth trail of each track at the  Scout level (ages 7–9). The Animals track goes down into the sea, from sharks, octopuses and coral reefs to the dark home of the anglerfish, and ends with Jonah’s great fish and the Leviathan of the Bible. The Dinosaurs track opens the Bible beside the fossils: the living things God made, Behemoth (Job 40) and Leviathan (Job 41), the Ark and the Flood, dragon stories from around the world, and how to read a museum sign carefully. The Great Battles track visits eight battles of the nineteenth century, from Waterloo (1815) to Appomattox (1865), five of them from the American Civil War. Trails A–C are not required first.

WHO IT IS FOR

Written for children about ages 7–9 who are read to by a parent, or who read short passages on their own. Older siblings can join in. Nothing earlier is required.

HOW TO USE THIS COURSE

1. **One stop at a time.** A stop takes 15–25 minutes: read the story aloud, look at the picture, do the hands-on part and play the game. Two or three stops a week works well.
2. **Any order.** The tracks are independent. Do one track at a time, or rotate between them.
3. **Field Notebook.** Every stop ends with a page for the notebook. At the end of the trail the pages become a booklet, and the parent signs the Trail D certificate.
4. **Badge quizzes.** Each track has two short, optional oral quizzes. They are for fun, not grades.

SCOPE AND SEQUENCE

Track 1: Animals  **Trail D: Ocean Life** (Self-paced)

Track 2: Dinosaurs  **Trail D: Dinosaurs and the Bible** (Self-paced)

Track 3: Great Battles ✕ **Trail D: The Nineteenth Century** (Self-paced)

MATERIALS

- **Field Notebook (a sketchbook or composition book)** One for the whole trail.
- **Colored pencils, a ruler, scissors and glue** For drawings, terrain maps and ocean-depth charts.

- **Household things** Each hands-on project lists what it needs: blocks, clay, string, toy figures, cups, a shallow pan or box of sand.
- **A Bible (KJV)** For the verse at each stop.

GRADING

Explore Tracks are not graded. A stop is done when the child has heard the story, done the hands-on part and made a notebook page.

Badges and the Trail D certificate are earned by finishing the stops.

A NOTE TO PARENTS

You do not need to be an expert. Read the story aloud, look at the picture together and ask, “What do you notice?” Each stop has a short *For families* note with background and any facts that scholars still discuss.

Ocean life: the Animals stops tell what scientists have observed and what is still unknown, especially about the deep sea and the giant squid, which was first filmed alive in its deep home only in 2012. The last stop reads Jonah and the Leviathan passages as true Scripture; where the Bible does not name an exact kind of animal, the stop says so rather than guessing.

Dinosaur dates: museums give ages in millions of years. Stops marked 🕒 (D5, D7, D8 and D9) include a short box with three parts: *What the sign says*, *What we observe* and *How Christians read it*. The trail teaches the period names as museum words and explains that the dates are interpretations; many Christian families understand the fossils within a young earth and the Flood. Where Christians differ, as on what happened to the dinosaurs, each view is presented fairly.

Battles are told for young children: the map, the plan, the people and why it mattered, with honor for courage, faith and wisdom and no gory detail. Losses are given as numbers, and wounds and deaths are stated plainly but not described. Both sides are described fairly, in the terms of their own time. The Civil War stops say plainly that slavery was the central cause of secession, as the seceding states’ own declarations said, while honoring the courage of soldiers on both sides. The trail ends with Grant’s generous terms at Appomattox.

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Track 2: Dinosaurs 🦖 Trail D: Dinosaurs and the Bible

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Track 3: Great Battles ✂ Trail D: The Nineteenth Century

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- 3.2 New Orleans (1815): The Mud Wall by the River
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- 3.8 Appomattox (1865): Grant’s Terms and Lee’s Surrender

Each stop takes 15–25 minutes. Tracks may be done in any order, and a child may do just one track.

ANIMALS TRAIL D: OCEAN LIFE

The fourth trail of the Animals track dives into the sea: sharks with their rows of spare teeth, the eight-armed octopus, coral reefs built by tiny animals, the giant squid that a Newfoundland minister photographed, playful dolphins, jellyfish, the glowing anglerfish of the deep, salmon swimming home, seals and sea lions, and the great fish and leviathan of the Bible. Each stop is a short read-aloud story, a picture to study, something to draw or build, quick questions, a game and a verse of Scripture.

This is the  **Scout** level, written for ages 7 to 9. A parent reads the story aloud, or a strong reader reads it alone. Every stop stands by itself. The sea creatures are taught as God's handiwork, made "after their kind" (Genesis 1:21), and caring for them is taught as good stewardship (Genesis 2:15). The  Ranger and  Expert levels of these same stops will add maps, numbers and primary sources later.

Five stops earn the **Ocean Scout badge, part 1**, and ten stops earn part 2 and the **Trail D certificate**. The badge quizzes are at the end of the trail and are optional.

BEFORE YOU BEGIN

- Listen to a story of about five minutes and tell it back.
- Find the Atlantic and Pacific Oceans, Australia and Alaska on a globe (a grown-up may help).

MASTERY CHECKLIST

- ☐ I can tell the difference between a fish and a sea mammal, and name one of each.
- ☐ I can tell one true and surprising fact about each animal on this trail.
- ☐ I can tell how two sea animals hide, hunt or stay warm.
- ☐ I can tell why the deep sea is dark and name one animal that makes its own light.
- ☐ I can tell the story of Jonah and the great fish in order.

OPTIONAL BOOKS AND RESOURCES

- **Smithsonian Ocean** (<https://ocean.si.edu>): Free pages, photos and short videos on sharks, coral, the giant squid and the deep sea.
- **Monterey Bay Aquarium Live Cams** (<https://www.montereybayaquarium.org/animals/live-cams>): Free live cameras of jellies, sea otters, sharks and a kelp forest; good for Stops D1 and D6.
- **NOAA Ocean Exploration** (<https://oceanexplorer.noaa.gov>): Photos and videos from deep-sea dives; use them with Stop D7.

1.1 SHARKS: ROWS OF TEETH AND SANDPAPER SKIN

OBJECTIVES

- Tell two ways a shark is different from most other fish: a skeleton of cartilage and skin like sandpaper.
- Explain why a shark never runs out of teeth.
- Name the biggest fish in the sea and tell what it eats.

Warm-up. Press the tip of your nose and wiggle it. Now bend your ear. They bend because they are made of cartilage, not bone. A shark's whole skeleton is made of cartilage, like your nose and ears!

Video slot. Video coming. Sharks for children: a whale shark feeding, a shark's rows of teeth, a hammerhead swimming. Search approved channels (Monterey Bay Aquarium, Smithsonian Ocean, NOAA Fisheries, National Geographic Kids); preview first.

KEY TERMS

fish

An animal that lives in water, breathes with gills and swims with fins.

gills

Slits on the side of a fish's head that take air out of the water so the fish can breathe.

cartilage

A strong, bendy material, like the inside of your nose and ears. A shark's skeleton is made of it.

predator

An animal that hunts other animals for food.

CORE IDEAS

The story. Far out in the warm blue sea, a shadow glides under a fishing boat. It is long and gray, with a tall fin on its back and a tail that swishes from side to side. It is a shark. The sailors lean over the side to watch. The shark does not even look at them. It has smelled a school of fish far ahead, and off it goes.

No bones at all. Sharks are fish. They breathe with **gills** and swim with fins. But a shark has no bones! Its skeleton is made of **cartilage**, which is light and bendy, so a shark can turn quickly. Its skin is covered with tiny tooth-shaped scales. Rub a shark one way and it feels smooth; rub it the other way and it feels like sandpaper.

A mouth full of spare teeth. A shark has rows and rows of teeth, one behind another. When a front tooth breaks or falls out, a new one moves forward to take its place, like a

moving sidewalk. One shark may use thousands of teeth in its life. That is why shark teeth are some of the easiest things to find on certain beaches.

Super senses. Sharks are **predators**, and God gave them keen senses for hunting. A shark can smell a tiny bit of blood in the water from far away. Tiny pores on its snout can even feel the weak electric signals every living animal gives off, so a shark can find a fish hiding in the sand. The hammerhead's wide, flat head spreads those pores out like a metal detector.

Big and gentle. There are hundreds of kinds of sharks. Some are smaller than your hand. The biggest is the whale shark, the largest fish in the world, as long as a school bus. But it does not hunt big animals. It swims with its huge mouth open and strains tiny floating creatures out of the water. Divers can swim right beside it.

PICTURE STUDY



The Gulf Stream, Winslow Homer, 1899 · Oil on canvas · The Metropolitan Museum of Art, New York
Wikimedia Commons · Public domain

Winslow Homer was an American painter who loved the sea. He sailed to the Bahamas and Florida and painted the warm waters of the Gulf Stream. In this picture a sailor is alone on a boat whose mast has broken off. Sharks circle in the waves. Far away, a ship sails by.

Look closely

- Count the sharks. Where are their fins and tails?
- Find the broken mast. Find the ship far away on the edge of the sea.
- Look at the color of the water. Is it calm or rough?

Talk about it

1. How do you think the sailor feels? What would you do if you were on that boat?

2. Do you think the faraway ship will see him? Why?

HANDS-ON: SHARK TOOTH CONVEYOR BELT

Make a paper model of a shark's jaw that shows how new teeth move forward to replace old ones.

You will need

- A paper plate
- A strip of white paper about 2 inches wide and 12 inches long
- A pencil and a gray crayon
- Scissors and tape (with a grown-up)

Steps

1. Fold the paper plate in half to make a shark's open mouth. Color the outside gray.
2. Draw a row of pointed triangle teeth all along the paper strip.
3. Ask a grown-up to cut two slits at the front edge of the mouth, one on each side. Thread the strip through so a few teeth stick out at the front and the rest are hidden inside.
4. Pretend a front tooth broke off. Pull the strip forward so a new tooth moves up. Keep going until you have used them all!

Check your work

- My shark mouth has a row of teeth that moves forward.
- I can show how a new tooth replaces an old one.
- I can tell what a shark's skeleton is made of (cartilage).

FIELD NOTEBOOK

1. Draw a shark from the side. Label the fin on its back, the tail, the gills and the teeth.
2. Draw a whale shark next to a school bus to show how big it is.

Did you know? Some sharks, like the nurse shark, can rest on the sea floor and pump water over their gills. Others must keep swimming to breathe. Shark eggs come in tough cases that people call "mermaid's purses," though many sharks are born alive instead. People are not a shark's food: shark bites on people are very rare.

Goes deeper in. Life Science, the fish and ocean animals unit (coming soon); and Geography, for the Gulf Stream and the warm seas.

For families. There are more than 500 known kinds of sharks (NOAA Fisheries). Whale sharks are commonly reported at about 40 feet long, with some estimates larger. The

“tiny pores” are the ampullae of Lorenzini, which sense electric fields. Homer’s *The Gulf Stream* (1899) is tense but not graphic; you may preview it before showing it.

PRACTICE

1. **EASY** What is a shark’s skeleton made of?
2. **MEDIUM** Why does a shark never run out of teeth?
3. **EASY** What is the biggest fish in the world, and what does it eat?

Make it a game • Shark Sense. One player is the shark and closes their eyes. Another player hides a “fish” (a small toy) somewhere close by, then quietly gives clues by saying “warmer” or “colder” as the shark moves. The shark uses its “super senses” to find the fish. Then switch.

Scripture. “The fowl of the air, and the fish of the sea, and whatsoever passeth through the paths of the seas.” (Psalm 8:8, KJV)

David marveled at all the creatures God made, even the ones that swim far out in the paths of the sea. Sharks are part of God’s handiwork too.

Practice: answers

1. Cartilage, a strong, bendy material like the inside of your nose and ears.
2. It has rows of spare teeth, and a new one moves forward whenever one falls out.
3. The whale shark. It eats tiny floating creatures that it strains from the water.

1.2 OCTOPUS: EIGHT ARMS AND THREE HEARTS

OBJECTIVES

- Name three surprising parts of an octopus: eight arms, three hearts and blue blood.
- Tell three ways an octopus hides or escapes from danger.
- Explain why an octopus can squeeze through a tiny hole.

Warm-up. Try to touch and pick up three things at once using only one hand. Hard, isn't it? An octopus has eight arms, and every one of them can feel, grab and even taste on its own!

Video slot. Video coming. Octopus changing color, squeezing through small spaces and squirting ink. Search approved channels (Monterey Bay Aquarium, Smithsonian Ocean, NOAA Ocean Exploration, National Geographic Kids); preview first.

KEY TERMS

octopus

A soft sea animal with eight arms covered in suckers and no bones.

sucker

A round cup on an octopus arm that grips things and can feel and taste them.

camouflage

Colors or shapes that help an animal blend in with what is around it.

ink

A dark cloud an octopus squirts into the water to hide while it escapes.

CORE IDEAS

The story. A diver swims slowly over a rocky sea floor, looking for an octopus. She sees rocks, weeds and shells, but no octopus. Then one of the “rocks” moves! Its bumpy brown skin turns smooth and pale, and eight long arms ripple out. The octopus had been sitting right in front of her the whole time.

A wonderful body. An **octopus** has eight arms lined with **suckers**. Each sucker can grip, and it can taste too, so an octopus can taste a crab just by touching it. An octopus has three hearts and blue blood. It has no bones at all. The only hard part of its body is its beak, which is shaped like a parrot's beak and is used to crack open shells.

Masters of hiding. An octopus can change its color in the blink of an eye. It can make its skin bumpy like a rock or smooth like sand. This **camouflage** keeps it safe from hungry fish and seals. If a hunter finds it anyway, the octopus squirts a dark cloud of **ink** and shoots away backward by pushing water out of its body like a jet.

Squeeze and slip. Because it has no bones, an octopus can squeeze through any hole its beak can fit through. It hides in cracks, empty shells and even old bottles on the sea floor. Octopuses in aquariums are known for climbing out of their tanks, and the keepers have to put tight lids on them!

A careful mother. A mother octopus lays thousands of tiny eggs in a den. For weeks she stays with them, cleaning them and blowing fresh water over them, and she hardly ever leaves to eat. God gave the octopus a clever body and a mother's care for her young.

PICTURE STUDY



Octopus Stirrup Jar from Gournia, Unknown Minoan potter, About 1500 BC (museum dating) · Painted clay · Heraklion Archaeological Museum, Crete, Greece
Wikimedia Commons · CC BY 3.0

Long ago, the Minoan people lived on the island of Crete in the Mediterranean Sea. They were sailors and fishermen who knew sea creatures well. A potter painted this octopus so its arms wrap all the way around the jar, the way a real octopus wraps around a rock.

Look closely

- Find the octopus's two eyes. Find its head (really its body).
- Follow one arm with your finger. Where does it go?
- Look for other shapes between the arms. What might they be?

Talk about it

1. Why do you think the potter spread the arms all over the jar?
2. What do you think the jar was used to carry?

HANDS-ON: COLOR-CHANGING OCTOPUS

Make a paper octopus that can “change color” to hide on different backgrounds.

You will need

- Two sheets of paper
- Crayons or colored pencils
- Scissors (with a grown-up)
- A few things to hide on: a rug, a book cover, a rock or a pillow

Steps

1. Draw an octopus with a round head and eight wavy arms on one sheet. Cut it out.
2. Color one side to match one hiding place, such as gray and bumpy like a rock.
3. Color the other side to match a different hiding place, such as tan like sand or the color of your rug.
4. Lay the octopus on each background. Ask someone to find it. Flip it over to “change color” and hide somewhere new.

Check your work

- My octopus has eight arms.
- Each side matches a different hiding place.
- I can tell two other ways an octopus escapes (ink and jetting away).

FIELD NOTEBOOK

1. Draw an octopus and label the arms, suckers, eyes and beak. Write “3 hearts” and “blue blood” beside it.
2. Draw an octopus hiding in a shell or a crack in a rock.

Did you know? The word octopus comes from Greek words meaning “eight feet.” An octopus can grow back an arm it has lost. Most octopuses live only a year or two. The giant Pacific octopus is the biggest kind; its arms can stretch wider than a car is long.

Goes deeper in. Life Science, the ocean animals unit (coming soon); and History, for the Minoans of Crete.

For families. Octopus blood is blue because it carries oxygen with copper (hemocyanin) instead of iron. The jar is a Late Minoan “Marine Style” stirrup jar from Gournia, Crete; the date is the museum’s. An octopus can pass through openings only slightly larger than its beak. Aquarium escape stories (such as “Inky” in New Zealand, 2016) are as reported by the aquariums.

PRACTICE

1. **EASY** How many arms and how many hearts does an octopus have?
2. **MEDIUM** Name two ways an octopus hides or escapes from danger.
3. **MEDIUM** Why can an octopus fit through a tiny hole?

Make it a game • Octopus Tag. One player is the octopus and stands in the middle with arms spread. The others are fish and try to run past. Anyone tagged becomes an “arm” and holds hands with the octopus. Keep going until the octopus has eight arms (or everyone is caught).

Scripture. “But ask now the beasts, and they shall teach thee; and the fowls of the air, and they shall tell thee: Or speak to the earth, and it shall teach thee: and the fishes of the sea shall declare unto thee.” (Job 12:7-8, KJV)

Job said the creatures of the sea teach us about God. A clever octopus shows how wise its Maker is.

Practice: answers

1. Eight arms and three hearts.
2. Any two: changing color, changing the bumps on its skin, squirting ink, jetting away, squeezing into a crack.
3. It has no bones; only its beak is hard.

1.3 CORAL REEFS: CITIES BUILT BY TINY ANIMALS

OBJECTIVES

- Tell what a coral polyp is and how corals build a reef.
- Name the biggest coral reef in the world and find it on a globe.
- Name two animals that live on a coral reef and how they help each other.

Warm-up. Stack ten blocks one on top of another. Now imagine that each block is smaller than a grain of rice, and that millions of tiny builders keep stacking for years and years. That is how a coral reef is built!

Video slot. Video coming. Coral reefs for children: coral polyps feeding at night, clownfish in an anemone, parrotfish on the Great Barrier Reef. Search approved channels (NOAA Ocean Service, Smithsonian Ocean, Monterey Bay Aquarium, National Geographic Kids); preview first.

KEY TERMS

coral

A tiny sea animal that builds a hard cup around itself; many corals living together make a reef.

polyp

One little coral animal, shaped like a tube with a ring of tentacles on top.

reef

A long ridge of rock or coral near the top of the sea.

habitat

The home where an animal finds its food, water and shelter.

CORE IDEAS

The story. A boy puts on a snorkel mask and lies face down in the warm, clear water off the coast of Australia. Below him is a whole city of color: pink, purple and yellow shapes like trees, fans, brains and towers. Striped fish dart in and out. A sea turtle paddles past. He is floating over the Great Barrier Reef.

Rocks that are alive. Those colorful shapes are **coral**. They look like plants or rocks, but corals are animals! Each tiny coral animal is called a **polyp**. It is a soft tube with a ring of tentacles on top, often smaller than a pea. At night, the polyps reach out their tentacles to catch tiny floating food.

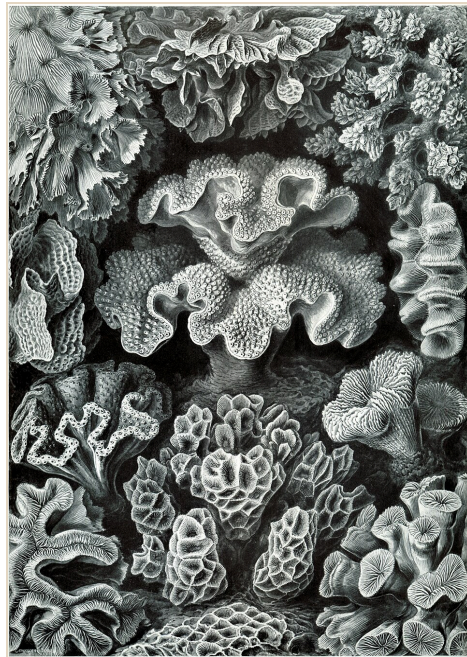
Builders of the sea. Each polyp builds a hard cup of stone around its soft body. Thousands of polyps live together, side by side, and their cups join into one big piece of coral. New polyps grow on top of old ones, year after year. Over a long time, the coral grows into a **reef**.

The Great Barrier Reef is the biggest of all, about 1,400 miles long, made of thousands of smaller reefs.

A busy habitat. A coral reef is a **habitat** for a huge crowd of creatures: fish, crabs, shrimp, sea stars, eels and turtles. The orange clownfish lives among the stinging arms of a sea anemone. The anemone does not sting it, and the clownfish keeps the anemone clean. Parrotfish crunch on coral with their beak-like teeth, and the bits they leave behind become fine white sand.

Things creeping innumerable. The psalmist looked at the sea and saw creatures “innumerable, both small and great” (Psalm 104:25). A coral reef shows it well. God made great reefs out of animals too small to notice, and He gave people the job of caring for them wisely.

PICTURE STUDY



Hexacoralla (Six-Rayed Corals), Plate 9 of Art Forms in Nature, Ernst Haeckel (drawings), Adolf Giltch (lithograph), 1899–1904 · Color lithograph · From the book Kunstformen der Natur (Art Forms in Nature)
Wikimedia Commons · Public domain

Ernst Haeckel was a German scientist who studied sea creatures under the microscope and drew them with great care. His book of one hundred prints showed how beautiful and orderly these small animals are. This page shows stony corals, the kind that build reefs.

Look closely

- Find a coral with wavy grooves like a brain.
- Find a coral made of many little star-shaped cups. Each cup was the home of one polyp.
- Look at how the corals are arranged on the page. Is it messy or in a pattern?

Talk about it

1. Why do you think the artist put the corals in a neat pattern instead of the way they grow on a reef?
2. Which coral would you most like to see in the sea? Why?

HANDS-ON: EGG-CARTON CORAL REEF

Build a little coral reef and fill it with the creatures that live there.

You will need

- A cardboard egg carton
- Paints or markers in bright colors
- Pipe cleaners, tissue paper or yarn
- Paper, crayons, scissors and glue (with a grown-up)

Steps

1. Cut the egg cups apart. Each cup is one coral polyp's stony home.
2. Paint the cups in bright reef colors. Glue them close together on a piece of cardboard to make a reef.
3. Poke short pieces of pipe cleaner or tissue into some cups to be the polyps' tentacles.
4. Draw and cut out a clownfish, a parrotfish, a sea turtle and a crab. Glue them on or around your reef.

Check your work

- My reef has many coral cups joined together.
- I added at least three reef animals.
- I can tell what a polyp is.

FIELD NOTEBOOK

1. Draw one coral polyp up close with its ring of tentacles. Next to it, draw a big piece of coral made of many polyps.
2. Find Australia on a globe. Draw its shape and mark the Great Barrier Reef along the northeast coast.

Did you know? Corals are cousins of jellyfish and sea anemones: they all have stinging tentacles. On a few nights each year, after a full moon, many corals on the Great Barrier Reef let out tiny eggs all at once, like an underwater snowstorm. Reef-building corals have tiny plant-like helpers living inside them that make food from sunlight and give the corals their colors.

Goes deeper in. Life Science, the ocean habitats unit (coming soon); and Geography, for Australia and the Pacific Ocean.

For families. The Great Barrier Reef is about 2,300 km (about 1,400 miles) long and is made of roughly 2,900 individual reefs (Great Barrier Reef Marine Park Authority). The helpers are algae called zooxanthellae. Haeckel's *Kunstformen der Natur* was issued in parts from 1899 to 1904; Haeckel promoted evolutionary ideas, but his drawings are used here only as careful art. Care for reefs is taught as stewardship (Genesis 2:15).

PRACTICE

1. **EASY** Is coral a plant, a rock or an animal?
2. **MEDIUM** How do tiny polyps build a giant reef?
3. **EASY** How do the clownfish and the sea anemone help each other?

Make it a game • Clownfish, Find Your Anemone. Lay a few pillows or hula hoops on the floor as anemones. Everyone swims around like fish. When the leader calls "Shark!" every fish must hurry to an anemone. Take one anemone away each round, and players may share as long as they all fit.

Scripture. "So is this great and wide sea, wherein are things creeping innumerable, both small and great beasts." (Psalm 104:25, KJV)

A coral reef is full of more creatures than anyone can count, from tiny polyps to great sea turtles. God made them all.

Practice: answers

1. An animal. Each tiny coral animal is a polyp.
2. Each polyp builds a hard cup; thousands join together, and new ones grow on top of old ones year after year.
3. The anemone gives the clownfish a safe home, and the clownfish keeps the anemone clean.

1.4 THE GIANT SQUID: A SEA MONSTER FOUND

OBJECTIVES

- Tell the true story of the giant squid that Moses Harvey photographed in Newfoundland.
- Name two giant parts of a giant squid: its long tentacles and its huge eyes.
- Tell what a legend is and how real evidence can show what is true.

Warm-up. Hold up a dinner plate in front of your face. A giant squid’s eye is about as big as that plate! It has some of the biggest eyes of any animal in the world.

Video slot. Video coming. The giant squid: first video in the deep sea (Japan, 2012) and the Smithsonian giant squid. Search approved channels (Smithsonian Ocean, NOAA Ocean Exploration, Ocean Exploration Trust, PBS Nature); preview first.

KEY TERMS

squid

A sea animal like an octopus, with eight arms, two long tentacles and a long body.

tentacle

A long, bendy feeler. A squid has two extra-long tentacles with suckers at the tips for grabbing food.

legend

An old story passed down that may have some truth in it but is not fully proven.

evidence

Something you can see or touch that helps show what is true.

CORE IDEAS

The story. For hundreds of years, sailors told tales of a huge sea monster called the kraken, with long arms that could wrap around a ship. Many people laughed and said it was only a **legend**. Then, in the autumn of 1873, three fishermen near St. John’s, Newfoundland, rowed out to a strange shape in the water. It was alive! A long arm wrapped around their boat. A boy named Tom Piccot grabbed a hatchet and chopped it off, and the creature slid away into the deep.

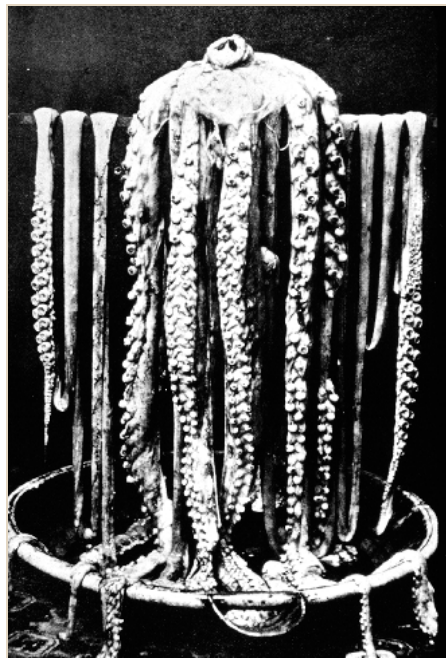
A minister with a camera. A Presbyterian minister in St. John’s named Moses Harvey loved studying nature. He bought the long arm from the fishermen. A few weeks later, other fishermen caught a whole giant **squid** in their net in Logy Bay. Mr. Harvey hung it over the curtain rod above his bathtub and took its photograph. It was one of the first photographs of a giant squid. Now there was **evidence**: the “monster” was a real animal.

Arms, tentacles and eyes. A giant squid has eight arms and two extra-long **tentacles**, with toothed suckers at the tips for grabbing fish. The biggest giant squid are about as long as a school bus from the tip of the body to the end of the tentacles. Their eyes are as big as dinner plates. Those huge eyes help them see in the dark, deep water where they live.

A battle in the deep. Giant squid have one great enemy: the sperm whale. Sperm whales dive deep to hunt them, and many sperm whales have round scars on their skin from squid suckers. Squid beaks have been found in their stomachs. No one has ever seen one of those deep-sea fights, but the scars are good clues.

Seen at last. For many years no one had seen a living giant squid in its home. In 2004, scientists from Japan lowered a camera deep into the sea and took the first photographs of a live giant squid in the wild. In 2012, they filmed one swimming. God had made this wonder of the deep long before anyone saw it.

PICTURE STUDY



The Giant Squid in Moses Harvey's Bathtub, Photograph made for Rev. Moses Harvey, 1873-1874 ·
Photograph · St. John's, Newfoundland (copies in museums and archives)
Wikimedia Commons · Public domain

This old photograph was made in Moses Harvey's house in St. John's, Newfoundland. The squid was draped over a rail so all its arms hung down where they could be seen. It was later sent to scientists at Yale College, who studied it and wrote one of the first good descriptions of the giant squid.

Look closely

- Find the squid's body at the top. Find the arms hanging down.
- Look closely at the arms. Can you see the rows of round suckers?

- Look at the bathtub at the bottom. How does it help you guess how big the squid is?

Talk about it

1. Why do you think a photograph helped people believe the giant squid was real?
2. What would you have said if you saw this hanging in your bathroom?

HANDS-ON: LIFE-SIZE GIANT SQUID ON THE SIDEWALK

Use sidewalk chalk to draw a giant squid as long as a real one.

You will need

- Sidewalk chalk
- A tape measure or a long piece of string
- A driveway, sidewalk or long hallway with paper taped down
- A dinner plate

Steps

1. With a grown-up, measure 35 to 40 feet along the ground. Mark the start and the end.
2. Draw the squid's long body with two fins at the top end.
3. Trace around the dinner plate to draw a giant eye on the body.
4. Draw eight arms, then two very long tentacles reaching all the way to the end mark.
Lie down beside it. How many of you would fit?

Check your work

- My squid has eight arms and two longer tentacles.
- Its eye is as big as a dinner plate.
- I can tell how Moses Harvey showed the giant squid was real.

FIELD NOTEBOOK

1. Draw a giant squid. Label the body, fins, eye, eight arms and two tentacles.
2. Draw a sperm whale with round sucker scars on its skin.

Did you know? A giant squid has three hearts and blue blood, like its cousin the octopus. Its beak is hard and sharp, like a parrot's. The Smithsonian's National Museum of Natural History in Washington, D.C., has a real giant squid on display. A different animal, the colossal squid, is heavier still and has eyes just as big.

Goes deeper in. Life Science, the ocean animals unit (coming soon); and History, for the fishing life of old Newfoundland.

For families. The tentacle was taken off Portugal Cove in October 1873 by Theophilus Piccot, his son Tom and a third man; the whole squid came from Logy Bay later that year,

and the photograph is dated 1873 or 1874 in different sources. Harvey sent the specimen to A. E. Verrill at Yale. Length estimates for the largest giant squid are about 12–13 m (roughly 40 feet) including tentacles (Smithsonian). Kubodera and Mori photographed a live giant squid off the Ogasawara Islands in 2004 (published 2005); the first deep-sea video was made in 2012.

PRACTICE

1. **EASY** How big is a giant squid's eye?
2. **MEDIUM** What did Moses Harvey do that helped prove the giant squid was real?
3. **EASY** Which big animal hunts giant squid in the deep sea?

Make it a game • Kraken Says. Play like “Simon Says,” but the leader is the Kraken. “Kraken says wave eight arms!” “Kraken says make your eyes as big as plates!” “Kraken says swim backward!” If the leader does not say “Kraken says,” stay still.

Scripture. “They that go down to the sea in ships, that do business in great waters; These see the works of the LORD, and his wonders in the deep.” (Psalm 107:23–24, KJV)

The fishermen of Newfoundland worked on the great waters, and they saw one of God's wonders of the deep with their own eyes.

Practice: answers

1. About as big as a dinner plate.
2. He got a whole giant squid from fishermen and photographed it hanging over his bathtub.
3. The sperm whale.

1.5 DOLPHINS: BREATHING, WHISTLING AND PLAYING

OBJECTIVES

- Explain why a dolphin is a mammal and not a fish.
- Tell how a dolphin breathes and how it rests without drowning.
- Tell how dolphins use whistles to call to each other.

Warm-up. Take a deep breath and hold it while a grown-up counts. How long did you last? A bottlenose dolphin usually comes up to breathe every few minutes, and it breathes through a hole on top of its head!

Video slot. Video coming. Bottlenose dolphins for children: a pod leaping, a mother and calf, a dolphin breathing through its blowhole. Search approved channels (NOAA Fisheries, Monterey Bay Aquarium, Smithsonian Ocean, National Geographic Kids); preview first.

KEY TERMS

mammal

An animal that breathes air, has warm blood and feeds its babies milk.

blowhole

The hole on top of a dolphin's or whale's head that it breathes through.

pod

A family group of dolphins or whales that swim together.

calf

A baby dolphin or whale.

CORE IDEAS

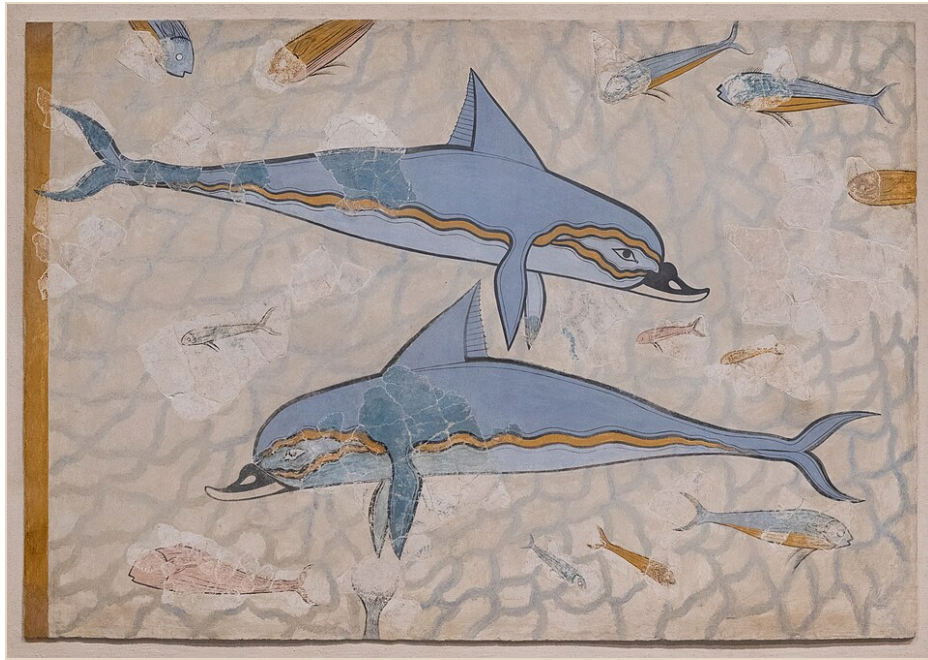
The story. A sailboat cuts through the waves off the coast of Florida. Suddenly a gray back curves out of the water beside the bow, then another, then five more. A **pod** of bottlenose dolphins is racing the boat! They leap and splash and ride the wave the boat pushes in front of it. The children on deck can hear a soft “pfoosh” each time a dolphin breathes.

Not a fish. Dolphins live in the sea and have fins, but they are not fish. They are **mammals**, like dogs, horses and people. They breathe air, they have warm blood, and the mother feeds her baby milk. A dolphin breathes through a **blowhole** on top of its head. It pops up, breathes out and in with a quick puff, and closes the blowhole tight before it dives again.

Mother and calf. A baby dolphin, called a **calf**, is born underwater, usually tail first. Right away its mother nudges it up to the surface for its first breath. The calf swims close beside its mother for a year or more, drinking her milk and learning to catch fish.

Whistles and naps. Dolphins talk to each other with clicks, squeaks and whistles. Each dolphin makes its own special whistle, almost like a name, and others in the pod know it. Because a dolphin must remember to breathe, it never falls all the way asleep. It rests one half of its brain at a time while the other half stays awake. Dolphins are some of the most playful animals God made. They toss seaweed, chase each other and leap for joy.

PICTURE STUDY



The Dolphin Fresco, Unknown Minoan painter (restored in the early 1900s), About 1600-1450 BC (museum dating) · Fresco (paint on wet plaster) · From the palace of Knossos; Heraklion Archaeological Museum, Crete, Greece
Wikimedia Commons · CC0

This wall painting comes from the palace of Knossos on the island of Crete. The Minoan people painted it on wet plaster, so the colors soaked in. Many pieces were broken and missing, and people in the 1900s carefully put it back together and filled in the gaps. The painter had clearly watched real dolphins swimming in the sea.

Look closely

- Count the dolphins. Which way are they all swimming?
- Find the little fish. How are they different from the dolphins?
- Look at the dolphins' stripes and fins. Does this look like a real dolphin to you?

Talk about it

1. Why do you think someone wanted dolphins painted on the wall of a room?
2. What part of the picture do you think was filled in later? How could you tell?

HANDS-ON: BLOWHOLE BREATH TEST

Find out how often a dolphin breathes and practice “surfacing” like one.

You will need

- A timer or a clock with a second hand
- A blue blanket or towel on the floor (the sea)
- Paper and a pencil

Steps

1. Lie on the blue blanket like a dolphin swimming. Take a deep breath and “dive” by holding it (stop at once if you feel uncomfortable).
2. When you need air, “surface”: lift your head and blow out with a big “pfoosh” through a pretend blowhole.
3. Have a grown-up time you. Write down how many seconds you lasted.
4. Talk about it: why does a dolphin need a blowhole on top of its head instead of on its face?

Check your work

- I “surfaced” and blew out like a dolphin.
- I wrote down my time.
- I can tell three things that make a dolphin a mammal.

FIELD NOTEBOOK

1. Draw a dolphin leaping out of the water. Label the blowhole, the fin on its back, the flippers and the tail.
2. Draw a mother dolphin and her calf swimming side by side.

Did you know? Dolphins are small toothed whales. The orca, or killer whale, is really the biggest kind of dolphin. A dolphin’s tail moves up and down when it swims, but a fish’s tail moves side to side. Dolphins also find food with clicks and echoes; you can learn more at Trail F, Stop F1 “Echolocation.”

Goes deeper in. Life Science, the mammals unit (coming soon); and History, for the Minoans of Crete.

For families. Signature whistles in bottlenose dolphins are well studied (for example, the Sarasota Dolphin Research Program). Resting one brain half at a time is called unihemispheric sleep. The Knossos fresco was heavily restored by the Gilliéron workshop for Arthur Evans; the dating is the museum’s. If your child practices breath-holding, keep it short and on dry land.

PRACTICE

1. **EASY** Is a dolphin a fish or a mammal?
2. **MEDIUM** Name two things that show a dolphin is a mammal.
3. **MEDIUM** How does a dolphin rest without forgetting to breathe?

Make it a game • Signature Whistle. Each player makes up their own special whistle, hum or call. Everyone learns each other's calls. Then one player closes their eyes, and another makes their call from somewhere in the room. Can the listener tell whose call it was and point to where it came from?

Scripture. "Let the heaven and earth praise him, the seas, and every thing that moveth therein." (Psalm 69:34, KJV)

When dolphins leap and play, the sea seems to be praising God. Everything that moves in the sea was made to show His glory.

Practice: answers

1. A mammal.
2. Any two: it breathes air, it has warm blood, the mother feeds her calf milk.
3. It rests one half of its brain at a time while the other half stays awake.

1.6 JELLYFISH: NO BRAIN, NO BONES, NO PROBLEM

OBJECTIVES

- Tell three things a jellyfish does not have: a brain, a heart and bones.
- Explain how a jellyfish swims and how it catches food.
- Tell why you should never touch a jellyfish, even one on the beach.

Warm-up. Open your hand wide, then squeeze it closed, then open it again, slowly, over and over. That is how a jellyfish swims: it opens and squeezes its bell to push water and move along.

Video slot. Video coming. Jellyfish for children: moon jellies pulsing, a lion's mane jellyfish, glowing jellies in the deep. Search approved channels (Monterey Bay Aquarium Jelly Cam, MBARI, NOAA Ocean Exploration, Smithsonian Ocean); preview first.

KEY TERMS

jellyfish

A soft, jelly-like sea animal with a bell-shaped body and stinging tentacles. It is not really a fish.

bell

The round, umbrella-shaped top of a jellyfish.

sting

To poke with a tiny dart that has poison on it. Jellyfish tentacles sting.

drift

To float along wherever the water or wind carries you.

CORE IDEAS

The story. A girl walks along the beach in the early morning with her grandfather. On the wet sand lies something round and clear, like a plate of jelly. "Don't touch it," Grandpa says. "It's a jellyfish. Even washed up on the sand, it can still sting." They crouch down and look closely. Inside the clear jelly she can see four pale rings, like flower petals. It is a moon jelly.

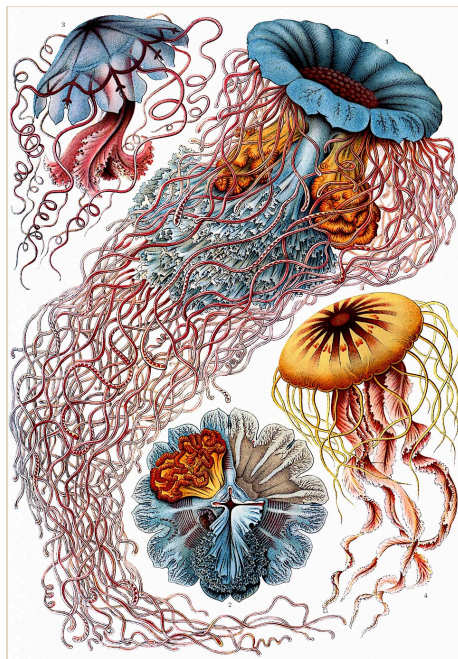
A strange, simple body. A **jellyfish** is not a fish at all. It has no brain, no heart, no bones and no blood. Its body is mostly water. The top part, called the **bell**, opens and squeezes, opens and squeezes, to push the jellyfish through the water. But a jellyfish is not a strong swimmer. Mostly it **drifts** wherever the ocean carries it.

Stinging tentacles. Long tentacles hang down from the bell. They are covered with thousands of tiny stinging darts. When a small fish or shrimp bumps a tentacle, the darts shoot out and **sting** it. Then the tentacles pull the food up to the jellyfish's mouth, under the

middle of the bell. Some jellyfish stings are mild, but a few are very dangerous, which is why we look and never touch.

Big, glowing and hungry. The biggest jellyfish is the lion's mane. Its bell can be wider than a grown-up is tall, and its tentacles can be longer than a blue whale. Many jellyfish in the deep sea glow with their own blue or green light. And jellyfish are food for others: big leatherback sea turtles eat almost nothing but jellyfish. God made even this simple creature for its own place in the sea.

PICTURE STUDY



Discomedusae (Disk Jellyfish), Plate 8 of Art Forms in Nature, Ernst Haeckel (drawings), Adolf Giltch (lithograph), 1899–1904 · Color lithograph · From the book Kunstformen der Natur (Art Forms in Nature) Wikimedia Commons · Public domain

Ernst Haeckel, a German scientist and artist, drew this jellyfish for his book of one hundred nature prints. He named this kind Desmonema after one he saw. Its long, curling tentacles look like ribbons or hair floating in the water.

Look closely

- Find the bell at the top. What shape is it?
- Follow the long tentacles with your finger. How do they move?
- Find the smaller drawings around the big jellyfish. What do you think they show?

Talk about it

1. Why might a jellyfish that is dangerous to touch also be beautiful to look at?
2. If you could color this jellyfish any way you liked, what colors would you choose?

HANDS-ON: JELLYFISH IN A BOTTLE

Make a jellyfish that drifts and floats inside a bottle of water.

You will need

- A clear plastic bottle with a cap, filled with water
- A thin plastic grocery bag
- A piece of string or thread
- Scissors and a few drops of blue food coloring (with a grown-up)

Steps

1. Cut a square from the plastic bag. Pinch the middle into a small ball of air and tie it off with string to make the bell.
2. Cut the loose plastic below the knot into thin strips for tentacles.
3. Push the jellyfish into the bottle, add a drop of blue food coloring, and fill the bottle to the top with water. Screw the cap on tight.
4. Tip and turn the bottle slowly. Watch your jellyfish drift and float like a real one.

Check your work

- My jellyfish has a bell and tentacles.
- It floats and drifts in the bottle.
- I can tell why we never touch a real jellyfish.

FIELD NOTEBOOK

1. Draw a jellyfish. Label the bell, the tentacles and the mouth. Write “no brain, no heart, no bones” beside it.
2. Draw a leatherback sea turtle swimming toward a jellyfish for its dinner.

Did you know? A group of jellyfish is sometimes called a “bloom” or a “smack.” Jellyfish are cousins of coral (Stop D3). The Portuguese man-of-war looks like a jellyfish but is really a crowd of tiny animals living together as one. If you ever see a jellyfish on the beach, look with your eyes and keep your hands and feet away.

Goes deeper in. Life Science, the ocean animals unit (coming soon); and Art, for drawing patterns in nature.

For families. Jellyfish are about 95 percent water. The stinging cells are called nematocysts, and they can still fire after a jellyfish washes up. The record lion’s mane, found in Massachusetts Bay in 1870, was reported with a bell about 7 feet wide and tentacles about 120 feet long; this is an old report, not a modern measurement. If a sting happens, seek local lifeguard or medical advice; treatment varies by species. Haeckel promoted evolutionary ideas; his drawings are used here only as art.

PRACTICE

1. **EASY** Name two things a jellyfish does not have.
2. **MEDIUM** How does a jellyfish catch its food?
3. **EASY** Should you touch a jellyfish on the beach?

Make it a game • Jellyfish Drift. Everyone is a jellyfish and can only move by opening and closing their arms slowly while drifting. The leader calls out the ocean's "current": "Drift left!" "Drift to the window!" "Big wave!" Jellyfish must go where the current says. Anyone who walks fast instead of drifting sits out one turn.

Scripture. "And God said, Let the waters bring forth abundantly the moving creature that hath life, and fowl that may fly above the earth in the open firmament of heaven."
(Genesis 1:20, KJV)

On the fifth day God filled the waters with moving creatures. Even a jellyfish, with no brain or bones, moves and lives because God made it.

Practice: answers

1. Any two: a brain, a heart, bones, blood.
2. Its tentacles sting small animals that bump into them and pull the food up to its mouth.
3. No. It can still sting, even out of the water.

1.7 ANGLERFISH AND THE DEEP SEA

OBJECTIVES

- Describe the deep sea: dark, cold and pressing hard on everything.
- Tell how an anglerfish uses its glowing lure to catch food.
- Tell about one of the first people to visit the deep sea.

Warm-up. Go into a closet or bathroom with a grown-up and turn off the light. Wait a moment. Can you see anything? That is what the deep sea is like all the time. Now switch on a small flashlight. In the deep sea, many animals make their own light!

Video slot. Video coming. Deep-sea anglerfish and glowing deep-sea animals filmed by research submarines. Search approved channels (MBARI, NOAA Ocean Exploration, Ocean Exploration Trust/Nautilus Live, Smithsonian Ocean); preview first.

KEY TERMS

deep sea

The deepest part of the ocean, where sunlight never reaches.

anglerfish

A fish with a “fishing rod” on its head that has a glowing tip to attract food.

lure

Something used to attract an animal so it can be caught.

pressure

A push or squeeze. Deep in the sea, the heavy water presses hard on everything.

CORE IDEAS

The story. In 1934, two men squeezed into a hollow steel ball called a bathysphere, with windows no bigger than a dinner plate. A ship lowered them on a long cable into the sea near Bermuda, down, down, down, more than half a mile. One of them, William Beebe, pressed his face to the window. Outside was blackness, but then he saw sparks and flashes, like fireworks: fish and shrimp glowing with their own light.

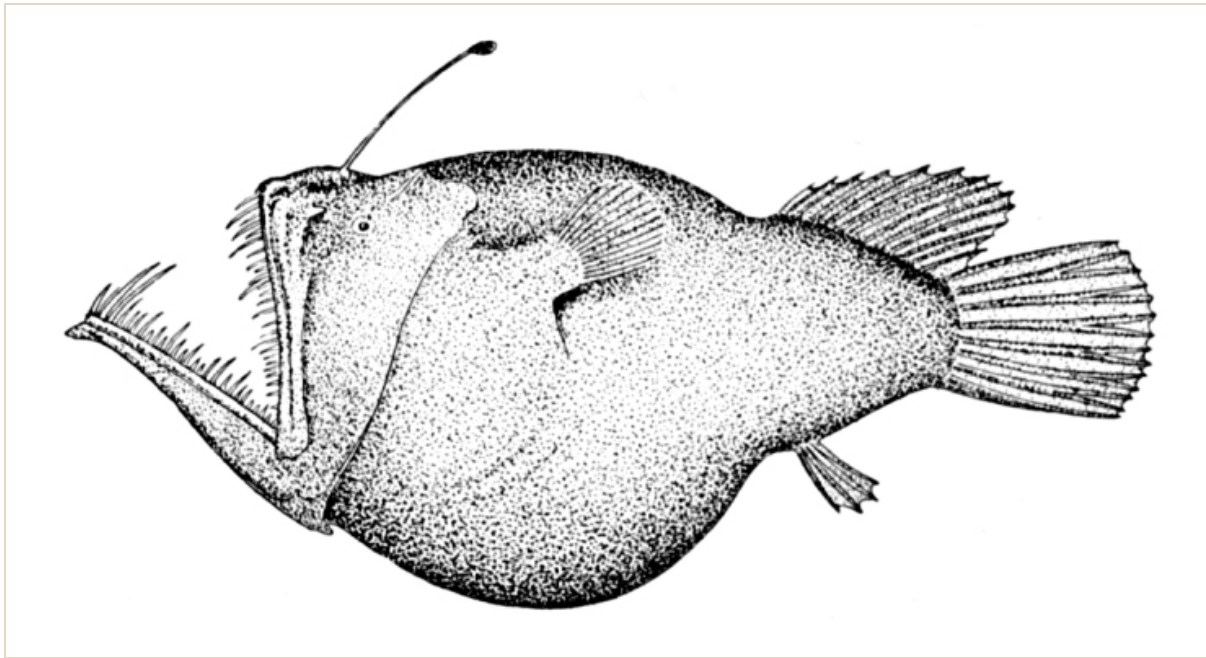
The dark, cold deep. Sunlight only reaches a little way into the ocean. Below that, the **deep sea** is dark all the time, day and night. The water is icy cold. And the weight of all the water above presses down with great **pressure**, enough to crush a soda can flat. Yet God has filled even this dark place with living creatures made just right for it.

Fishing in the dark. One of those creatures is the **anglerfish**. An angler is a person who fishes with a rod and line. The anglerfish has its own fishing rod: a long spine growing from its head with a glowing tip. In the dark, small fish swim toward the light, thinking it is food.

Then, snap! The anglerfish opens its huge mouth and gulps them down. Its long, sharp teeth point inward so its dinner cannot get out.

Small but fierce. In pictures, anglerfish look like monsters, but most deep-sea anglerfish are small, many no bigger than your fist. Food is hard to find in the deep, so an anglerfish can swallow a fish nearly as big as itself; its stomach stretches like a balloon. The glow in its lure is made by tiny living things called bacteria that live inside it.

PICTURE STUDY



Deep-sea anglerfishes, from the atlas of Oceanic Ichthyology, Scientific illustrators for G. Brown Goode and Tarleton H. Bean, 1896 · Printed scientific drawings · From *Oceanic Ichthyology*, published by the Smithsonian Institution's U.S. National Museum
Wikimedia Commons · Public domain

Long before submarines, American ships dragged nets along the bottom of the deep Atlantic and brought up strange fish. Two Smithsonian scientists, George Brown Goode and Tarleton Bean, wrote a big book about them, with an atlas of more than four hundred drawings.

Look closely

- Find an anglerfish. Find its “fishing rod” and the knob at the tip.
- Look at the teeth. Which way do they point?
- Compare the fish on the page. Which one looks strangest to you?

Talk about it

1. Why do you think the drawings are in black and white instead of color?
2. The scientists never saw these fish alive. What do you think they wished they could see?

HANDS-ON: GLOWING ANGLERFISH

Make an anglerfish with a lure that lights up in the dark.

You will need

- Black or dark blue paper
- White and yellow crayons or chalk
- A pipe cleaner or straw
- A small flashlight, or a bit of foil or glow-in-the-dark sticker

Steps

1. Draw a big round anglerfish on the dark paper with white crayon. Give it a huge mouth and long, pointy teeth.
2. Tape a pipe cleaner to the top of its head for the fishing rod.
3. Put a ball of foil or a glow sticker on the tip of the rod for the lure.
4. Turn off the lights and shine a small flashlight on the lure. Pretend to be a little fish swimming toward the light!

Check your work

- My anglerfish has a big mouth, sharp teeth and a fishing rod with a lure.
- I tried it in the dark.
- I can tell why the deep sea is dark.

FIELD NOTEBOOK

1. Draw the ocean from top to bottom: sunny blue at the top, darker in the middle and black at the bottom. Draw an anglerfish in the deep, dark part.
2. Draw the bathysphere on its cable with a person looking out the window.

Did you know? In 1960, Jacques Piccard and Don Walsh rode a deep-sea vessel called the *Trieste* to the bottom of the Challenger Deep in the Pacific Ocean, nearly 7 miles down, the deepest place in all the oceans. Most of the deep sea has still never been seen by anyone. The monkfish that people eat in restaurants is a kind of anglerfish that lives in shallower water.

Goes deeper in. Earth Science, the oceans unit (coming soon); and Geography, for the Pacific and Atlantic Oceans.

For families. William Beebe and Otis Barton reached 3,028 feet in the bathysphere off Bermuda on August 15, 1934. Total darkness to human eyes begins around 1,000 m (about 3,300 feet). *Oceanic Ichthyology* (Goode and Bean) is dated 1895 on its title page and was issued in 1896; plate numbers for the anglerfish vary by edition, so search the

book on the Biodiversity Heritage Library. In some deep-sea anglerfish only the female has the lure; the tiny males are not discussed at this level.

PRACTICE

1. **EASY** Why is the deep sea always dark?
2. **MEDIUM** How does an anglerfish catch food in the dark?
3. **EASY** What did William Beebe ride in to go deep in the sea?

Make it a game • Anglerfish in the Dark. In a dim room, one player is the anglerfish and sits still holding a flashlight. The others are little fish and creep toward the light. When the anglerfish switches the light off and says “Snap!”, any fish within arm’s reach is caught and becomes the next anglerfish.

Scripture. “Yea, the darkness hideth not from thee; but the night shineth as the day: the darkness and the light are both alike to thee.” (Psalm 139:12, KJV)

No one sees the deep sea without a light, but God sees every creature there. Darkness is never dark to Him.

Practice: answers

1. Sunlight cannot reach that far down into the water.
2. It waves a glowing lure on a rod on its head; small fish swim to the light, and it gulps them.
3. A hollow steel ball called a bathysphere.

1.8 SALMON: THE LONG WAY HOME

OBJECTIVES

- Tell the journey of a salmon from stream to sea and back again.
- Explain how a salmon finds its way back to the stream where it hatched.
- Tell one way people help salmon get past dams.

Warm-up. Close your eyes and have a grown-up hold something under your nose: an orange, a cinnamon stick or soap. Can you tell what it is by smell alone? A salmon finds its way home by smelling the water of the stream where it was born!

Video slot. Video coming. Salmon run for children: salmon leaping up waterfalls, bears catching salmon in Alaska, a fish ladder at a dam. Search approved channels (National Park Service, NOAA Fisheries, U.S. Fish and Wildlife Service, Explore.org Katmai bear cams); preview first.

KEY TERMS

salmon

A strong fish that hatches in a river, grows up in the sea and swims back up the river to lay its eggs.

migrate

To travel a long way at a certain time to find food or to have young.

spawn

To lay and fertilize eggs in the water.

fish ladder

A set of water steps built beside a dam so fish can swim up past it.

CORE IDEAS

The story. In a cold, clear stream in Alaska, a tiny pink egg lies hidden among the pebbles. One day it hatches. Out wiggles a little fish with its own lunch, a round yolk sac, stuck to its belly. It is a baby **salmon**. For many months it grows in the stream, eating insects and hiding from bigger fish.

Off to sea. When it is big enough, the young salmon swims downstream, all the way to the ocean. Its body changes so it can live in salt water. For one to five years, depending on the kind, it swims far out in the sea, eating shrimp and smaller fish and growing big and strong.

The way home. Then something amazing happens. The salmon turns around and **migrates** home, often hundreds of miles, to the very same stream where it hatched. Scientists think it uses its sense of smell to find the way: every stream smells a little different, and the salmon remembers. It swims upstream against the rushing water and leaps right up small waterfalls.

A gift to the forest. At last the salmon reaches the gravel where it began. The mother digs a nest with her tail, and the salmon **spawn**, laying thousands of new eggs. Pacific salmon die after spawning, and their bodies become food for bears, eagles, gulls and even the trees along the bank. When people built big dams on rivers, the salmon could not get past, so builders added **fish ladders**: water steps the fish can climb. Caring for rivers this way is good stewardship of what God has made.

PICTURE STUDY



Salmon, Takahashi Yuichi, About 1877 · Oil on paper · University Art Museum, Tokyo University of the Arts, Japan
Wikimedia Commons · Public domain

Takahashi Yuichi was one of the first Japanese artists to paint in oil paints, the way European painters did. He painted this salmon hanging in a kitchen, salted to keep it through the winter. Some of it has already been sliced off for dinner. The painting is so real that it is one of Japan's treasured works of art.

Look closely

- Find the straw rope. Where is the salmon tied?
- Look at the skin. Where does it shine? Where is it rough?
- Find the place where the fish has been cut. What color is the inside?

Talk about it

1. Why do you think a painter would choose an ordinary kitchen fish to paint?
2. How do you think this salmon got from the river to the kitchen?

HANDS-ON: SALMON JOURNEY MAP

Make a map game that follows a salmon from its stream to the sea and back.

You will need

- A large sheet of paper
- Crayons or markers
- A paper salmon cut out (or a small toy fish)
- One die

Steps

1. Draw a stream at the top of the paper, a winding river down the middle and the blue sea at the bottom.
2. Draw about 20 stepping-stone spaces down the river and back up again. Mark some spaces “waterfall: go back 1,” “fish ladder: go ahead 2” and “bear! go back 3.”
3. Put your salmon on the gravel nest at the top. Roll the die to swim down to the sea, then turn around and swim back home.
4. When your salmon reaches the stream again, draw new pink eggs in the gravel.

Check your work

- My map shows the stream, the river and the sea.
- My salmon made the whole journey down and back.
- I can tell how a salmon finds its home stream (by smell).

FIELD NOTEBOOK

1. Draw the salmon’s life in a circle: egg, baby with a yolk sac, young fish going to sea, big fish in the ocean, salmon leaping home.
2. Draw a bear standing in a waterfall catching a leaping salmon.

Did you know? Some sockeye salmon turn bright red with green heads when they swim home to spawn. Salmon can leap up waterfalls taller than a grown-up. Bonneville Dam on the Columbia River, finished in 1938, was built with fish ladders, and people can watch the salmon swim past through underwater windows.

Goes deeper in. Life Science, the fish and life cycles unit (coming soon); Geography, for the rivers of Alaska and the Pacific Northwest; and Gardening & Animals, for caring for streams.

For families. Pacific salmon (sockeye, chinook, coho, chum, pink) die after spawning; Atlantic salmon may spawn more than once. The smell (olfactory imprinting) explanation for homing is well supported, and salmon may also use Earth’s magnetic field at sea. Leap

heights of up to about 10–12 feet are reported for Atlantic salmon. Takahashi Yuichi's *Salmon* (c. 1877) is an Important Cultural Property of Japan.

PRACTICE

1. **EASY** Where does a salmon hatch, and where does it grow up?
2. **MEDIUM** How does a salmon find its way back to its home stream?
3. **EASY** What is a fish ladder?

Make it a game • Swim Upstream. Two players hold a jump rope low and wiggle it like rushing water. The salmon must jump over the “waterfall” to get home. After each jump, raise the rope a little higher. Who can leap the highest waterfall?

Scripture. “All the rivers run into the sea; yet the sea is not full; unto the place from whence the rivers come, thither they return again.” (Ecclesiastes 1:7, KJV)

Solomon saw how the water goes to the sea and comes back again. God made the salmon to follow the rivers to the sea and return to the place it came from.

Practice: answers

1. It hatches in a stream and grows up in the sea.
2. By smell: it remembers how its home stream smells.
3. A set of water steps beside a dam that lets fish swim up past it.

1.9 SEALS AND SEA LIONS: FLIPPERS, WHISKERS AND BLUBBER

OBJECTIVES

- Tell two ways to tell a seal from a sea lion.
- Explain how blubber and whiskers help seals live in the sea.
- Tell how people worked together to save the northern fur seals.

Warm-up. Lie on your tummy on the floor with your arms at your sides. Try to move across the room without using your hands, just by wiggling. That is how a seal moves on land! Now get up on your hands and knees and walk. That is more like a sea lion.

Video slot. Video coming. Seals and sea lions for children: harbor seals on rocks, California sea lions barking and walking on their flippers. Search approved channels (NOAA Fisheries, Monterey Bay Aquarium, National Park Service, Smithsonian Ocean); preview first.

KEY TERMS

pinniped

A sea mammal with flippers for feet, such as a seal, sea lion or walrus. The word means “fin-footed.”

flipper

A wide, flat arm or leg used for swimming.

blubber

A thick layer of fat under the skin that keeps sea animals warm.

whiskers

Long, stiff hairs on the face that help an animal feel things around it.

CORE IDEAS

The story. On a pier in California, a crowd of brown animals lies piled up in the sun like puppies, honking and barking. One lifts its head, pushes up on its front flippers and waddles to the edge. Splash! It dives in and twists through the water as fast as a torpedo. These are California sea lions. On the rocks across the bay, a spotted harbor seal lies on its belly, quiet as can be.

Seal or sea lion? Seals and sea lions are both **pinnipeds**, sea mammals with **flippers**. Here is how to tell them apart. A sea lion has little ear flaps you can see, and it can turn its back flippers forward to walk on land. A seal has only tiny ear holes, and it cannot walk on its flippers, so it wiggles along on its belly. Sea lions bark loudly; seals mostly grunt and stay quiet.

Made for cold water. Many seals and sea lions swim in icy seas. Under their skin is a thick layer of fat called **blubber**, like a warm coat on the inside. Their **whiskers** are very sensitive. In dark or muddy water, a harbor seal can follow the tiny swirls a fish leaves behind just by feeling them with its whiskers.

The seals that came back. Far north, on the Pribilof Islands of Alaska, millions of northern fur seals come ashore each summer. Long ago, hunters killed so many for their thick fur that very few were left. In 1911, the United States, Great Britain, Japan and Russia signed a treaty, an agreement to stop hunting fur seals at sea. The herds grew large again. It was a good example of people caring for God's creatures together.

PICTURE STUDY



Head of a Walrus, Albrecht Dürer, 1521 · Pen and ink with watercolor on paper · The British Museum, London

Wikimedia Commons · Public domain

The walrus is the seals' big cousin: it is a pinniped too. Albrecht Dürer, a great German artist, drew this walrus head in 1521 while he was traveling in the Low Countries (where Belgium and the Netherlands are today). Few people in his part of Europe had ever seen a walrus, so he wrote a note on the drawing about the animal.

Look closely

- Find the tusks. How long are they compared to the head?
- Find the whiskers. How did Dürer draw so many?
- Look for the writing at the top. Why would an artist write on a drawing?

Talk about it

1. Do you think Dürer saw a living walrus or only a head? What makes you think so?

2. How is a walrus like a seal? How is it different?

HANDS-ON: BLUBBER GLOVE TEST

Find out how blubber keeps a seal warm in icy water.

You will need

- A large bowl of ice water
- Two zipper plastic bags
- Solid vegetable shortening (about a cup)
- A spoon and a timer

Steps

1. With a grown-up, spoon shortening into one bag. Turn the second bag inside out, slip it inside the first and zip the two together so the shortening is a layer between them. This is your “blubber glove.”
2. Put one bare hand into the ice water. Count how long until it feels too cold. Take it out and warm it up.
3. Put the same hand inside the blubber glove and put it in the ice water. Count again.
4. Which way could you keep your hand in longer? Why?

Check your work

- I tested my hand with and without blubber.
- I can tell which one stayed warmer.
- I can tell what blubber is and why seals need it.

FIELD NOTEBOOK

1. Draw a seal and a sea lion side by side. Circle the sea lion’s ear flap. Draw arrows to show how each one moves on land.
2. Draw a seal’s face with long whiskers and write “whiskers feel the fish.”

Did you know? Elephant seals can dive more than a mile deep and hold their breath for over an hour. Baby seals are called pups. Harp seal pups are born with fluffy white fur that helps them hide on the ice. The biggest sea lion, the Steller sea lion, can weigh more than a small car.

Goes deeper in. Life Science, the mammals unit (coming soon); Geography, for Alaska and the Bering Sea; and History, for the 1911 fur seal treaty.

For families. Seals and sea lions are pinnipeds: “true” (earless) seals, eared seals (sea lions and fur seals) and the walrus. The North Pacific Fur Seal Convention of 1911 was signed by the United States, Great Britain (for Canada), Japan and Russia, and is often called one of the first international wildlife agreements. Harbor seal whisker-tracking is

from studies by Wolf Hanke and colleagues (2001). Dürer's walrus drawing (1521) is in the British Museum; scholars think he drew from a dead specimen or head. The blubber test uses cold water only briefly; take hands out at once if they ache.

PRACTICE

1. **MEDIUM** Name two ways to tell a sea lion from a seal.
2. **EASY** What is blubber, and what does it do?
3. **EASY** How did people help the northern fur seals?

Make it a game · Seal or Sea Lion?. The leader calls out “Seal!” or “Sea lion!” For “Seal,” everyone drops to the floor and wiggles on their tummy. For “Sea lion,” everyone walks on hands and knees and barks. The leader may also call “Walrus!”: everyone holds two fingers down from their mouth like tusks.

Scripture. “And the LORD God took the man, and put him into the garden of Eden to dress it and to keep it.” (Genesis 2:15, KJV)

God gave people the work of caring for His creation. When nations agreed to protect the fur seals, they were keeping what God made.

Practice: answers

1. Any two: a sea lion has ear flaps; it can walk on its flippers; it barks loudly. A seal has ear holes and wiggles on its belly.
2. A thick layer of fat under the skin that keeps the animal warm.
3. Four countries signed a treaty in 1911 to stop hunting them at sea, and the herds grew again.

1.10 JONAH AND LEVIATHAN

OBJECTIVES

- Tell the story of Jonah and the great fish in order.
- Tell what the Bible says about leviathan and why no one could tame it.
- Explain how Jesus used the story of Jonah.

Warm-up. Think of the biggest sea animal you have learned about on this trail. Could you catch it with a fishing pole? God asked Job a question like that about a creature called leviathan. Today we hear two true stories from the Bible about God and the great creatures of the sea.

Video slot. Video coming. The story of Jonah for children, read from the Bible or told with pictures. Search approved channels (The Bible Project, Crossway, Answers in Genesis Kids, a trusted church children's ministry); preview first.

KEY TERMS

prophet

A person God sends to speak His message to people.

Nineveh

A great city long ago in the land of Assyria, where Iraq is today.

repent

To be sorry for doing wrong and turn away from it.

leviathan

A huge, mighty sea creature described in the Book of Job and the Psalms.

CORE IDEAS

The story. God told the **prophet** Jonah, "Go to **Nineveh** and tell the people to stop their wickedness." But Jonah did not want to go. He ran the other way, to the seaport of Joppa, and got on a ship sailing far off to Tarshish. Out at sea, God sent a great wind. The waves rose so high that the sailors thought the ship would break apart.

Into the deep. Jonah knew the storm was his fault. "Throw me into the sea," he told the sailors, "and the sea will be calm." At last they did, and the storm stopped. But God had a plan for Jonah. "Now the LORD had prepared a great fish to swallow up Jonah" (Jonah 1:17). For three days and three nights Jonah was inside the fish. There, in the dark, he prayed and thanked God. Then God spoke to the fish, and it spat Jonah out onto dry land.

A second chance. This time, Jonah obeyed. He went to Nineveh and preached. The king and all the people believed God, and they **repented**. God showed mercy and did not destroy the city. Long afterward, Jesus said that as Jonah was three days and three nights in the belly of

the great fish, so He would be three days and three nights in the heart of the earth (Matthew 12:40). Then He rose again.

The mighty leviathan. In the Book of Job, God describes another great creature, **leviathan**. It has strong scales close together like shields, terrible teeth, and no hook or spear can take it. “Canst thou draw out leviathan with an hook?” God asks Job (Job 41:1). No one can tame it. Yet Psalm 104:26 says God made leviathan “to play” in the sea. The strongest creature in the sea is like a plaything to God. The same God who rules leviathan and the great fish rules the storms of our lives too.

PICTURE STUDY



Jonah and the Whale, Pieter Lastman, 1621 · Oil on oak panel · Museum Kunstpalast, Düsseldorf, Germany
Wikimedia Commons · Public domain

Pieter Lastman was a Dutch painter who loved painting Bible stories. He was the teacher of the famous painter Rembrandt. Here he shows the moment the great fish spits Jonah out onto dry land. Like many artists of his time, he painted the fish as a strange sea monster, because the Bible does not tell us what kind of fish it was.

Look closely

- Find Jonah. What is he doing with his arms? What does his face show?
- Look at the great fish. Find its mouth and its eye.
- Look at the sky and the water. Is the storm over, or still going?

Talk about it

1. What do you think Jonah said to God right after this moment?
2. Why did the painter make the fish look so huge?

HANDS-ON: JONAH STORY WHEEL

Make a turning wheel that tells the story of Jonah in four pictures.

You will need

- Two paper plates
- Crayons
- A brass paper fastener
- Scissors (with a grown-up)

Steps

1. Draw lines to divide one plate into four parts, like a pie.
2. In the four parts draw: 1) Jonah running away on the ship in the storm, 2) Jonah inside the great fish praying, 3) the fish spitting Jonah onto land, 4) Jonah preaching in Nineveh.
3. Ask a grown-up to cut one pie-shaped window out of the second plate. Draw waves and the words “Jonah and the Great Fish” on it.
4. Put the window plate on top and push the fastener through both centers. Turn the wheel and tell the story to someone.

Check your work

- My wheel shows four parts of the story in the right order.
- I told the story to someone using my wheel.
- I can tell what Jesus said about Jonah.

FIELD NOTEBOOK

1. Draw Jonah praying inside the great fish. Write Jonah 1:17 underneath.
2. Draw what you think leviathan might have looked like, using the words in Job 41: scales like shields, strong teeth.

Did you know? The Book of Jonah calls the creature “a great fish.” In Matthew 12:40, the King James Bible uses the word “whale.” The Bible does not say what kind of animal it was; it says God prepared it. Jonah’s prayer from inside the fish is in Jonah chapter 2. You can find Nineveh on a map near the city of Mosul in Iraq.

Goes deeper in. Literature, for Bible stories and retelling; History, for Assyria and Nineveh; and Geography, for the lands of the Bible.

For families. Hebrew *dag gadol* means “great fish”; the Greek *ketos* in Matthew 12:40 means a great sea creature, rendered “whale” in the KJV. Christians have identified leviathan in different ways: a crocodile, a great whale, or a now-extinct sea creature (some creationists suggest a great sea reptile). The story does not choose one and treats

the passages as true. Isaiah 27:1 also names leviathan. Lastman's *Jonah and the Whale* (1621) is in the Museum Kunstpalast, Düsseldorf.

PRACTICE

1. **EASY** Where did God tell Jonah to go, and where did Jonah go instead?
2. **MEDIUM** How long was Jonah inside the great fish, and what did he do there?
3. **MEDIUM** What does Psalm 104:26 say God made leviathan to do?

Make it a game • Storm on the Sea. Players sit on a blanket “ship.” The leader is the wind and calls “Little waves!” (everyone sways gently), “Big waves!” (sway hard), or “Great fish!” (everyone curls up small). When the leader calls “The LORD calms the sea!” everyone sits perfectly still. Anyone who moves becomes the next wind.

Scripture. “Now the LORD had prepared a great fish to swallow up Jonah. And Jonah was in the belly of the fish three days and three nights.” (Jonah 1:17, KJV)

God was in charge of the sea, the storm and the great fish. He did not give up on Jonah, and He gave Jonah a second chance to obey.

Practice: answers

1. God told him to go to Nineveh; Jonah got on a ship sailing to Tarshish instead.
2. Three days and three nights. He prayed to God.
3. To play in the sea.

TRACK 1 BADGE QUIZZES

The badge quizzes are optional. Read each question aloud; the child may answer by talking, pointing or drawing. Four right out of five earns the badge. Badges and the certificate are earned by doing the stops, not by scores.

Badge quiz 1 (Stops 1–5)

1. Why does a shark never run out of teeth?
2. How many hearts does an octopus have, and what color is its blood?
3. What tiny animals build a coral reef?
4. Where did Moses Harvey hang the giant squid to photograph it?
5. How does a dolphin breathe?

Badge quiz 2 (Stops 6–10)

6. Name two things a jellyfish does not have.
7. What does an anglerfish use to catch food in the dark?
8. How does a salmon find its home stream?
9. Which can walk on its flippers, a seal or a sea lion?
10. Who prepared the great fish that swallowed Jonah?

TRAIL CERTIFICATE: MY OCEAN FIELD NOTEBOOK AND TRAIL D CERTIFICATE

Gather the Field Notebook pages from this trail into one booklet with a cover: “My Ocean Field Notebook,” your name and the dates you started and finished.

Add an “Ocean from top to bottom” page (from Stop D7) and put each animal from the trail where it lives: near the shore, on the reef, in the open sea or in the deep.

When the booklet is done, a parent signs the Trail D certificate.

- **Ten stops:** At least one page for each stop, each with a title and a date.
- **Ocean zones:** The ocean page shows at least six animals placed where they live.
- **Fish or mammal:** The child can sort the trail’s animals into fish, mammals and others (such as octopus, squid, coral and jellyfish).
- **Care:** Drawings are labeled and done carefully.

Answer key

1. It has rows of spare teeth, and a new one moves forward when one falls out.
2. Three hearts and blue blood.
3. Coral polyps.
4. Over the rail above his bathtub.
5. Through a blowhole on top of its head (it breathes air; it is a mammal).
6. Any two: a brain, a heart, bones, blood.
7. A glowing lure on a “fishing rod” on its head.

8. By smell.
9. A sea lion.
10. The LORD (God).

DINOSAURS TRAIL D: DINOSAURS AND THE BIBLE

The fourth trail of the Dinosaurs track opens the Bible beside the fossils: the land animals God made on day six, behemoth and leviathan in the Book of Job, dinosaurs on Noah's Ark, fossil graveyards and the Flood, dragon legends around the world, what happened to the dinosaurs, how to read a museum sign, soft tissue and dating, and the wonderful designs God built into dinosaurs. Each stop is a short read-aloud story, a picture to study, something to make, quick questions, a game and a verse of Scripture.

This is the  **Scout** level, for ages 7 to 9. A parent reads the story aloud, or a strong reader reads it alone, and every stop stands by itself. The trail is creation-friendly: it teaches Genesis as true history and shows how many creation scientists read the rocks. Period names such as **Jurassic** and **Cretaceous** are taught as "museum words," and dates on museum signs are called what they are: interpretations. Stops D5, D7, D8 and D9 have the  box: *What the sign says / What we observe / How Christians read it*. Other views are named fairly, and no one is mocked.

Five stops earn the **Bible and Bones badge, part 1**, and ten stops earn part 2 and the **Trail D certificate**. The badge quizzes are at the end of the trail and are optional.

BEFORE YOU BEGIN

- Know the six days of creation and the story of Noah's Ark (Genesis 1 and 6-9), or read them together first.
- Know what a fossil is (Trail A or Trail B, or ask a grown-up).

MASTERY CHECKLIST

- ☐ I can tell on which day God made the land animals, and why many Christians say dinosaurs were made that day.
- ☐ I can tell what Job 40 says about behemoth and what Job 41 says about leviathan.
- ☐ I can explain how dinosaurs could have fit on the Ark and why fossil graveyards need quick burial.
- ☐ I can tell two views of what happened to the dinosaurs without making fun of either one.
- ☐ I can read a museum sign and sort it into what we observe and what people interpret.

OPTIONAL BOOKS AND RESOURCES

- **Blue Letter Bible** (<https://www.blueletterbible.org>): Free King James Bible online for reading Genesis 1, Genesis 6-9 and Job 40-41 together.
- **Answers in Genesis Kids** (<https://answersingenesis.org/kids/>): Free creation articles and activities for children on dinosaurs, the Ark and the Flood; preview first.

- **Dinosaur National Monument (National Park Service)** (<https://www.nps.gov/dino>): Photos of the bone wall in the Quarry Exhibit Hall for Stop D5. Read the park's signs with the  box in mind.
- **Biodiversity Heritage Library** (<https://www.biodiversitylibrary.org>): Free old books, including Louis Figuier's *The World Before the Deluge* with Riou's engravings (Stop D7).

2.1 “EVERY LIVING THING” ON DAY SIX

OBJECTIVES

- Tell what God made on the fifth day and on the sixth day of creation.
- Explain why many Christians say God made the dinosaurs on day six.
- Say Genesis 1:25 and tell what “after his kind” means.

Warm-up. Hold up six fingers and count the days of creation: light; the sky; land and plants; sun, moon and stars; fish and birds; land animals and people. On that sixth finger, God made the land animals, and the dinosaurs walked on land!

Video slot. Video coming. The six days of creation for children; the land animals of day six. Search approved channels (Answers in Genesis Kids, Institute for Creation Research, Creation Ministries International); preview first.

KEY TERMS

creation

Everything God made, and the six days in which He made it (Genesis 1).

kind

A family of animals God made to have babies like themselves. One kind can have many varieties, like all the different dogs.

land animal

An animal that lives and breathes on dry ground, not in the sea.

very good

What God said about everything He had made at the end of the sixth day (Genesis 1:31).

CORE IDEAS

The story. In the beginning there were no animals at all. Then God spoke. On the fifth day He filled the seas with fish and great sea creatures, and He filled the sky with birds. Then came the sixth day. God said, “Let the earth bring forth the living creature after his kind” (Genesis 1:24). And across the new green land, animals began to walk, run, creep and graze.

Day six. On the sixth day God made cattle, creeping things and “the beast of the earth.” Dinosaurs were land animals. Their bones are found in rock that was once mud and sand, and their footprints are pressed into what was once soft ground. So many Christians believe God made the dinosaurs on day six, the same day He made Adam and Eve. The great swimming reptiles and flying reptiles were not dinosaurs; they fit with the sea and sky creatures of day five.

After his kind. Genesis says again and again that God made animals “after his kind.” That means each kind has babies like itself. A Triceratops egg hatched a baby Triceratops, never a

chicken. A kind can have many varieties, the way a Great Dane and a Chihuahua are both dogs.

Green plants for food. God told Adam that He had given “every green herb for meat” to the beasts of the earth (Genesis 1:30). In old English, “meat” means food. Many Christians believe that at first even the biggest dinosaurs ate plants, and that animals began to hunt each other only after sin came into the world. Christians think about this in more than one way, but all agree that God made a good world.

Very good. When the sixth day ended, “God saw every thing that he had made, and, behold, it was very good” (Genesis 1:31). Soon after, God brought the animals to Adam to see what he would name them (Genesis 2:19). The Bible does not tell us those names, but Adam may have been the very first person ever to see a dinosaur!

PICTURE STUDY



The Creation of the Animals, Jacopo Tintoretto, About 1550-1553 · Oil on canvas · Gallerie dell'Accademia, Venice, Italy
Wikimedia Commons · Public domain

Tintoretto lived in Venice, Italy, almost five hundred years ago. He painted God rushing over the world, calling the animals into being. The painting is full of motion, as if creation is happening right now.

Look closely

- Find God. Which way is He flying, and what is His hand doing?
- Find the birds, the fish and the land animals. Which days of creation do they belong to?
- Look at the birds and the fish. Do they look still or moving?

Talk about it

1. Why do you think the painter made everything look fast and busy?
2. If you painted day six, which dinosaurs would you put in the picture?

HANDS-ON: DAY FIVE AND DAY SIX CLAY ANIMALS

Make clay creatures and sort them into the days God made them.

You will need

- Modeling clay or play dough in several colors
- Two sheets of paper labeled “Day 5: sea and sky” and “Day 6: land”
- A toothpick for drawing scales and eyes

Steps

1. Make one fish and one bird from clay. Put them on the Day 5 paper.
2. Make one dinosaur you know, such as a Stegosaurus with plates or a Triceratops with three horns. Put it on the Day 6 paper.
3. Make one more land animal that lives today, like a cow or a lizard, and put it beside your dinosaur.
4. Use the toothpick to add eyes, scales and toes. Tell a grown-up why each animal belongs on its day.

Check your work

- I made at least four clay animals.
- My dinosaur is on the Day 6 paper.
- I can tell what “after his kind” means.

FIELD NOTEBOOK

1. Fold a page in half. Draw day five on one side (fish and birds) and day six on the other (a dinosaur, a cow and a person).
2. Copy Genesis 1:25 in your best handwriting.

Did you know? The word “dinosaur” was not made up until 1842, more than two hundred years after the King James Bible was printed in 1611. That is why you will not find the word “dinosaur” in the Bible, just as you will not find “kangaroo” or “penguin.” But the Bible does say God made every beast of the earth.

Goes deeper in. Life Science, the creation unit, and Earth Science, the creation and Flood units (coming soon).

For families. This track takes a creation-friendly, young-earth reading of Genesis 1, with land animals (dinosaurs among them) made on day six (Genesis 1:24-25). Christians hold different views on the days of creation; the course names them fairly in Grade 8. The “great whales” of Genesis 1:21 translate the Hebrew *tanninim*, which can mean large sea

creatures in general. The plant-eating reading comes from Genesis 1:29–30; permission for people to eat meat is given after the Flood (Genesis 9:3). The story says Christians think about the early diet “in more than one way.”

PRACTICE

1. **EASY** On which day did God make the land animals?
2. **MEDIUM** Why do many Christians say dinosaurs were made on day six and not day five?
3. **EASY** What does “after his kind” mean?

Make it a game • Day Five or Day Six?. The leader calls out an animal. If it was made on day five (fish, whale, bird), players flap their arms or swim with their hands. If it was made on day six (cow, lion, T. rex, Brachiosaurus), players stomp like a dinosaur. Anyone who mixes up the motion becomes the next caller.

Scripture. “And God made the beast of the earth after his kind, and cattle after their kind, and every thing that creepeth upon the earth after his kind: and God saw that it was good.” (Genesis 1:25, KJV)

God made every land animal, from the tiniest beetle to the biggest dinosaur, and He called them good.

Practice: answers

1. The sixth day.
2. Dinosaurs were land animals: they walked on the ground and left footprints. Day six is when God made the land animals.
3. Each kind of animal has babies like itself.

2.2 BEHEMOTH (JOB 40)

OBJECTIVES

- Tell three things Job 40 says about behemoth.
- Name two ideas Christians have about what behemoth was.
- Tell why God showed Job such a mighty animal.

Warm-up. Go outside and hug a tree trunk, or pretend to. Feel how thick and strong it is. God told Job that behemoth “moveth his tail like a cedar,” a big, tall tree!

Video slot. Video coming. Behemoth in Job 40 for children; what was behemoth? Search approved channels (Answers in Genesis Kids, Institute for Creation Research, Creation Ministries International); preview first.

KEY TERMS

Job

A good man in the Bible who suffered great trouble and kept trusting God (say “JOBE”).

behemoth

A huge, strong, grass-eating animal God described to Job (say “bih-HEE-muth”).

cedar

A tall, strong tree with a thick trunk, famous in Bible lands.

sauropod

A giant plant-eating dinosaur with a long neck and a long tail, like Brachiosaurus or Diplodocus.

CORE IDEAS

The story. Job was a good man who loved God. Then terrible troubles came. He lost his animals, his children and his health. Job sat in sadness and asked, “Why?” His friends argued with him for a long time. At last God Himself answered Job “out of the whirlwind” (Job 38:1). God asked Job about the stars, the sea and the animals. Then He said, “Behold now behemoth, which I made with thee.”

What God said. Behemoth “eateth grass as an ox.” His strength was in his hips and belly. “He moveth his tail like a cedar.” His bones were “like bars of iron.” He rested under shady trees by the water, and when the river rushed and flooded, he was not afraid. God called him “the chief of the ways of God,” the greatest of the animals (Job 40:15-24).

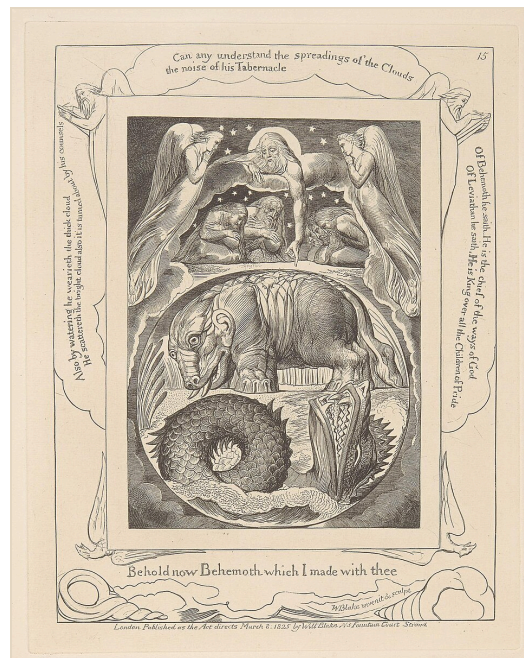
What was it? Some Bible teachers think behemoth was a hippopotamus or an elephant. Hippos eat grass and lie in rivers, and elephants are very strong. But a hippo’s tail is short and stubby, and an elephant’s tail is thin like a rope. Neither is much like a cedar tree. Many

creation Christians think behemoth may have been a sauropod, a giant long-necked dinosaur whose thick tail could be as long as a school bus.

What we know. The Bible does not give us a picture, so we cannot be sure. But we do know two things. God made behemoth “with thee,” with Job and all people, and Job could go and look at it. So behemoth was a real animal that lived in Job’s day, and it was the mightiest creature he knew.

Why God showed Job. God was not only giving Job a science lesson. He was showing Job how great, strong and wise He is. If God made behemoth and rules over it, He can surely take care of Job. Job bowed before God and trusted Him, and in the end “the LORD gave Job twice as much as he had before” (Job 42:10).

PICTURE STUDY



Behemoth and Leviathan, Plate 15 of Illustrations of the Book of Job, William Blake, 1825 · Engraving · From Illustrations of the Book of Job; copies are in the Tate (London) and other collections
Wikimedia Commons · CC0

William Blake was an English poet and artist who loved the Book of Job. He made twenty-one pictures of Job's story. In this one, God points down to show Job two great creatures: behemoth on the land and leviathan in the sea.

Look closely

- Find behemoth. What animal does Blake make him look like?
- Find God's hand. Where is He pointing?
- Look at the circle around the two creatures. Why might Blake have put them inside it?

Talk about it

1. Does Blake's behemoth have a tail "like a cedar"? How would you draw it?
2. How do you think Job felt when God showed him these creatures?

HANDS-ON: A TAIL LIKE A CEDAR

Measure three tails with string and see which one could move "like a cedar."

You will need

- A ball of string or yarn
- A tape measure
- Scissors (with a grown-up)
- Three paper tags labeled "hippo," "elephant" and "Diplodocus"

Steps

1. Cut a string about 1½ feet long. Tie on the "hippo" tag. That is about as long as a hippo's tail.
2. Cut a string about 4 feet long for the elephant's tail.
3. Outside, stretch out a string about 40 feet long for a Diplodocus tail. Walk along it and count your steps.
4. Lay the three strings side by side. Find a tree trunk. Which tail could look most like a cedar?

Check your work

- I measured three tails.
- I counted my steps along the longest one.
- I can tell two ideas about what behemoth was.

FIELD NOTEBOOK

1. Draw behemoth the way Job 40 describes him: eating grass, standing by a river, with a tail like a cedar. Write "Job 40:15" under your picture.
2. Write one sentence: "God is greater than behemoth."

Did you know? Many Bible scholars think Job may be one of the oldest stories in the Bible, telling of a man who lived long ago, around the time of Abraham. The word "behemoth" comes from the Hebrew word for "beast" and may mean something like "the great beast" or "the beast of beasts."

Goes deeper in. Literature, the Bible as literature (Job's poetry), and Life Science, for hippos, elephants and sauropods (coming soon).

For families. Behemoth is described in Job 40:15-24. Many commentaries identify it as a hippopotamus or elephant (some read "tail" as an elephant's trunk); many young-earth creationists suggest a sauropod, pointing to the tail "like a cedar" and to "made with

thee” (made on day six). The stop presents both without mockery and does not claim certainty. Tail lengths are rough: hippo about 14–22 inches, elephant about 3½–5 feet, Diplodocus roughly 40 feet. The dating of Job’s setting is traditional and uncertain.

PRACTICE

1. **EASY** What did behemoth eat?
2. **MEDIUM** Why do many creation Christians think behemoth might have been a sauropod?
3. **MEDIUM** Why did God show Job behemoth?

Make it a game • Behemoth Says. Play like “Simon Says,” but the leader says “Behemoth says.” Use behemoth moves: “Behemoth says eat grass” (pretend to munch), “Behemoth says swing your tail” (swing your arm slowly like a heavy tail), “Behemoth says stand in the river.” If the leader does not say “Behemoth says,” do not move!

Scripture. “Behold now behemoth, which I made with thee; he eateth grass as an ox.” (Job 40:15, KJV)

God made behemoth, and He made Job too. The God who made the mightiest animal also cares for each one of us.

Practice: answers

1. Grass, like an ox.
2. Because God said he moved his tail like a cedar, and sauropods had huge, thick tails. A hippo or elephant tail is small.
3. To show Job how great and strong God is, so Job could trust Him.

2.3 LEVIATHAN (JOB 41)

OBJECTIVES

- Tell three things Job 41 says about leviathan.
- Name two ideas Christians have about what leviathan was.
- Tell what Job learned about God from leviathan.

Warm-up. Try to lift a sofa with one finger. Could you do it? God asked Job, “Canst thou draw out leviathan with an hook?” Job knew the answer: no!

Video slot. Video coming. Leviathan in Job 41 for children; crocodiles and great sea reptiles. Search approved channels (Answers in Genesis Kids, Institute for Creation Research, Creation Ministries International); preview first.

KEY TERMS

leviathan

A fierce, armored creature of the water that God described to Job (say “leh-VY-uh-thun”).

scales

Hard, flat plates that cover the skin of fish and reptiles.

the deep

An old Bible name for the deep waters of the sea.

humble

Not proud; knowing that God is greater than we are.

CORE IDEAS

The story. After God showed Job behemoth on the land, He told him about a creature even more fearsome, in the water. “Canst thou draw out leviathan with an hook?” God asked. Could Job catch him with a fishing line? Could he keep him as a pet, or “play with him as with a bird”? Job sat silent. No one could do that.

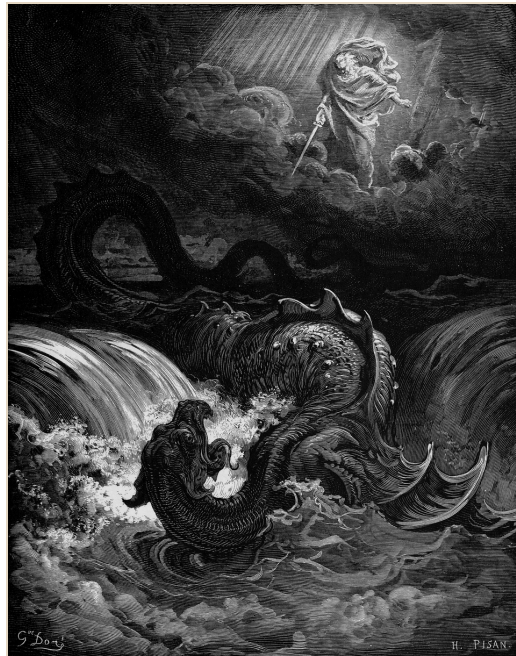
What God said. Leviathan’s scales were packed so tightly together that no air could get between them. Swords and spears did not hurt him; iron was like straw to him. When he swam, “he maketh the deep to boil like a pot,” and he left a shining trail of foam behind him. “Upon earth there is not his like, who is made without fear” (Job 41:33).

Fire and smoke? God also said, “Out of his mouth go burning lamps, and sparks of fire leap out,” and smoke came from his nose. Some Christians think this is poetry, like saying a hot spray looked like fire. Others think it might have been real in some way. After all, God made the bombardier beetle, a tiny bug that shoots a hot, popping spray out of its body to scare away enemies!

What was it? Some Bible teachers think leviathan was a crocodile, with its tough armor and rows of teeth. Others think of a great whale. Many creation Christians wonder if it was one of the huge sea reptiles whose bones are found as fossils today. Psalm 104 says leviathan plays in the sea where the ships go. We cannot be sure, but we know leviathan was mighty, and God made him.

What Job learned. God said, “None is so fierce that dare stir him up: who then is able to stand before me?” If no one can stand up to leviathan, how much greater is the God who made him! Job became humble. He said to God, “I know that thou canst do every thing” (Job 42:2).

PICTURE STUDY



The Destruction of Leviathan, Gustave Doré, 1865 · Wood engraving · From *La Grande Bible de Tours* (Paris)
Wikimedia Commons · Public domain

Gustave Doré was a French artist who made more than two hundred pictures for a large Bible. This one shows a verse from Isaiah 27:1, where God promises to punish “leviathan that crooked serpent.” Doré imagined leviathan as a huge serpent of the sea.

Look closely

- Follow leviathan’s long body with your finger. How many curves can you count?
- Find the angel. Where is the light coming from?
- Look at the waves. Are they calm or wild?

Talk about it

1. Is Doré’s leviathan more like a crocodile, a whale or a sea reptile?
2. Why do you think the artist made the top of the picture bright and the bottom dark?

HANDS-ON: DRAW FROM THE WORDS

Artists like Doré read the words of the Bible and then drew what they imagined. Now you try it.

You will need

- Paper and crayons or colored pencils
- A Bible open to Job 41, or the verse cards below

Steps

1. A grown-up writes four clue cards: “His scales are his pride” (41:15). “He maketh the deep to boil like a pot” (41:31). “He maketh a path to shine after him” (41:32). “Upon earth there is not his like” (41:33).
2. Read one card at a time and add that part to your drawing: tight scales, bubbling water, a shining trail of foam.
3. Draw a small fishing boat near leviathan to show how big he is.
4. Show your picture and tell which verse each part came from.

Check your work

- My drawing uses all four clues.
- I put a boat in to show size.
- I can tell two ideas about what leviathan was.

FIELD NOTEBOOK

1. Paste or copy your leviathan drawing into your Field Notebook. Write “Job 41” at the top.
2. Write: “Leviathan is mighty, but God is mightier.”

Did you know? Leviathan is named in four books of the Bible: Job, Psalms (74 and 104), and Isaiah (27). The bombardier beetle mixes two chemicals inside its body, and the mix pops out hot, close to the temperature of boiling water, with a tiny bang.

Goes deeper in. Literature, the Bible as literature (Job’s poetry), and Life Science, for crocodiles, beetles and sea reptiles (coming soon).

For families. Leviathan appears in Job 3:8 and 41, Psalm 74:14, Psalm 104:26 and Isaiah 27:1. Commentaries often suggest a crocodile; others a whale or a poetic sea monster. Many young-earth writers suggest a large marine reptile such as a plesiosaur or Kronosaurus, and some suggest the fire language may describe a real chemical defense, comparing the bombardier beetle. The stop presents these as possibilities, not certainties. Doré’s engraving illustrates Isaiah 27:1, not Job, which the intro says plainly.

PRACTICE

1. **EASY** Where did leviathan live: on land or in the water?
2. **EASY** Name one thing Job 41 says about leviathan.
3. **MEDIUM** What did Job learn from leviathan?

Make it a game • Leviathan's Scales. Several players stand close together, shoulder to shoulder, like leviathan's tight scales. One player, the fisher, gently rolls a soft ball and tries to get it through a gap between their feet. If the scales stay tight, the ball cannot get through! Take turns being the fisher.

Scripture. "Canst thou draw out leviathan with an hook? or his tongue with a cord which thou lettest down?" (Job 41:1, KJV)

No one could catch leviathan with a fishing hook, but God made him and rules over him. Nothing is too strong for God.

Practice: answers

1. In the water (the sea, "the deep").
2. Any one: tight scales; swords and spears could not hurt him; he made the deep boil like a pot; he left a shining path; sparks and smoke came from him; no one could catch him with a hook.
3. That God is far greater and stronger than anything He made, so Job became humble and trusted Him.

2.4 DINOSAURS ON THE ARK?

OBJECTIVES

- Tell what God told Noah to bring onto the Ark.
- Explain how dinosaurs could have fit on the Ark.
- Measure your own cubit and tell how long the Ark was.

Warm-up. Bend your arm and measure from your elbow to the tip of your middle finger. That is your **cubit**! Noah's Ark was 300 cubits long. A grown-up's cubit is about 18 inches, so the Ark was about 450 feet long.

Video slot. Video coming. Noah's Ark for children: its size, the animals and the Ark Encounter full-size model. Search approved channels (Answers in Genesis Kids, Ark Encounter, Institute for Creation Research); preview first.

KEY TERMS

ark

The huge wooden boat God told Noah to build to save his family and the animals from the Flood.

cubit

An old measure: the length from the elbow to the tip of the middle finger, about 18 inches.

the Flood

The great flood in Noah's day that covered the whole earth (Genesis 6-9).

deck

A floor of a ship. The Ark had three.

CORE IDEAS

The story. Long after Adam and Eve, the earth "was filled with violence." People had turned away from God. "But Noah found grace in the eyes of the LORD" (Genesis 6:8). God told Noah to build an ark of wood, 300 cubits long, 50 cubits wide and 30 cubits high. That is longer than a football field and taller than a four-story building!

Who came aboard? God said that two of every kind of land animal and bird would "come unto thee, to keep them alive" (Genesis 6:20), and seven of some kinds. Noah did not have to chase the animals; God brought them. If dinosaurs were living on the land in Noah's day, then dinosaurs would have come too.

How could they fit? God did not ask for every variety, only every kind. Noah did not need a poodle and a wolf and a collie; two of the dog kind were enough. Dinosaurs have many names but fewer kinds. Also, many dinosaurs were not giants. Plenty were no bigger than a sheep. Even the biggest ones hatched from eggs about the size of a football. God may have

sent young dinosaurs, which were smaller, ate less and had many years ahead to have babies.

Inside the Ark. The Ark had three decks (Genesis 6:16), with room for animals, food and Noah's family. In Kentucky today there is a full-size model of the Ark called the Ark Encounter. Inside, it shows one way the animals, including young dinosaurs, might have been kept in pens on the decks.

Shut in safe. When everyone was aboard, "the LORD shut him in" (Genesis 7:16). The rain fell and the waters rose, but the Ark floated. Months later it came to rest "upon the mountains of Ararat" (Genesis 8:4). Then God told Noah to bring the animals out to fill the earth again. God keeps His people safe and keeps His promises.

PICTURE STUDY



Noah's Ark, Edward Hicks, 1846 · Oil on canvas · Philadelphia Museum of Art
Wikimedia Commons · CC0

Edward Hicks was a Quaker preacher and sign painter in Pennsylvania. He loved painting animals from the Bible. Here he shows the animals walking two by two into the Ark just before the rain begins.

Look closely

- Count the pairs of animals you can find.
- Find the ramp and the door of the Ark.
- Look at the sky. What is about to happen?

Talk about it

1. Hicks did not paint any dinosaurs. If you added a pair, where would you put them?

2. How do you think Noah's family felt as the animals came in?

HANDS-ON: A FLOATING FOIL ARK

Build a little ark with the same shape God gave Noah: 300 long, 50 wide, 30 high. Then see how much it can carry.

You will need

- Aluminum foil
- A ruler
- A sink, tub or large bowl of water
- Pennies or small toy animals

Steps

1. Make a box shape from doubled foil that is 30 centimeters long, 5 centimeters wide and 3 centimeters high. Each centimeter stands for 10 cubits.
2. Pinch the corners tight so no water can leak in.
3. Float your ark on the water.
4. Add pennies or toy animals one at a time, spreading them out evenly. Count how many your ark holds before it sinks.

Check your work

- My ark has the right shape: long, narrow and low.
- My ark floated.
- I can tell how long the Ark was in cubits and in feet.

FIELD NOTEBOOK

1. Draw the Ark from the side. Draw three decks inside and put a pair of dinosaurs on one deck.
2. Write: "300 cubits long, 50 cubits wide, 30 cubits high (Genesis 6:15)."

Did you know? The Ark's shape, six times longer than it is wide, is very steady in rough water. Big ships today often use a shape that is long and narrow too. The Ark Encounter in Williamstown, Kentucky, opened in 2016 and is 510 feet long.

Goes deeper in. Earth Science, the Flood unit, and Arithmetic, for measuring and scale (coming soon).

For families. The dimensions are from Genesis 6:15. At an 18-inch cubit the Ark is about 450 feet long; the Ark Encounter uses a longer cubit of about 20.4 inches, giving 510 feet. Creation researchers estimate the number of Ark "kinds" in the low thousands at most (Answers in Genesis has suggested fewer than 7,000 animals in all), far fewer than the number of named species; such estimates are hedged and debated. The claim that God

may have sent young animals is a common creationist suggestion, not a statement of Scripture, and the stop presents it as “may.” Some Christians hold a local-flood view; this course teaches a global Flood. Sauropod eggs were roughly 6–8 inches across.

PRACTICE

1. **EASY** How long was the Ark in cubits?
2. **MEDIUM** Why did Noah not need every variety of animal?
3. **MEDIUM** Give one reason the dinosaurs could fit on the Ark.

Make it a game • Two by Two. Draw pairs of animal cards (two lions, two Stegosaurus, two eagles, and so on), mix them up and lay them face down. Take turns flipping two cards. If they match, say “Two by two!” and march the pair into a shoebox ark. The game ends when every pair is safe inside.

Scripture. “Of fowls after their kind, and of cattle after their kind, of every creeping thing of the earth after his kind, two of every sort shall come unto thee, to keep them alive.” (Genesis 6:20, KJV)

God brought the animals to Noah to keep them alive. He cared for His creatures even in the Flood.

Practice: answers

1. 300 cubits (about 450 feet).
2. God asked for two of every kind, and one kind (like the dog kind) can later have many varieties.
3. Any one: many dinosaurs were small; God may have sent young ones; only kinds were needed, not every variety; the Ark was huge, with three decks.

2.5 FOSSIL GRAVEYARDS AND THE FLOOD

OBJECTIVES

- Tell why a bone must be buried quickly to become a fossil.
- Describe a fossil graveyard, like the bone wall at Dinosaur National Monument.
- Tell how many Christians connect fossil graveyards with Noah's Flood.

Warm-up. Think about an apple core left on the ground outside. What happens to it after a week? Bugs, birds and weather take it away. A dinosaur bone left on the ground would disappear too, unless something covered it up fast!

Video slot. Video coming. The dinosaur bone wall at Dinosaur National Monument (Quarry Exhibit Hall); how fossils form by quick burial. Search approved channels (National Park Service, Answers in Genesis Kids, Institute for Creation Research); preview first.

KEY TERMS

fossil

The hardened remains or traces of a living thing, kept in rock.

sediment

Mud, sand and little stones carried by water and laid down in layers.

fossil graveyard

A place where the bones of many animals are buried together in the rock.

quarry

A place where rock is dug out of the ground.

CORE IDEAS

The story. In August 1909, a fossil hunter named Earl Douglass was searching the dry hills of Utah for the Carnegie Museum in Pittsburgh. At the top of a rocky ledge he saw eight tail bones of a giant dinosaur lying in a row, just as they had been in the living animal. He wrote in his diary that it was “a beautiful sight.” Douglass and his workers dug there for years.

A wall of bones. Today that place is called Dinosaur National Monument. Inside a building, visitors can see a tilted wall of rock with about 1,500 dinosaur bones still in it. The bones are jumbled together: Allosaurus, Stegosaurus, Apatosaurus, Diplodocus and more, many broken apart and mixed up. Not far away, at another quarry in Utah, workers have dug up more than 12,000 bones in one place.

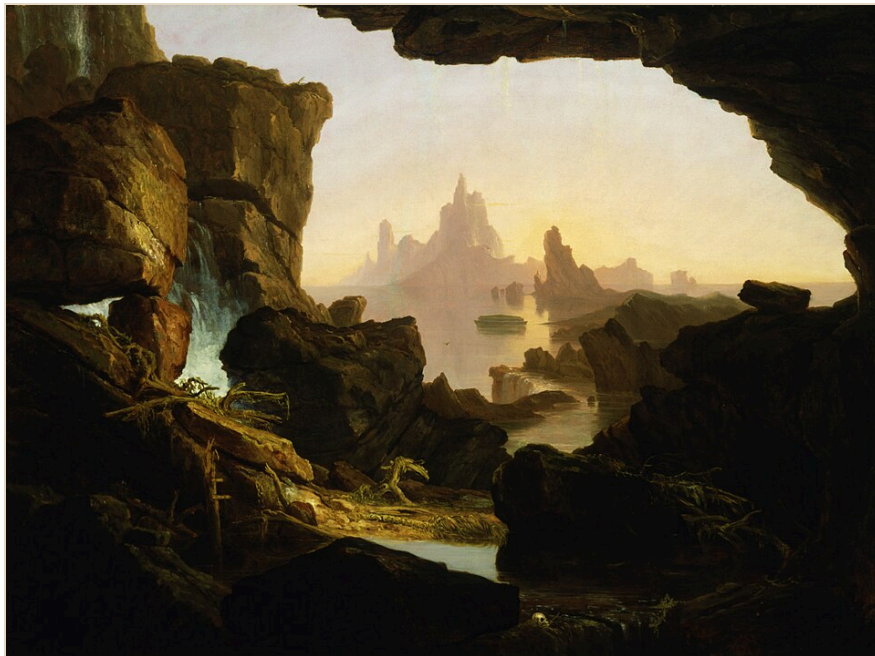
Buried fast. When an animal dies on open ground, it is usually eaten or rots away. To become a fossil, it must be covered quickly by mud or sand. Then, over time, minerals fill the

bone and harden it. A fossil graveyard shows that many animals were buried together, quickly, by water and **sediment**.

The Flood. The Bible says that in Noah's day "all the fountains of the great deep" broke open, and the waters covered even the high hills (Genesis 7:11, 19). Many creation geologists read fossil graveyards like these as made during the Flood year. Rushing water and mud could carry many animals, pile them together and bury them fast.

Another reading. The museum sign gives another explanation: a river flood long ago dropped the bones on a sandbar. Notice that both explanations agree on what we can see: water and sand buried many dinosaurs quickly. They disagree about when and how big the flood was. Read the 🕒 box below to sort it out.

PICTURE STUDY



The Subsiding of the Waters of the Deluge, Thomas Cole, 1829 · Oil on canvas · Smithsonian American Art Museum, Washington, D.C.
Wikimedia Commons · Public domain

Thomas Cole was a famous American painter of mountains and wild places. In this painting he imagined the end of the Flood, when the waters were going down and the sun was breaking through the clouds.

Look closely

- Look far away on the water. Can you find the Ark?
- Find the brightest part of the sky. Where is the darkest part of the picture?
- Look at the rocks. Do they look smooth or broken and rough?

Talk about it

1. How does this picture make you feel: afraid, sad or hopeful? Why?
2. What do you think would be buried under the mud when the waters went down?

HANDS-ON: FLOOD IN A JAR

See how moving water sorts mud and sand into layers and buries “bones” fast.

You will need

- A clear plastic jar with a tight lid
- A cup of mixed garden soil, sand and small pebbles
- Six pieces of dry pasta (your “bones”)
- Water

Steps

1. Put the soil, sand, pebbles and pasta bones into the jar.
2. Fill the jar almost to the top with water and screw the lid on tight.
3. Shake the jar hard for ten seconds, like a rushing flood, then set it down.
4. Watch for five minutes, then again the next day. Draw the layers. Where did the pasta bones end up?

Check your work

- I saw the jar settle into layers.
- I found at least one pasta bone buried in the sediment.
- I can tell why fossils need quick burial.

FIELD NOTEBOOK

1. Draw your Flood jar the next day. Label the layers: pebbles, sand, mud, water. Mark where the bones are.
2. Draw part of the bone wall at Dinosaur National Monument, with bones of different shapes mixed together.

Did you know? Earl Douglass hoped the bone quarry would be kept so people could see the bones right where they were found. In 1915 it became Dinosaur National Monument, and today the bone wall is still inside a building, just as he hoped.

 **What the sign says / What we observe / How Christians read it.**  **What the sign says:** “These dinosaurs lived about 150 million years ago, in the Late Jurassic. A river in flood carried their bodies and dropped them on a sandbar.” **What we observe:** about 1,500 bones of many kinds of dinosaurs are mixed together in one layer of sandstone; many are broken apart and jumbled; the sand was laid down by moving water, and the bones were buried before they could rot away. **How Christians read it:** many young-earth Christians read fossil graveyards like this one as laid down quickly in Noah’s Flood, only thousands of years ago. Other Christians accept the sign’s dates and still trust

the Bible. Everyone agrees on the observation: water and sand buried many dinosaurs fast. “Jurassic” is a museum word for a set of rock layers, not a date anyone watched.

Goes deeper in. Earth Science, the fossils and Flood units, and Trail D, Stop D7 “What happened to the dinosaurs?” (coming soon).

For families. This is a ⌚ stop. Earl Douglass found the site on August 17, 1909, working for the Carnegie Museum; his diary describes eight Apatosaurus (then “Brontosaurus”) tail vertebrae “in exact position” and adds, “It was a beautiful sight.” The quarry was worked until 1924 and the monument was proclaimed in 1915. The National Park Service says the Quarry Exhibit Hall wall shows about 1,500 bones, in the Morrison Formation, and interprets the site as a river sandbar. The Cleveland-Lloyd Dinosaur Quarry (Utah) has yielded more than 12,000 bones, mostly Allosaurus. Many creationists date the Flood to roughly 4,300–4,500 years ago; the stop says “thousands of years.”

PRACTICE

1. **EASY** What must happen to a bone quickly for it to become a fossil?
2. **EASY** What is a fossil graveyard?
3. **MEDIUM** What do the museum sign and many creation geologists agree on about the bone wall?

Make it a game · Bone Quarry Dig. A grown-up buries pasta “bones” of different shapes in a sandbox or a tub of rice. Players dig with spoons and paintbrushes, gently, like real fossil hunters. Sort the bones into piles by shape. Who can find the most without breaking any?

Scripture. “And the waters prevailed exceedingly upon the earth; and all the high hills, that were under the whole heaven, were covered.” (Genesis 7:19, KJV)

The Flood was not a little rain. The waters covered the whole earth, and many Christians see its work still written in the rocks.

Practice: answers

1. It must be buried quickly by mud or sand.
2. A place where bones of many animals are buried together in the rock.
3. That water and sand buried many dinosaurs quickly. They disagree about when and how big the flood was.

2.6 DRAGON LEGENDS WORLDWIDE

OBJECTIVES

- Name three places in the world that have old dragon stories.
- Tell two ideas about where dragon stories came from.
- Tell the difference between a legend and true history.

Warm-up. Take one minute and draw a dragon as fast as you can. What did you give it? Scales? A long tail? Sharp teeth? Wings? Now look at a picture of a dinosaur. Which parts are the same?

Video slot. Video coming. Dragon legends around the world for children; Saint George and the dragon; Chinese dragon dances. Search approved channels (Answers in Genesis Kids, The National Gallery London, Smithsonian); preview first.

KEY TERMS

legend

An old story passed down for a long time. It may have some truth in it, but parts have grown or changed.

dragon

A great scaly creature with a long tail found in old stories all over the world. The King James Bible also uses the word.

Saint George

A real Christian soldier who died for his faith long ago. A famous legend says he fought a dragon.

Beowulf

A very old English poem about a hero who fights monsters and, at the end, a dragon (say “BAY-uh-wulf”).

CORE IDEAS

The story. Long ago in China, people told stories of long, scaly dragons that lived near rivers and clouds. Today, dragon dancers still wind through the streets at Chinese New Year. Far away in England, people told how Saint George rescued a princess from a dragon. The country of Wales has a red dragon on its flag. And an old English poem called *Beowulf* ends with a fire-breathing dragon guarding a pile of treasure.

All over the world. People in Asia, Europe, Africa and the Americas told dragon stories. Many of these people never met each other. Yet their dragons are often alike: big, scaly reptiles with long tails, sharp teeth and great strength. Isn’t that interesting? Why would people so far apart tell such similar stories?

Where did dragons come from? Many creation Christians think that after the Flood, people may have seen some living dinosaurs or other great reptiles, and the stories grew bigger each time they were told, adding wings or fire. Other people think that long ago, folks dug up huge fossil bones and imagined what creature they came from. Some dragon stories were probably just made up. The answer may be a little of each.

Dragons in the Bible. The King James Bible uses the words “dragon” and “dragons” more than thirty times. Psalm 148 calls on the dragons to praise the Lord. The Hebrew word behind it can mean a great sea creature, a serpent or a wild desert animal. In Revelation, “the dragon” is a picture of Satan, God’s enemy, who is finally defeated.

Legend or history? A legend may hold a seed of truth. Saint George was a real Christian soldier who died for his faith about 1,700 years ago, but the dragon part of his story was added hundreds of years later. The Bible is different: it is true history, not legend. When you hear an old story, a wise reader asks, “What is the true part?”

PICTURE STUDY



Saint George and the Dragon, Paolo Uccello, About 1470 · Oil on canvas · The National Gallery, London
Wikimedia Commons · Public domain

Paolo Uccello was an Italian painter who loved shapes and patterns. He painted the legend of Saint George as a calm, almost fairy-tale scene. Notice that the lady is not running away at all!

Look closely

- Look at the dragon’s wings. What shapes did Uccello paint on them?
- Find the cord in the lady’s hand. Where does it go?
- Find the swirling cloud in the sky. Which way does it point?

Talk about it

1. Does Uccello's dragon look more like a dinosaur, a bat or a lizard? Why?
2. Why might people have liked telling stories of a brave hero who fights a dragon?

HANDS-ON: MY DRAGON LEGENDS MAP

Make a map that shows how many places in the world told dragon stories.

You will need

- A printed world map or a map you trace from a globe
- Crayons or colored pencils
- Small paper dragons you cut out (with a grown-up's help with scissors)
- Glue stick

Steps

1. Find China on the map and glue a long, wiggly dragon there.
2. Find England and Wales. Glue a dragon there for Saint George and the red dragon of Wales.
3. Find Denmark and Sweden, where the story of Beowulf takes place, and glue a dragon there.
4. Color the oceans blue. Count your dragons and talk about how far apart these places are.

Check your work

- My map has at least three dragons in different places.
- I can name the story that goes with each dragon.
- I can tell two ideas about where dragon stories came from.

FIELD NOTEBOOK

1. Draw a dragon from a legend on one side of a page and a real dinosaur on the other. Circle the parts that are alike.
2. Copy Psalm 148:7.

Did you know? Saint George is the patron saint of England, and his red cross on a white flag is the flag of England. The dragon on the flag of Wales is called *Y Ddraig Goch* (say "uh THRYG gawkh"), which means "the red dragon" in Welsh.

Goes deeper in. Literature, for legends and *Beowulf*; History, for the early Church and the martyrs; and Geography, for the map (coming soon).

For families. George was a soldier martyred around 303 under Diocletian; the dragon episode appears in sources from roughly the 11th-12th centuries and was spread by the

Golden Legend (about 1260). *Beowulf* survives in a manuscript from about AD 1000; the poem's date of composition is debated. The red dragon became the official flag of Wales in 1959. The KJV count ("dragon" and "dragons" together, about 35 times) translates mainly Hebrew *tannin/tannim* and Greek *drakon*; modern versions often render some as "jackals" or "serpent." The fossil idea is argued by historian Adrienne Mayor (*The First Fossil Hunters*, 2000). Claimed dinosaur carvings on old buildings and tombs are disputed and are left out here.

PRACTICE

1. **EASY** Name two places that have old dragon stories.
2. **MEDIUM** Give one idea about where dragon stories came from.
3. **MEDIUM** What is a legend?

Make it a game • Catch the Dragon's Tail. Players line up, each holding the waist or shoulders of the one in front, to make a long dragon. The first player is the head; the last player is the tail. The head tries to tag the tail while the whole dragon stays connected. If the dragon breaks apart or the head tags the tail, the head goes to the back and becomes the new tail. Play on soft grass and move gently.

Scripture. "Praise the LORD from the earth, ye dragons, and all deeps:" (Psalm 148:7, KJV)

Even the greatest creatures, the "dragons" and the deep sea, are called to praise the God who made them.

Practice: answers

1. Any two: China, England, Wales, Denmark and Sweden (Beowulf), or other places around the world.
2. Any one: people saw living dinosaurs or great reptiles after the Flood; people found fossil bones and imagined the creature; some stories were simply made up.
3. An old story passed down that may have some truth in it but has grown or changed over time.

2.7 WHAT HAPPENED TO THE DINOSAURS? EACH VIEW

OBJECTIVES

- Tell what “extinct” means and name an animal that went extinct in recent history.
- Tell the asteroid view and the creation view of what happened to the dinosaurs.
- Name two clues that scientists observe.

Warm-up. Name an animal that you could never see alive at a zoo, because there are none left anywhere. Did you think of a mammoth? A dodo? A T. rex? Animals like these are **extinct**.

Video slot. Video coming. What happened to the dinosaurs? The asteroid view and the Flood view for children; the dodo. Search approved channels (Answers in Genesis Kids, Institute for Creation Research, Natural History Museum London); preview first.

KEY TERMS

extinct

Gone forever: no more of that kind of animal or plant are alive anywhere.

asteroid

A big rock flying through space. A small one that hits the earth is called a meteorite.

crater

A round hole or bowl in the ground made when something big crashes into it.

dodo

A large bird that could not fly. It lived on an island in the Indian Ocean and went extinct about 350 years ago.

CORE IDEAS

The story. On the island of Mauritius, in the Indian Ocean, there once lived a big gray bird called the dodo. It could not fly, and it had no reason to be afraid. Then, in 1598, sailors from Holland landed on the island. Ships brought rats and pigs that ate the dodos’ eggs, and hungry sailors hunted the birds. In less than a hundred years, the dodo was gone. People saw it, wrote about it and drew it, but no one will ever see a living dodo again.

The dinosaur mystery. No one alive today has seen a living T. rex either. What happened? Scientists look for clues. They observe that dinosaur bones are found in some rock layers but not in the layers above them. In many places around the world there is a thin layer of clay with a rare metal called iridium, which is common in space rocks. And under the ground in Mexico there is a huge buried **crater**, about 110 miles across.

View one: the asteroid. Most museum signs say that a giant asteroid crashed into Mexico about 66 million years ago. Dust and smoke filled the sky and blocked the sun, plants died,

and the dinosaurs starved. Some scientists think huge volcanoes in India helped too. Many scientists hold this view, and so do many Christians who believe the earth is very old.

View two: the Flood and after. Many young-earth Christians say that most dinosaurs died in Noah's Flood and were buried in the rock layers. The dinosaurs on the Ark came out afterward (Genesis 8:17). But the world after the Flood was harder: colder in places, with less food, and with people hunting. One by one the dinosaur kinds died out, the way the dodo did. Some creation scientists think big space rocks hit the earth during the Flood year, so the crater in Mexico could fit this view too.

What every view agrees on. The dinosaurs are gone, God made them, and death is part of a world broken by sin (Genesis 3). The Bible says "the whole creation groaneth" and waits for the day when Jesus will set it free. One day He will say, "Behold, I make all things new" (Revelation 21:5).

PICTURE STUDY



Iguanodon and Megalosaurus, from The World Before the Deluge, Édouard Riou, 1863 · Wood engraving · From Louis Figuier, La Terre avant le déluge (Paris, 1863), in English The World Before the Deluge Wikimedia Commons · Public domain

Édouard Riou was a French artist who also drew pictures for Jules Verne's adventure books. He made this picture for a book called *The World Before the Deluge*. "Deluge" is an old word for the Flood. Scientists in 1863 knew only a few dinosaur bones, so Riou drew the dinosaurs looking like giant lizards.

Look closely

- Find the two dinosaurs. How are they standing: on two legs or four?
- Look at the trees and plants. Do they look like the ones near your home?

- Find something in the picture that we now know is not quite right about dinosaurs.

Talk about it

1. The book's title is "The World Before the Deluge." What does that title tell you about how people talked about dinosaurs then?
2. Why do pictures of dinosaurs change as people find more bones?

HANDS-ON: MAKE A CRATER

See what a crater looks like and what clues it leaves behind.

You will need

- A baking pan
- Flour (about 2 inches deep)
- A spoonful of cocoa powder
- Three different-sized round stones or marbles
- Newspaper under the pan

Steps

1. Spread the flour smooth in the pan. Sprinkle a thin layer of cocoa on top.
2. Hold the smallest stone up high and drop it into the flour. Look at the shape it makes.
3. Drop the bigger stones. Look for the round bowl and the white flour thrown out on top of the brown cocoa.
4. Talk about it: what clues would a crater leave for a scientist to find later? Which view of the dinosaurs uses the crater, and how?

Check your work

- I made at least three craters.
- I can tell what a crater is.
- I can tell both views of what happened to the dinosaurs.

FIELD NOTEBOOK

1. Make two columns: "View one: the asteroid" and "View two: the Flood and after." Draw a picture and write one sentence in each.
2. Draw a dodo and write: "Extinct by about 1690."

Did you know? The buried crater in Mexico is called Chicxulub (say "CHEEK-shoo-loob"), after a small town near it. Much of it lies under the sea and under the ground, so you cannot see it from a plane. Scientists found it by measuring the rocks deep underground.

 **What the sign says / What we observe / How Christians read it.**  **What the sign says:** “About 66 million years ago, at the end of the Cretaceous Period, a giant asteroid struck Earth and the dinosaurs died out.” **What we observe:** dinosaur bones are found in some rock layers but not in the layers above; a thin clay layer rich in iridium is found in many places; a huge crater about 110 miles wide is buried in Mexico; and animals like the dodo have gone extinct in recorded history. **How Christians read it:** many young-earth Christians say most dinosaurs were buried in Noah’s Flood, thousands of years ago, and the rest died out afterward in a harder world; some think the crater was made during the Flood year. Many Christians who hold an old earth accept the asteroid view. Everyone agrees on the clues; they read them in different ways. “Cretaceous” is a museum word for a set of rock layers.

Goes deeper in. Earth Science, the Flood and Ice Age units; Life Science, for extinction; and Trail E, Stops E6–E8, for Ice Age animals (coming soon).

For families. This is a  stop. The impact hypothesis was proposed by Luis and Walter Alvarez and colleagues in *Science* (1980), based on the iridium layer; the Chicxulub crater (about 180 km, or 110 miles, across) was linked to it around 1991. The Deccan Traps volcanism in India is the main alternative or added cause in mainstream science. Young-earth views vary: many see most dinosaur fossils as Flood burials and post-Flood extinction for the rest; some creation geologists place large impacts within the Flood year. Many museums teach that birds are living dinosaurs; creation scientists hold that birds were made separately on day five. Dutch sailors reached Mauritius in 1598; the last widely accepted dodo sighting was in 1662, and extinction is usually placed by about 1690.

PRACTICE

1.  What does “extinct” mean?
2.  Tell the asteroid view in one sentence.
3.  Tell the young-earth creation view in one or two sentences.

Make it a game • Clue Detectives. A grown-up hides three clue cards around the room: “A buried crater,” “A clay layer with a space metal,” and “Bones in some layers but not above.” Players hunt for them. When a clue is found, the finder reads it aloud and tells how the asteroid view explains it and how the Flood view explains it.

Scripture. “For we know that the whole creation groaneth and travaileth in pain together until now.” (Romans 8:22, KJV)

Animals die and kinds go extinct because the world is broken by sin. But God has promised to make all things new.

Practice: answers

1. Gone forever: none of that kind are alive anywhere.
2. A giant asteroid hit Mexico, dust blocked the sun, plants died and the dinosaurs starved.
3. Most dinosaurs died and were buried in Noah's Flood. The ones from the Ark died out later in a harder world, the way the dodo did.

2.8 READING A MUSEUM SIGN

OBJECTIVES

- Find the parts of a museum sign: name, where found, size, food and date.
- Read the museum words Triassic, Jurassic and Cretaceous and say what they name.
- Rewrite a museum sign so it keeps observations and interpretations apart.

Warm-up. Pick up a cereal box. Find something on it you could check for yourself, like the weight. Now find something that is only someone's opinion, like "Tastes great!" Museum signs have both kinds of words too.

Video slot. Video coming. A family museum visit: reading dinosaur exhibit signs; Triceratops skeletons. Search approved channels (Answers in Genesis Kids, Institute for Creation Research museum guides, Field Museum, Smithsonian); preview first.

KEY TERMS

museum

A building where real objects, like fossils and paintings, are kept and shown so people can learn.

label

The small sign beside a museum object that tells what it is.

period name

A museum word, like Jurassic or Cretaceous, used to name a set of rock layers.

interpretation

An explanation of what something means. It can be checked and talked about, but it is not the same as what we see.

CORE IDEAS

The story. Picture yourself walking into a big museum hall. In the middle stands a giant skeleton with a bony frill and three sharp horns. Beside it is a sign: *TRICERATOPS HORRIDUS. "Three-horned face." Late Cretaceous Period, 68 to 66 million years ago. Found in Montana, Wyoming and the Dakotas. Length: about 30 feet. Diet: plants.* What can a young dinosaur hunter learn from this sign?

Part by part. The **name** comes from old Greek: *tri* means three, *cera* means horn and *tops* means face. **Where it was found** is something people saw: they dug these bones out of the ground. The **size** was measured with a tape. The **diet** is a good clue from the teeth, which were made for slicing plants. These parts rest on things people can see and measure.

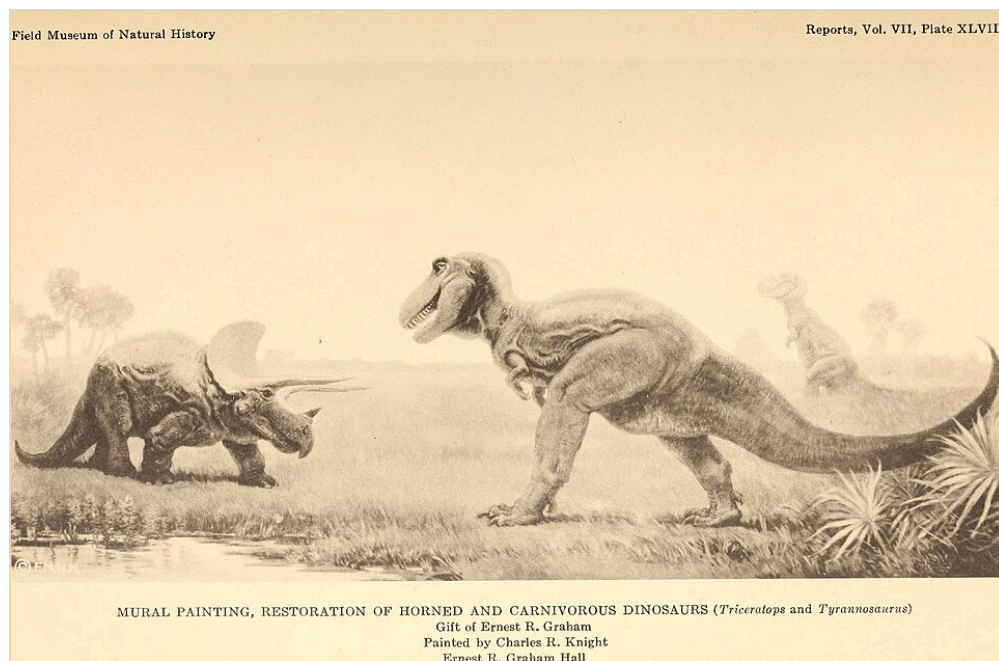
Museum words. Signs often use **period names**: Triassic, Jurassic and Cretaceous. These are names for sets of rock layers, a little like chapter titles in a book. "Jurassic" comes from

the Jura Mountains in France and Switzerland. “Cretaceous” comes from the Latin word for chalk. Learn these words so you can read any sign. But a name for a layer is not a date that anyone watched.

The date. “68 to 66 million years ago” is different. No one was there to see a living Triceratops and write down the year. The date comes from measuring rocks and making guesses about the past. That makes it an **interpretation**. Many Christians read the same bones as buried in Noah’s Flood only thousands of years ago. When a sign says a dinosaur “evolved from” another, that is an interpretation too.

Kind and careful. Museum workers dig in the hot sun, clean bones grain by grain and build skeletons with great skill. Thank God for their hard work, and never mock them. Then read like the people of Berea in the Bible, who listened gladly but also “searched the scriptures daily, whether those things were so” (Acts 17:11).

PICTURE STUDY



Tyrannosaurus and Triceratops, from the Field Museum murals, Charles R. Knight, 1926-1930 (mural series) · Oil on canvas (mural) · Field Museum, Chicago
Wikimedia Commons · Public domain

Charles R. Knight painted a set of huge pictures for the walls of the Field Museum in Chicago, so visitors could imagine fossils as living animals. Paintings like this are part of what a museum shows, just like the signs. Knight worked closely with scientists and studied real bones before he painted.

Look closely

- Find the three horns on the Triceratops. Which way is it facing?
- Look at the Tyrannosaurus. How is it standing?

- Look at the land and the sky. What season or weather do you think it is?

Talk about it

1. Which things in this painting could the artist learn from the bones, and which did he have to imagine?
2. If you wrote a museum label for this painting, what would you put on it?

HANDS-ON: MUSEUM SIGN REWRITE

Write your own museum sign that is honest about what we see and what people think.

You will need

- An index card or half a sheet of paper
- Two colored pencils (for example, green and orange)
- A dinosaur toy, model or picture
- The sample Triceratops sign in the story, or a real sign from a museum website

Steps

1. Copy the sample sign. Underline the parts people can see or measure in green and the explanations in orange.
2. On a new card, write a sign for your own dinosaur. At the top write its name and what the name means.
3. Under the heading “What we observe,” write two facts: where it was found, its size or its teeth.
4. Under the heading “What people think,” write one interpretation, and add how many Christians read it. Stand your sign beside your dinosaur like a real museum.

Check your work

- My sign has a name, two observations and one interpretation.
- I used the right colors on the sample sign.
- I can say what the word “Cretaceous” names.

FIELD NOTEBOOK

1. Paste or copy your museum sign into your Field Notebook, with a drawing of your dinosaur beside it.
2. Write the three museum words in order from the lowest layers: Triassic, Jurassic, Cretaceous.

Did you know? Triceratops is one of the most common dinosaurs found in Montana and the Dakotas. Its skull alone could be longer than a grown-up is tall. Its frill was solid bone, and its horn cores were covered in life with a hard sheath, like a cow’s horn.

 **What the sign says / What we observe / How Christians read it.**  **What the sign says:** “Triceratops horridus. Late Cretaceous Period, 68 to 66 million years ago.”

What we observe: Triceratops bones are dug from certain rock layers in Montana, Wyoming and the Dakotas; the skeleton is about 30 feet long; the teeth are shaped for slicing plants. **How Christians read it:** many young-earth Christians read these layers as laid down in Noah’s Flood, only thousands of years ago, and treat “Cretaceous” as a name for the layers, not a date. Other Christians accept the sign’s dates. A good reader keeps the observations and the interpretations apart and treats the museum workers with respect.

Goes deeper in. Earth Science, the rock layers and dating units; Literature, for careful reading; and Trail D, Stop D9 “Soft tissue and dating” (coming soon).

For families. This is a  stop. *Triceratops horridus* was named by O. C. Marsh in 1889; its fossils come mainly from the Hell Creek and Lance Formations. Adult length estimates run about 26–30 feet. The sample sign is a composite in the style of real museum labels, not a quotation. “Jurassic” comes from the Jura Mountains; “Cretaceous” from Latin *creta*, chalk (named by d’Omalius d’Halloy, 1822); “Triassic” from the three-part layering in Germany (von Alberti, 1834). The stop teaches period names as museum vocabulary and the dates as interpretations, without mocking museum staff. Charles R. Knight died in 1953; the Field Museum murals were painted 1926–1930.

PRACTICE

1.  What does “Triceratops” mean?
2.  On a museum sign, is “Found in Montana” an observation or an interpretation?
3.  What does a period name like “Jurassic” name?

Make it a game · Museum Guide. One player is the museum guide and stands beside a toy dinosaur with a homemade sign. The guide reads the sign aloud. After each sentence the visitors ask, “How do you know?” If the guide can say “We can see it” or “We measured it,” the visitors clap once. If the answer is “That is what people think,” the visitors touch their chins. Take turns being the guide.

Scripture. “These were more noble than those in Thessalonica, in that they received the word with all readiness of mind, and searched the scriptures daily, whether those things were so.” (Acts 17:11, KJV)

The Bereans listened gladly and then checked what they heard. We can read every sign with a ready mind and a careful eye.

Practice: answers

1. “Three-horned face.”
2. An observation: people dug the bones out of the ground there.

3. A set of rock layers. It is a museum word, not a date anyone watched.

2.9 SOFT TISSUE AND DATING

OBJECTIVES

- Tell the three “ifs” every rock-clock date depends on.
- Explain why soft tissue in dinosaur bones surprised scientists.
- Tell two ways people read the soft tissue finds.

Warm-up. Watch a sand timer or an egg timer. If you walked into the room halfway through, could you tell how long it had been running? Only if you knew how much sand was in the top at first and how fast it falls!

Video slot. Video coming. How scientists date rocks, explained simply with an hourglass; soft tissue in dinosaur bones. Search approved channels (Answers in Genesis Kids, Institute for Creation Research, Creation Ministries International, Smithsonian); preview first.

KEY TERMS

dating

Working out how old something is.

assumption

Something we take to be true without being able to check it, because no one was there to see.

rate

How fast something happens, like how many drops fall each minute.

protein

A tiny building block of living bodies. Proteins in skin, muscle and bone slowly break down after an animal dies.

CORE IDEAS

The story. Imagine you come into the kitchen and find a candle burning on the table. It is two inches tall. How long has it been burning? To answer, you need to know three things. How tall was it at the start? How fast does it burn? Did anyone blow it out and light it again? You were not there, so you have to make guesses. Those guesses are called **assumptions**.

Rock clocks. Scientists date some rocks in a way that works a little like that candle or an hourglass. Certain tiny bits in volcanic rock slowly change into other kinds, like sand falling from the top of a timer to the bottom. Scientists measure how much is in the “top” and “bottom” today and figure backward. They usually date layers of volcanic ash near the bones, not the bones themselves.

The three ifs. A rock-clock date is only right *if* we know how much was there at the start, *if* the change always went at the same **rate**, and *if* nothing was added or taken away. No one can go back and check those three things. That is why this course calls the dates interpretations.

A soft surprise. In Stop B10 you met Mary Schweitzer, who found soft, stretchy material inside a T. rex bone. Since then, other scientists have reported soft tissue or bits of **protein** in more dinosaur bones. This surprised many people, because proteins break down over time. In the lab, they fall apart much faster than millions of years.

Two ways of reading it. Many young-earth Christians say soft tissue fits bones that are only thousands of years old, and it is a hint that the three “ifs” may not hold. Many other scientists say something in the bone, like iron, kept the tissue safe for millions of years. Both sides keep testing. And all of us can remember what God asked Job: “Where wast thou when I laid the foundations of the earth?” God was there. We were not.

PICTURE STUDY



Cork cells, Scheme XI from Micrographia, Robert Hooke, 1665 · Engraving · From Micrographia, published in London for the Royal Society
Wikimedia Commons · Public domain

Robert Hooke was an English scientist who built a microscope and drew what he saw. When he looked at a thin slice of cork, he saw tiny boxes and called them “cells,” like the small rooms where monks lived. Scientists who study soft tissue in dinosaur bones look for tiny shapes like cells too.

Look closely

- Find the slice marked B. Count the tiny boxes in one row.

- Find the slice marked A. How are its holes different from the boxes in B?
- Look for the small plant at the bottom. Why do you think Hooke put it there?

Talk about it

1. Why is it important to draw exactly what you see under a microscope, and not what you expect?
2. What would you like to look at under a microscope?

Safety first. A grown-up makes the hole in the cup with a pushpin or thumbtack and puts it away right after.

HANDS-ON: THE DRIP CLOCK

Make a water clock and find out what happens to a date when one of the three “ifs” goes wrong.

You will need

- A paper or plastic cup
- A pushpin (for a grown-up)
- A clear glass or jar
- A marker and a measuring cup
- A timer or clock

Steps

1. A grown-up pokes one small hole in the bottom of the cup. Set the cup on top of the clear jar.
2. Pour in one cup of water and start the timer. After 5 minutes, mark the water line on the jar.
3. Now play detective: a grown-up secretly empties the jar, sets it dripping again, and partway through pours in a little extra water. Come back, look at the water line and guess how many minutes it has been running.
4. Was your guess right? Which “if” went wrong: the starting amount, the rate, or something added?

Check your work

- My drip clock dripped into the jar.
- I made a guess and checked it.
- I can name the three “ifs.”

FIELD NOTEBOOK

1. Draw an hourglass. Next to it, write the three “ifs”: the starting amount, a steady rate, nothing added or taken away.

2. Copy Job 38:4.

Did you know? Robert Hooke's book *Micrographia* was the first big book of drawings made through a microscope. It showed a flea and a fly's eye so large that people were amazed. Hooke is the person who first used the word "cell" for the tiny parts of living things.

 **What the sign says / What we observe / How Christians read it.**  **What the sign says:** "This Tyrannosaurus is about 68 million years old, dated by the volcanic ash layers above and below it." **What we observe:** scientists measure the amounts of certain elements in ash layers today; soft, stretchy tissue and traces of protein have been reported inside some dinosaur bones; in the lab, proteins break down over time. **How Christians read it:** many young-earth Christians say the dates depend on three assumptions that cannot be checked, and that soft tissue fits bones only thousands of years old. Other scientists, including some Christians, think iron or minerals preserved the tissue for millions of years. Both keep testing; the observations are the part everyone shares.

Goes deeper in. Earth Science, the dating unit; Life Science, for cells and microscopes; and Trail B, Stop B10 "Mary Schweitzer's soft tissue" (coming soon).

For families. This is a  stop, simplified for ages 7-9. Dinosaur-bearing layers are usually dated by radiometric methods (for example argon-argon) on volcanic ash beds, not on the bones. Soft tissue: Schweitzer et al., *Science* (2005); protein sequences from a Brachylophosaurus (2009); structures like red blood cells in eight Natural History Museum specimens (Bertazzo et al., *Nature Communications*, 2015); the iron-preservation hypothesis (Schweitzer et al., 2014). Some creation researchers have reported carbon-14 in dinosaur bones; most scientists attribute this to contamination. These claims are left out of the child's text. Hooke's *Micrographia* was published in 1665; the cork drawing is Observation XVIII, Scheme XI.

PRACTICE

1.  **EASY** What is an assumption?
2.  **MEDIUM** Name the three "ifs" behind a rock-clock date.
3.  **MEDIUM** Why did soft tissue in dinosaur bones surprise scientists?

Make it a game • Bean Clock. Put 30 beans in a cup. Each time the leader claps, a player moves 2 beans into a bowl. One player leaves the room while the others clap a few times. The player comes back, counts the beans in the bowl and guesses how many claps there were. Next round, the leader secretly drops a few extra beans in the bowl first. Does the guess still work? Talk about which "if" went wrong.

Scripture. "Where wast thou when I laid the foundations of the earth? declare, if thou hast understanding." (Job 38:4, KJV)

No scientist was there at the beginning, but God was. We measure carefully, and we trust the One who saw it all.

Practice: answers

1. Something we take to be true but cannot check, because no one was there.
2. We know the starting amount; the rate stayed the same; nothing was added or taken away.
3. Because proteins and soft tissue break down over time, and many expected nothing soft to last that long.

2.10 FEARFULLY MADE: DESIGN IN DINOSAURS

OBJECTIVES

- Name three designs God built into dinosaurs.
- Tell what the word “dinosaur” means and how it connects to Psalm 139.
- Say Psalm 139:14 and tell what it means.

Warm-up. Run your tongue over your teeth. If you lose a baby tooth, a grown-up tooth grows in its place, but only once. Some dinosaurs got brand-new teeth again and again, all their lives!

Video slot. Video coming. Design in dinosaurs for children: hollow sauropod neck bones, duck-bill tooth batteries and dinosaur eggshells. Search approved channels (Answers in Genesis Kids, Institute for Creation Research, Creation Ministries International); preview first.

KEY TERMS

design

A plan that makes something fit its job well. A design points to a designer.

air sac

A balloon-like bag of air in the body that helps with breathing. Birds have them, and some dinosaurs did too.

tooth battery

Rows and stacks of teeth packed together, with new teeth ready below the old ones.

pore

A tiny hole. Eggshells have pores that let air in.

CORE IDEAS

The story. In 1842 an English scientist named Richard Owen made up the word “dinosaur.” He built it from two Greek words: *deinos*, meaning terrible or “fearfully great,” and *sauros*, meaning lizard. King David used the same idea of awe long before, when he prayed, “I am fearfully and wonderfully made.” Dinosaurs fill us with wonder, and so does the God who made them.

Light, strong necks. How could a Brachiosaurus hold up a neck as long as a giraffe and a half? God made its neck bones with hollow spaces inside, filled with air from **air sacs**, the way many bird bones are today. The bones were strong where they needed strength and light everywhere else, like a steel bridge with holes in its beams. Scientists can see these hollow spaces in the fossil bones.

Teeth that never ran out. Duck-billed dinosaurs, like Edmontosaurus, ate tough plants all day long. Their jaws held a **tooth battery**: hundreds of teeth packed tightly in rows, with new teeth stacked underneath, ready to move up as the old ones wore away. Together they made a grinding surface like a rough file.

Eggs that breathe. A baby dinosaur grew inside a hard eggshell. But a baby needs air! God made the shells with tiny **pores**, holes too small to see, so air could come in and water could slowly go out, just like a chicken egg today. Scientists have studied these pores in fossil dinosaur eggshells.

A Designer. When you see a bridge, you know someone planned it. Paul wrote that God's "eternal power and Godhead" are "clearly seen, being understood by the things that are made" (Romans 1:20). Hollow bones, endless teeth and breathing eggs all point to the great Designer. And He made you too: fearfully and wonderfully.

PICTURE STUDY



Leaping Laelaps, Charles R. Knight, 1897 · Painting · American Museum of Natural History, New York
Wikimedia Commons · Public domain

Charles R. Knight painted this picture with help from the fossil hunter Edward Drinker Cope. Most people then pictured dinosaurs as slow and heavy, but Knight showed them leaping and quick, full of life. Today this dinosaur is called *Dryptosaurus*.

Look closely

- Find the dinosaur in the air. What is it doing with its feet?
- Look at the other dinosaur's tail and legs. Is it ready to get up?
- Look at the colors. Where is the light coming from?

Talk about it

1. What parts of these dinosaurs look designed for speed and strength?
2. Why do you think Knight painted the dinosaurs moving instead of standing still?

HANDS-ON: LIGHT BUT STRONG

Find out why a hollow bone can be light and still strong.

You will need

- Four sheets of plain paper
- Tape
- Several small books

Steps

1. Lay one flat sheet of paper across the gap between two books standing a hand apart. Set a small book on it. What happens?
2. Roll three sheets of paper into tubes about as thick as your thumb, and tape them closed.
3. Stand the three tubes up and gently lay a book on top. Add more books, one at a time. Count how many they hold.
4. Talk about it: the tubes are hollow, but they are strong. How does this help a long-necked dinosaur?

Check your work

- I tested flat paper and paper tubes.
- I counted how many books my tubes held.
- I can name three designs God built into dinosaurs.

FIELD NOTEBOOK

1. Draw three boxes. In each, draw one design: a hollow neck bone, a tooth battery and an egg with tiny pores. Label each.
2. Copy Psalm 139:14 in your best handwriting.

Did you know? The dinosaur in Knight's painting was first named *Laelaps* by Cope. But the name had already been given to a tiny mite, so in 1877 O. C. Marsh gave it a new name: *Dryptosaurus*, "tearing lizard."

Goes deeper in. Life Science, for bones, teeth and eggs; Art, for Charles R. Knight; and Trail C, "How Dinosaurs Lived" (coming soon).

For families. Owen coined "Dinosauria" in 1842 from Greek *deinos* and *sauros*, explaining it as "fearfully great lizard"; the link to Psalm 139:14 is a teaching connection,

not a claim that Owen had the psalm in mind. Hollow, air-filled (pneumatic) vertebrae in sauropods are well documented and linked to bird-like air sacs. Hadrosaur dental batteries held hundreds of teeth in use and in reserve. Fossil dinosaur eggshells show gas-exchange pores. Knight painted *Leaping Laelaps* in 1897 for the American Museum of Natural History, guided by Cope; Knight died in 1953. Design is presented as Romans 1:20 presents it, as something clearly seen in creation.

PRACTICE

1. **EASY** What does the word “dinosaur” mean?
2. **MEDIUM** How did hollow neck bones help long-necked dinosaurs?
3. **EASY** Why do eggshells have tiny pores?

Make it a game • Design Detectives. Walk through the house and find three things that were designed for a job: a door hinge, a cup handle, a zipper. For each one, tell what job it does and who might have planned it. Then name a dinosaur design that does a job too: hollow bones, tooth batteries or breathing eggs.

Scripture. “I will praise thee; for I am fearfully and wonderfully made: marvellous are thy works; and that my soul knoweth right well.” (Psalm 139:14, KJV)

Dinosaurs were “fearfully great,” and so are you. Every good design in God’s creation is a reason to praise Him.

Practice: answers

1. “Terrible lizard” or “fearfully great lizard.”
2. They made the neck lighter while keeping it strong.
3. So air can get in to the baby inside.

TRACK 2 BADGE QUIZZES

The badge quizzes are optional. Read each question aloud; the child may answer by talking, pointing or drawing. Four right out of five earns each badge. Badges and the certificate are earned by doing the stops, not by scores.

Badge quiz 1 (Stops 1–5)

1. On which day did God make the land animals, like the dinosaurs?
2. God said behemoth moved his tail like what?
3. Could Job catch leviathan with a hook? What did Job learn?
4. Name one reason dinosaurs could fit on the Ark.
5. Why must a bone be buried quickly to become a fossil?

Badge quiz 2 (Stops 6–10)

6. Give one idea about where dragon stories came from.
7. Tell one view of what happened to the dinosaurs.
8. On a museum sign, is “68 million years ago” an observation or an interpretation?
9. Name one of the three “ifs” behind a rock-clock date.
10. Name one design God built into dinosaurs.

TRAIL CERTIFICATE: MY DINOSAURS AND THE BIBLE NOTEBOOK AND TRAIL D CERTIFICATE

Gather the Field Notebook pages from this trail into one booklet with a cover: “My Dinosaurs and the Bible Notebook,” your name and the dates you started and finished.

Add your museum sign from Stop D8 and one page with the two views of what happened to the dinosaurs from Stop D7.

Add one Bible verse from the trail that you can say from memory.

When the booklet is done, a parent signs the Trail D certificate.

- **Ten stops:** At least one page for each stop, each with a title and a date.
- **Scripture:** Verses are copied carefully, and the child can say one from memory.
- **Observe or interpret:** The museum sign keeps what we observe apart from what people interpret, and both views are told fairly.
- **Care:** Drawings are labeled and done carefully.

Answer key

1. The sixth day.
2. Like a cedar tree.
3. No. Job learned that God is far greater than anything He made.
4. Any one: only two of each kind were needed; many dinosaurs were small; God may have sent young ones; the Ark was huge, with three decks.

5. Otherwise it is eaten or rots away before it can harden into stone.
6. Any one: people saw living dinosaurs or great reptiles after the Flood; people found big fossil bones; some stories were made up.
7. Either: a giant asteroid hit the earth and the dinosaurs died out; or most died in the Flood and the rest died out afterward in a harder world.
8. An interpretation. No one was there to see it.
9. Any one: we know the starting amount; the rate stayed the same; nothing was added or taken away.
10. Any one: hollow, light neck bones; tooth batteries with new teeth ready; eggshells with tiny pores for air.

GREAT BATTLES ✕ TRAIL D: THE NINETEENTH CENTURY

The fourth trail of the Great Battles track visits eight battles of the 1800s, from Waterloo and New Orleans in 1815 to the surrender at Appomattox in 1865. It meets Wellington and Napoleon, Andrew Jackson, Sam Houston, Stonewall Jackson, the first ironclad warships, Grant at Vicksburg, the three days of Gettysburg and Lincoln's Gettysburg Address. Each battle is taught through **the map** (the land or water), **the plan, the people** (their courage and faith) and **why it mattered**.

This is the ● **Scout** level, for ages 7 to 9. A parent reads the story aloud, or a strong reader reads it alone. Battles are told plainly and gently: numbers of soldiers and losses are given as numbers, deaths are stated plainly but not described, and pictures are chosen for their story. Both sides are described fairly. The Civil War stops (D4–D8) say plainly what the Southern states' own declarations said, that slavery was the main reason they left the Union, while honoring the courage of soldiers on both sides.

Every stop has a **terrain map** to draw, a **tabletop** activity, and a **"Choose your move"** puzzle in which the child makes the commander's choice before learning what happened. Five stops earn the **Battle Scout badge, part 1**; eight earn part 2 and the **Trail D certificate**. The badge quizzes at the end are optional.

BEFORE YOU BEGIN

- Listen to a story of about five minutes and tell it back.
- Find Europe, the United States, Texas, Virginia and the Mississippi River on a globe or map (a grown-up may help).

MASTERY CHECKLIST

- ☐ I can put the eight battles of this trail in order on a timeline, from Waterloo (1815) to Appomattox (1865).
- ☐ I can find each battle on a map of Europe or the United States.
- ☐ I can tell how a ridge, a river or a hill helped one side at three of the battles.
- ☐ I can tell why the Southern states left the Union and name two great leaders of the Civil War, one from each side.
- ☐ I can say the first sentence of the Gettysburg Address and draw a terrain map with a title, a key and both armies.

OPTIONAL BOOKS AND RESOURCES

- **National Park Service** (<https://www.nps.gov>): Free maps, photos and Junior Ranger booklets for Manassas, Vicksburg, Gettysburg, Appomattox Court House and Chalmette (New Orleans).

- **American Battlefield Trust** (<https://www.battlefields.org>): Free battle maps, short videos and lesson pages on the War of 1812 and the Civil War.
- **The Mariners' Museum: USS Monitor Center** (<https://www.marinersmuseum.org>): Photos and the story of the Monitor's turret, raised from the sea floor in 2002; use with Stop D5.
- **Library of Congress** (<https://www.loc.gov>): Free Civil War photographs and Currier & Ives prints, and Lincoln's handwritten copies of the Gettysburg Address.

3.1 WATERLOO (1815): THE RIDGE AND THE FARMHOUSES

OBJECTIVES

- Find Waterloo and Brussels on a map of Belgium.
- Tell how Wellington used the back of a ridge to hide and protect his army.
- Explain why Waterloo ended many years of war in Europe.

Warm-up. Lie on the floor behind a couch and ask someone across the room to point to you. Can they see you? Now sit on top of the couch. Hiding behind a hill was one of the Duke of Wellington's favorite tricks.

Video slot. Video coming. The Battle of Waterloo, 1815, for young viewers: Wellington's ridge, Hougoumont and the arrival of the Prussians. Search approved channels (Kings and Generals, Simple History, The History Guy, National Army Museum); preview first.

KEY TERMS

Napoleon

Napoleon Bonaparte, the emperor of France, a brilliant general who conquered much of Europe.

Wellington

The Duke of Wellington, the British general who led the army against Napoleon at Waterloo.

ridge

A long, narrow hill, like the top of a roof.

square

Foot soldiers standing in a hollow box, facing out on every side, so horsemen cannot get behind them.

CORE IDEAS

The map. On June 18, 1815, two great armies met in the green fields of Belgium, just south of the village of Waterloo and the city of Brussels. It had rained hard all night, and the ground was deep, sticky mud. Across the fields ran a low **ridge**. In front of it stood two strong stone farms, Hougoumont and La Haye Sainte, like castles guarding the hill.

The people. On one side was **Napoleon**, emperor of France, who had fought and won battles all over Europe for almost twenty years. On the other side was the **Duke of Wellington**, with an army of British, Dutch, Belgian and German soldiers. A Prussian army under old Marshal Blücher, who was seventy-two, was marching through the mud to help him.

The plan. Wellington put most of his men just behind the top of the ridge, where French cannonballs and French eyes could not easily reach them. He filled the two farms with soldiers. His plan was to hold on all day, until the Prussians came. Napoleon waited until late morning for the mud to dry a little, then attacked.

What happened. All day the French came on. At Hougoumont, a few soldiers pushed the big gate shut against the attackers and held the farm until night. When French horsemen charged up the ridge, Wellington's soldiers formed **squares**, and the horsemen could not break them. In the afternoon the Prussians began to arrive. In the evening Napoleon sent his finest soldiers, the Imperial Guard, up the ridge. They were turned back, and the French army retreated. About 50,000 men on both sides were killed or wounded that day.

Why it mattered. Wellington said it had been "the nearest-run thing," a very close call. Napoleon gave up his throne and was sent far away to the tiny island of Saint Helena in the South Atlantic Ocean. The long wars that had troubled Europe since 1792 were over, and the nations of Europe had many years of peace.

PICTURE STUDY



Scotland Forever!, Elizabeth Thompson (Lady Butler), 1881 · Oil on canvas · Leeds Art Gallery, England
Wikimedia Commons · Public domain

Elizabeth Thompson, later Lady Butler, was one of the most famous painters of soldiers in Britain. This painting shows the Royal Scots Greys, Scottish horsemen on gray horses, charging at Waterloo. She painted the horses coming straight at us, as if we were standing in their way.

Look closely

- Find the horses' legs. Are any hooves touching the ground?

- Look at the riders' tall hats. What color are they?
- Follow the line of horses with your finger. Where does it end?

Talk about it

1. How does the painter make you feel the speed of the charge?
2. Why do you think she chose gray horses against a gray sky?

HANDS-ON: TABLETOP WATERLOO: BEHIND THE RIDGE

Build Wellington's ridge and test whether soldiers behind the top of a hill can be seen.

You will need

- A bath towel and two or three books (the ridge)
- About 20 blocks or toy soldiers in one color (Wellington's army)
- About 20 in a second color (the French) and 10 in a third color (the Prussians)
- Two small boxes (the farms)

Steps

1. Lay the books in a row and drape the towel over them to make a long ridge.
2. Put Wellington's soldiers on the far side of the ridge, just behind the top. Set the two boxes in front of the ridge for Hougoumont and La Haye Sainte, with a few soldiers inside.
3. Line up the French on the open side. Put your chin on the table on the French side and look. How many of Wellington's soldiers can you see?
4. Keep the Prussians off the table. Halfway through your battle, march them in from the left side. How do they change things?

Check your work

- My ridge has soldiers hidden behind the top and two farms in front.
- I looked at the ridge from the French side.
- I can tell why Wellington waited for the Prussians.

FIELD NOTEBOOK

1. **Terrain map.** Draw a long ridge across the middle of your page. Put Wellington's army behind it (top) and the French in front (bottom). Draw two small squares for the farms, Hougoumont on the right and La Haye Sainte in the middle. Draw an arrow from the right edge for the Prussians coming.
2. Write: "Waterloo, June 18, 1815. Wellington and Blücher."

Did you know? Two days before Waterloo, old Blücher's horse was shot and fell on him, and he was trapped beneath it. He was rescued, rubbed his bruises with medicine, and

rode on with his army. Wellington's famous boots gave us a word too: tall rubber rain boots are still called "wellingtons" or "wellies" in Britain.

Goes deeper in. History, the unit on Napoleon and Europe (coming soon); and Geography, for Belgium and the Low Countries.

For families. Strengths are usually given as about 68,000 for Wellington, about 72,000 for Napoleon and about 50,000 Prussians engaged by evening. Loss figures vary; most historians put killed and wounded on all sides between about 45,000 and 55,000, plus prisoners. Wellington's words "the nearest-run thing you ever saw" come from Thomas Creevey's diary. The closing of the north gate of Hougoumont was led by Lt. Col. James Macdonnell. The picture shows a cavalry charge with raised swords but no wounds.

PRACTICE

1. **MEDIUM Choose your move.** You are Wellington. Napoleon has a strong army and many cannons, and your friends the Prussians will not arrive until afternoon. Will you (a) march out and attack Napoleon in the morning, (b) line your men up on the front of the ridge where everyone can see them, or (c) keep your men just behind the top of the ridge, hold the two farms, and wait for the Prussians?
2. **EASY** What shape did soldiers make to stop horsemen?
3. **EASY** Where was Napoleon sent after Waterloo?

Make it a game • Form Square!. Players walk around the room or yard. When the leader calls "Cavalry!" everyone hurries together and stands back to back in a tight little square, facing out. Count how many seconds it takes. Can you do it faster the next time? Walk, don't run.

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

Napoleon had more cannons and fine horsemen, but battles do not always go to the strongest. Soldiers prepare, and God rules over the outcome.

Practice: answers

1. Wellington chose (c). The ridge protected his men, the farms held, and the Prussians arrived in time.
2. A square, facing out on every side.
3. To the island of Saint Helena, far away in the South Atlantic Ocean.

3.2 NEW ORLEANS (1815): THE MUD WALL BY THE RIVER

OBJECTIVES

- Find New Orleans and the Mississippi River on a map of the United States.
- Tell how Andrew Jackson used a canal, a river and a swamp to protect his line.
- Explain why the battle was fought after the peace treaty had already been signed.

Warm-up. Build a little wall of pillows across a hallway, from one side to the other. Can anyone walk around it? A wall that runs from edge to edge, with no way around, was Andrew Jackson's plan at New Orleans.

Video slot. Video coming. The Battle of New Orleans, January 8, 1815, for young viewers: Andrew Jackson's line at Chalmette. Search approved channels (National Park Service, American Battlefield Trust, Simple History); preview first.

KEY TERMS

War of 1812

A war between the United States and Great Britain that lasted from 1812 to 1815.

Andrew Jackson

The American general who defended New Orleans. He later became the seventh President.

rampart

A thick wall of earth built to protect soldiers.

treaty

A written agreement between nations, such as a promise to stop a war.

CORE IDEAS

The map. New Orleans sits beside the great Mississippi River, near where it flows into the Gulf of Mexico. Whoever held the city held the door to the whole river. Just below the city, at a sugar plantation called Chalmette, a narrow strip of dry land lay between the river on one side and a thick cypress swamp on the other. Across that strip ran an old ditch called the Rodriguez Canal.

The people. General **Andrew Jackson**, a tough, fiery man from Tennessee, gathered a mixed army: American soldiers, riflemen from Tennessee and Kentucky, Louisiana militia, free Black soldiers of New Orleans, Choctaw warriors, sailors, and even the pirate Jean Lafitte and his gunners. Against them came about 8,000 skilled British soldiers led by General Sir Edward Pakenham.

The plan. Jackson's men dug and piled the mud from the canal into a long **rampart**, a wall of earth taller than a man, running all the way from the river to the swamp. There was no

way around it. The British would have to cross an open field and climb the wall.

What happened. Early on the morning of January 8, 1815, the British marched forward through the fog. When the fog lifted, the Americans opened fire with cannons and rifles from behind their wall. Some British ladders to climb the wall had been left behind. In less than an hour about 2,000 British soldiers were killed, wounded or captured, and General Pakenham was killed. Jackson lost only about 70 men.

Why it mattered. Here is the surprise: two weeks before, on December 24, 1814, the two countries had already signed a peace **treaty** in Ghent, Belgium. News crossed the ocean by sailing ship, so no one in Louisiana knew. The war was not yet officially over until both governments approved the treaty, but the battle made Americans proud and kept New Orleans and the river safe. Jackson became a national hero.

PICTURE STUDY



The Battle of New Orleans, Jean Hyacinthe de Laclotte, 1815 · Oil on canvas · New Orleans Museum of Art
Wikimedia Commons · Public domain

Jean Hyacinthe de Laclotte was an architect and engineer who served in the Louisiana militia during the battle. He painted it as if from a bird flying high over the field, so we can see the whole plan at once.

Look closely

- Find the river. Find the swamp and woods. Find Jackson's line between them.
- Find the British soldiers in red. Which way are they marching?
- Look at the smoke. Where is it coming from?

Talk about it

1. Why do you think the artist painted the battle from high above instead of up close?
2. Looking at this picture, why was Jackson's line hard to get around?

HANDS-ON: TABLETOP NEW ORLEANS: RIVER TO SWAMP

Build Jackson's mud wall and see why there was no way around it.

You will need

- A baking tray, or a sand table
- Play dough, clay or damp sand (the rampart)
- A blue ribbon or paper strip (the river) and crumpled green paper (the swamp)
- About 15 toy soldiers or blocks for each side

Steps

1. Lay the blue river along one side of the tray and put the green swamp along the other side.
2. Press a line in the middle for the canal. Build the rampart of dough or sand right behind it, from the river all the way to the swamp.
3. Set Jackson's soldiers behind the wall and the British at the far end of the open field.
4. Try to find a way for the British to get around the wall without going through the river or swamp. Is there one?

Check your work

- My wall runs from the river to the swamp with no gaps.
- I placed both armies.
- I can tell why Jackson chose this narrow place.

FIELD NOTEBOOK

1. **Terrain map.** Draw the Mississippi River down the left side of your page and a swamp with cypress trees down the right. Draw the canal and Jackson's wall straight across between them. Mark New Orleans at the top and the British coming from the bottom.
2. Write: "New Orleans, January 8, 1815. Andrew Jackson."

Did you know? On the night before the battle, the Ursuline sisters of New Orleans, a convent of nuns, stayed up praying for the city. After the victory, Jackson asked for a service of thanksgiving in the cathedral, and on January 23, 1815, the people of New Orleans gathered to thank God. Many people still say Jackson's wall was made of cotton bales, but it was mostly mud.

Goes deeper in. History, the American unit on the War of 1812 (coming soon); and Geography, for the Mississippi River and its delta.

For families. British losses on January 8 are usually given as about 2,000 (291 killed, about 1,260 wounded and about 480 captured or missing); American losses were about 70. Jackson had roughly 4,000 to 5,000 men on the main line. The Treaty of Ghent was signed December 24, 1814, and ratified by the U.S. Senate on February 16, 1815; the war ended officially then. Cotton bales were used in a few places early on but proved poor protection. The Ursulines' prayer vigil before the statue of Our Lady of Prompt Succor is a well-known New Orleans tradition; the thanksgiving service of January 23, 1815, is well documented.

PRACTICE

1. **MEDIUM Choose your move.** You are Andrew Jackson. The British army is bigger and better trained than yours. Will you (a) march out and fight them in the open fields, (b) dig in behind the old canal and build a mud wall from the river to the swamp, or (c) pull back into the city and wait?
2. **EASY** Name the river beside New Orleans.
3. **MEDIUM** Why didn't the soldiers know that a peace treaty had been signed?

Make it a game • The Fog Lifts. One player is Jackson and stands at the far end of the room with their back turned. The others creep slowly forward through the "fog." When Jackson calls "The fog lifts!" and turns around, everyone freezes. Anyone seen moving goes back to the start. The first to tap Jackson's shoulder takes a turn as Jackson.

Scripture. "O give thanks unto the LORD, for he is good: for his mercy endureth for ever." (Psalm 107:1, KJV)

After the battle, the people of New Orleans gathered in church to give thanks. When God brings us safely through danger, we remember to thank Him.

Practice: answers

1. Jackson chose (b). The British had to cross an open field to reach a wall they could not go around.
2. The Mississippi River.
3. News crossed the ocean slowly by sailing ship, so it had not reached Louisiana yet.

3.3 SAN JACINTO (1836): EIGHTEEN MINUTES FOR TEXAS

OBJECTIVES

- Find Texas, Houston and the San Jacinto River on a map.
- Tell how Sam Houston surprised Santa Anna's camp in the afternoon.
- Explain how San Jacinto made Texas an independent country.

Warm-up. Hide behind a chair and creep across the room as quietly as you can while someone reads a book with their back to you. How close can you get before they hear you? Sam Houston's army crept close to its enemy without being seen.

Video slot. Video coming. The Battle of San Jacinto, April 21, 1836, for young viewers: Sam Houston and Santa Anna. Search approved channels (Texas State Historical Association, San Jacinto Museum of History, Simple History); preview first.

KEY TERMS

Texian

A settler living in Texas when it was part of Mexico, before it joined the United States.

Sam Houston

The commander of the Texian army, later President of the Republic of Texas. The city of Houston is named for him.

Santa Anna

The President of Mexico and the general who led the Mexican army into Texas.

independence

Being free to rule yourself, not ruled by another country.

CORE IDEAS

The people. In 1836 Texas belonged to Mexico. Thousands of settlers from the United States, called **Texians**, had moved there. When General **Santa Anna**, the President of Mexico, set aside Mexico's constitution and ruled by force, the Texians rebelled and declared **independence**. To Mexico, Texas was part of their country and the Texians were rebels. Santa Anna marched north and won at the Alamo and at Goliad, and the Texian defenders there were killed.

The map. Sam Houston led the small Texian army east for weeks while his men grumbled that he would never fight. At last he camped beside Buffalo Bayou near the San Jacinto River. Santa Anna camped close by, on open prairie, with a marsh and a lake behind him. A small rise in the ground stood between the two camps.

The plan. Most commanders attacked at dawn. Houston waited. On the afternoon of April 21, Santa Anna's tired soldiers were resting in camp. Houston's scout, Erastus "Deaf" Smith,

burned Vince's Bridge, the nearest bridge out. Then about 900 Texians lined up and walked quietly forward, hidden by the rise in the ground.

What happened. When they were very close, they charged, shouting "Remember the Alamo! Remember Goliad!" The Mexican army was taken by surprise. Houston said the battle took only about eighteen minutes. Hundreds of Mexican soldiers were killed and hundreds more captured. Only nine Texians were killed, and Houston was wounded in the ankle. The next day Santa Anna was found hiding in a plain soldier's clothes.

Why it mattered. Some Texians wanted Santa Anna put to death, but Houston kept him alive. Santa Anna agreed to order his armies out of Texas. Texas became its own country, the Republic of Texas, with Sam Houston as its President. Nine years later, in 1845, Texas joined the United States.

PICTURE STUDY



The Surrender of Santa Anna, William Henry Huddle, 1886 · Oil on canvas · Texas State Capitol, Austin
Wikimedia Commons · Public domain

William Henry Huddle painted this scene fifty years after the battle. He talked with men who had been there and studied their faces. Sam Houston lies under an oak tree with his wounded ankle, and the captured Santa Anna is brought before him.

Look closely

- Find Sam Houston. How can you tell he is hurt?
- Find Santa Anna. How is he standing?
- Look at the faces of the men around them. Are they happy, angry or curious?

Talk about it

1. Why do you think Houston chose to keep Santa Anna alive?
2. Why do you think the painter put the big tree in the picture?

HANDS-ON: TABLETOP SAN JACINTO: THE HIDDEN APPROACH

Build the field on a sand table or tray and test how a small rise can hide an army.

You will need

- A tray with sand, or a towel on the table
- A blue ribbon (the bayou) and blue paper (the marsh and lake)
- A rolled-up hand towel (the rise)
- A craft stick (Vince's Bridge) and blocks or toy soldiers in two colors

Steps

1. Lay the bayou along one side. Put the marsh and lake behind the place where Santa Anna will camp.
2. Set the rolled towel across the middle. Put Santa Anna's camp on one side and Houston's army on the other.
3. Lay the craft stick bridge over the bayou, then take it away the way Deaf Smith did.
4. Put your eye down at the height of Santa Anna's camp. Slide Houston's soldiers forward behind the rise. When can you first see them?

Check your work

- My field has a bayou, a marsh, a rise and two camps.
- I tested what Santa Anna's camp could see.
- I can tell why Houston attacked in the afternoon.

FIELD NOTEBOOK

1. **Terrain map.** Draw Buffalo Bayou along the top of your page and the San Jacinto River down the right side. Draw Houston's camp by the trees, a low rise in the middle, and Santa Anna's camp with the marsh and lake behind it. Draw Vince's Bridge with an X.
2. Write: "San Jacinto, April 21, 1836. Remember the Alamo!"

Did you know? In his plain clothes, Santa Anna might have passed for an ordinary soldier, but when he was brought into the Texian camp, some of the Mexican prisoners called out, "El Presidente!" The San Jacinto Monument, built on the battlefield, is taller than the Washington Monument and has a big star on top.

Goes deeper in. History, the American unit on Texas and the West (coming soon); and Geography, for the Gulf Coast of Texas.

For families. Texian strength was about 900; Santa Anna had roughly 1,200 to 1,400 after reinforcements. Mexican losses are usually given as about 630 killed and about 730

captured; Texian losses as 9 killed (some counts say 11) and about 30 wounded. The “eighteen minutes” comes from Houston’s report. Causes of the revolution included Santa Anna’s centralist rule and the setting aside of the 1824 constitution; historians also note that many Anglo settlers held slaves, and Mexico had moved to abolish slavery, which was one source of tension. Santa Anna signed the Treaties of Velasco in May 1836; Mexico did not recognize Texas independence.

PRACTICE

1. **MEDIUM Choose your move.** You are Sam Houston. Santa Anna’s army is camped close by with a marsh behind it. Will you (a) wait for Santa Anna to attack you, (b) attack in the afternoon while his soldiers are resting, coming up quietly behind the rise, or (c) keep retreating east toward Louisiana?
2. **EASY** What did the Texans shout as they charged?
3. **EASY** What did Texas become after San Jacinto?

Make it a game • Quiet Approach. One player is Santa Anna’s camp and stands facing a wall. The others start at the far side of the room and sneak forward. Whenever the camp turns around, everyone must freeze. Anyone caught moving goes back. The first to touch the camp’s shoulder wins and becomes the camp.

Scripture. “Have not I commanded thee? Be strong and of a good courage; be not afraid, neither be thou dismayed: for the LORD thy God is with thee whithersoever thou goest.” (Joshua 1:9, KJV)

Houston’s men were few and many were afraid. Courage is doing right even when we are afraid, and God promises to be with His people wherever they go.

Practice: answers

1. Houston chose (b). His army surprised the resting camp and won in about eighteen minutes.
2. “Remember the Alamo! Remember Goliad!”
3. An independent country, the Republic of Texas. It joined the United States in 1845.

3.4 FIRST BULL RUN (1861) AND STONEWALL JACKSON

OBJECTIVES

- Find Washington, D.C., Richmond and Manassas on a map of Virginia.
- Tell how Thomas Jackson got the name “Stonewall.”
- Explain why the Southern states left the Union and why the first battle showed the war would be long.

Warm-up. Stand up straight and still, like a statue, while someone counts to thirty. Don’t wiggle! A general named Thomas Jackson stood so steady in his first big battle that he was called “Stonewall” for the rest of his life.

Video slot. Video coming. The First Battle of Bull Run (Manassas), July 21, 1861, for young viewers: Henry House Hill and Stonewall Jackson. Search approved channels (American Battlefield Trust, National Park Service, Simple History); preview first.

KEY TERMS

Union

The United States under President Lincoln during the Civil War; also called the North.

Confederacy

The Confederate States of America, the eleven Southern states that left the Union; also called the South.

secession

When a state leaves, or secedes from, the United States.

brigade

A group of soldiers, usually a few thousand, led by one general.

CORE IDEAS

Why the war came. In 1860 and 1861, eleven Southern states left the United States and formed the **Confederacy**. Several of them wrote declarations telling the world why, and the main reason they gave was to protect slavery, the owning of people as property. President Abraham Lincoln said the **Union** could not be broken apart. In April 1861 war began. Brave men on both sides marched off, many believing it would be over in one battle.

The map. The Union capital, Washington, D.C., and the Confederate capital, Richmond, Virginia, were only about 100 miles apart. Between them, near a railroad junction called Manassas, ran a small stream called Bull Run. Above it rose Henry House Hill, a rounded hill with a farmhouse on top.

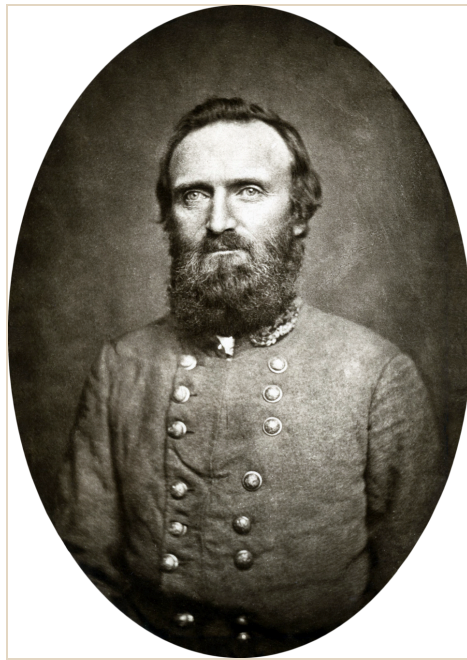
The plan. On July 21, 1861, the Union general Irvin McDowell marched about 35,000 men around the left side of the Confederate army, hoping to surprise it. Some people even rode

out from Washington in carriages to watch. But more Confederate soldiers were coming by train from the Shenandoah Valley, the first time a railroad carried a whole army to a battle.

The people. At first the Union attack worked, and Confederate soldiers fell back up Henry House Hill. There, General **Thomas J. Jackson**, a quiet Virginia Military Institute teacher and a man of deep Christian faith, lined up his **brigade** just behind the top of the hill and held firm. General Barnard Bee is said to have pointed and shouted, “There is Jackson standing like a stone wall!” From then on he was “Stonewall” Jackson.

What happened, and why it mattered. In the afternoon fresh Confederate troops arrived and charged. The tired Union army fell back, and the retreat to Washington became a crowded, confused rush. Nearly 5,000 men were killed, wounded or missing. Both sides learned that the war would be long and hard. Soldiers on both sides had shown great courage, and many more battles were coming.

PICTURE STUDY



General Thomas J. “Stonewall” Jackson, Photograph usually credited to Nathaniel Routzahn, 1862 · Photograph · Library of Congress (copies in many collections) Wikimedia Commons · Public domain

This photograph was taken in Winchester, Virginia, in November 1862, more than a year after Bull Run. Jackson did not like to sit for pictures. Notice the plain, serious look of a man who prayed often and spoke little.

Look closely

- Count the rows of buttons on Jackson’s coat.
- Look at his eyes. Where is he looking?
- Look at his beard and hair. Do they look neat or rough?

Talk about it

1. Does Jackson look like a man who would stand “like a stone wall”? Why?
2. Why do you think old photographs show people with such serious faces?

HANDS-ON: TABLETOP BULL RUN: HENRY HOUSE HILL

Build the hill and the railroad and see how fresh soldiers arriving by train changed the battle.

You will need

- A towel over a pillow or a stack of books (Henry House Hill)
- A blue ribbon (Bull Run) and a piece of yarn (the railroad)
- A small box (the Henry house)
- Blocks or toy soldiers in blue and gray, or two other colors

Steps

1. Lay Bull Run across the table and make the hill on the near side. Put the little house on top.
2. Put Jackson’s gray brigade just behind the top of the hill in a straight line, with a few cannons in front.
3. March the blue soldiers around the end of the stream and up toward the hill.
4. Lay the yarn railroad from the far edge of the table. Bring more gray soldiers down the track and add them to the line. What happens to the attack now?

Check your work

- My table has the stream, the hill, the house and the railroad.
- Jackson’s line stands just behind the top of the hill.
- I can tell how the railroad helped the Confederates.

FIELD NOTEBOOK

1. **Terrain map.** Draw Bull Run winding across your page. Draw Henry House Hill with a little house on top and Jackson’s line just behind it. Draw a railroad track coming in from the left, from the Shenandoah Valley, and arrows showing the Union army crossing the stream.
2. Write: “First Bull Run (Manassas), July 21, 1861. Stonewall Jackson.”

Did you know? The North usually named battles after streams, like Bull Run, and the South after towns, like Manassas, so many Civil War battles have two names. Jackson later told a friend that his faith taught him to feel as safe in battle as in bed, because God had already fixed the time of his death. Before the war he led a Sunday school class for Black children and adults in his town of Lexington, Virginia.

Goes deeper in. History, the American unit on the Civil War (coming soon); and Geography, for Virginia and the Shenandoah Valley.

For families. The secession declarations of South Carolina, Mississippi, Georgia and Texas name slavery as the central cause; Mississippi's begins, "Our position is thoroughly identified with the institution of slavery." Losses are usually given as about 2,900 Union and about 2,000 Confederate killed, wounded and missing. General Bee was mortally wounded soon after, so his exact words and meaning are uncertain; the stop says "is said to have." An elderly widow, Judith Henry, was killed in her house on the hill; she is often called the first civilian killed in the war. Jackson's Sunday school for enslaved and free Black people in Lexington is documented by his biographers; the "safe in battle as in bed" words come from his conversation with John Imboden.

PRACTICE

1. **MEDIUM Choose your move.** You are Jackson. Other Confederate soldiers are running back past you up Henry House Hill, and the Union army is coming. Will you (a) join the retreat, (b) charge straight down the hill at once, or (c) line your men up just behind the top of the hill, put cannons in front, and stand firm?
2. **EASY** What was the main reason the Southern states gave for leaving the Union?
3. **EASY** How did extra Confederate soldiers reach the battle?

Make it a game · Stone Wall. Everyone walks or hops around the room. When the leader calls "Stone wall!" everyone freezes in a line, shoulder to shoulder, and stays perfectly still while the leader counts to ten and makes funny faces. Anyone who laughs or wiggles becomes the next leader.

Scripture. "The LORD is my rock, and my fortress, and my deliverer; my God, my strength, in whom I will trust; my buckler, and the horn of my salvation, and my high tower." (Psalm 18:2, KJV)

Jackson was called a stone wall, but he trusted in God as his rock. A soldier's steadiness is a gift; the truest Rock is the Lord.

Practice: answers

1. Jackson chose (c). His brigade held the hill until fresh troops arrived, and he became "Stonewall" Jackson.
2. To protect slavery.
3. By railroad train, from the Shenandoah Valley.

3.5 THE MONITOR AND THE MERRIMACK (1862): IRONCLADS

OBJECTIVES

- Find Hampton Roads and Norfolk, Virginia, on a map.
- Describe how the Monitor and the Virginia (Merrimack) were different.
- Explain why this battle changed navies all over the world.

Warm-up. Turn slowly in a circle with your arm pointing straight out. You can point in every direction without moving your feet! The Monitor had a round tower for its guns that turned just like you.

Video slot. Video coming. The Battle of Hampton Roads, March 1862, for young viewers: USS Monitor and CSS Virginia (Merrimack), and the Monitor's turret today. Search approved channels (The Mariners' Museum USS Monitor Center, NOAA Ocean Service, American Battlefield Trust); preview first.

KEY TERMS

ironclad

A warship covered with thick iron plates to protect it from cannonballs.

turret

A round, turning tower on a ship that holds its guns.

harbor

A sheltered stretch of water where ships can stay safe near land.

blockade

Using ships to keep other ships from going in or out of an enemy's ports.

CORE IDEAS

The map. Where the James River flows into Chesapeake Bay in Virginia lies a wide **harbor** called Hampton Roads. In the Civil War, wooden Union warships waited there as part of a **blockade** to keep ships from going in and out of Southern ports. The war had begun when Southern states left the Union to protect slavery, and the North meant to squeeze the South by sea.

The people. At Norfolk the Confederates raised a burned Union ship, the *Merrimack*, and built a sloping iron house on top of it, like a roof floating on the water. They named it the CSS *Virginia*. In New York, a Swedish-born inventor named John Ericsson built the USS *Monitor* in about 100 days. It sat so low in the water that people called it “a cheesebox on a raft.” Its two big guns sat in a round **turret** that could turn in any direction.

What happened first. On March 8, 1862, the *Virginia* steamed out. Cannonballs bounced off her iron sides. She rammed and sank one wooden Union ship and set another on fire.

More than 200 Union sailors were lost. Everyone feared she would destroy the whole fleet the next day. But that night the little *Monitor* arrived.

The plan. On March 9, the two **ironclads** fought for about four hours, often very close. The *Virginia* was big and slow and needed deep water. Lieutenant John Worden kept the small *Monitor* moving, sometimes slipping into shallow water where the big ship could not follow, and turned the turret to fire again and again. Neither ship could sink the other. Worden was hurt in the eyes when a shell burst near his lookout slot, and the battle ended in a draw.

Why it mattered. The *Monitor* had saved the Union fleet, and the blockade went on. Navies all over the world saw that wooden warships were now out of date. Soon every great navy was building iron ships, many with turning turrets like the *Monitor*'s. Neither ship lasted long: the *Virginia* was destroyed by her own crew that May, and the *Monitor* sank in a storm off Cape Hatteras on the last day of 1862.

PICTURE STUDY



Crew of the USS Monitor on Deck, James River, Virginia, James F. Gibson, July 9, 1862 · Photograph · Library of Congress (this copy: Boston Public Library) Wikimedia Commons · Public domain

A few months after the famous battle, a photographer named James F. Gibson rowed out to the *Monitor* on the James River and took pictures of the crew. This is one of the oldest photographs of sailors at ease on their ship.

Look closely

- Find the round iron turret. How tall is it compared with the sailors?
- Look at the deck. Is it high above the water or low and flat?

- What are the sailors doing? Find someone sitting, someone standing and someone reading.

Talk about it

1. Would you want to live inside a ship that sat so low in the water? Why or why not?
2. Why do you think the sailors liked to come out on deck when they could?

HANDS-ON: TABLETOP IRONCLADS: CHEESEBOX AND ROOF

Build the two ironclads and float them in a tub to see which sits lower in the water.

You will need

- A flat foam tray or a flat piece of foam (the Monitor's deck)
- A bottle cap or a short piece of cardboard tube (the turret)
- A small box with a piece of folded cardboard on top like a roof (the Virginia)
- Aluminum foil, tape, a toothpick, and a sink or tub of shallow water

Steps

1. Cover both ships with foil to make them "ironclad."
2. Set the bottle cap in the middle of the flat tray for the Monitor's turret. Push a toothpick through the cap for a gun, and turn the cap to aim.
3. Tape the folded cardboard roof on top of the box for the Virginia.
4. Float both ships. Which sits lower in the water? Which could go into shallower water? Turn the Monitor's turret to point at the Virginia from different sides.

Check your work

- I built both ironclads.
- My Monitor's turret turns.
- I can tell one way the two ships were different.

FIELD NOTEBOOK

1. **Terrain map.** Draw Chesapeake Bay at the top of your page and the James River coming in from the left. Mark Hampton Roads where they meet, Norfolk to the south and Fort Monroe at the point. Draw the Monitor as a small circle on a flat raft and the Virginia as a long sloping roof.
2. Write: "Hampton Roads, March 9, 1862. The first battle between ironclads."

Did you know? In 1973 explorers found the wreck of the Monitor lying upside down on the sea floor off North Carolina. In 2002 Navy divers raised her turret. It is now kept at The Mariners' Museum in Newport News, Virginia, very close to where she fought. Northerners kept calling the Virginia by her old name, Merrimack, so people still call the battle "the Monitor and the Merrimack."

Goes deeper in. History, the American unit on the Civil War (coming soon); and Earth Science, for why some things float and others sink.

For families. On March 8 the Virginia sank USS Cumberland and forced USS Congress to surrender, which was then burned; Union losses that day are usually given as more than 200 killed. Few men were hurt on either ironclad on March 9. The Virginia was commanded on March 8 by Franklin Buchanan (wounded) and on March 9 by Lt. Catesby ap Roger Jones. The Monitor drew about 10 feet of water, the Virginia about 22. The secession declarations of several states named slavery as their central cause (see Stop D4).

PRACTICE

1. **MEDIUM Choose your move.** You are Lieutenant Worden on the small Monitor. The Virginia is much bigger, but slow, and she needs deep water. Will you (a) stay far away and fire from a long distance, (b) stay close, keep moving, slip into shallow water where she cannot follow, and turn your turret to keep firing, or (c) try to climb aboard her?
2. **EASY** What is a turret?
3. **EASY** Who won the battle between the two ironclads?

Make it a game • Turn the Turret. One player is the Monitor's turret and stands in the middle with arms straight out, pointing. The other players stand around the room. The leader calls out a player's name, and the turret turns, without stepping, to point at that player as fast as possible. Take turns being the turret.

Scripture. "They that go down to the sea in ships, that do business in great waters; These see the works of the LORD, and his wonders in the deep." (Psalm 107:23-24, KJV)

Sailors on iron ships and wooden ships alike faced the great waters. The sea that sank the Monitor is in God's hands, and He is Lord over the deep.

Practice: answers

1. Worden chose (b). The Monitor stayed close, kept moving and kept firing, and the Virginia could not sink her.
2. A round, turning tower on a ship that holds its guns.
3. Neither. It was a draw, but the Monitor saved the Union fleet.

3.6 VICKSBURG (1863): THE RIVER WAR

OBJECTIVES

- Find Vicksburg and the Mississippi River on a map of the United States.
- Tell how Grant and Porter got past the cannons on the bluffs.
- Explain why taking Vicksburg split the Confederacy in two.

Warm-up. Hold a piece of string in a long, wiggly line across the floor, then make one big bend in it like a letter U. If you sat at the top of the bend with a flashlight, could you shine it on boats coming from both directions? That is why Vicksburg was so hard to pass.

Video slot. Video coming. The Vicksburg Campaign and Siege, 1863, for young viewers: Grant, Porter’s gunboats and the river. Search approved channels (National Park Service, American Battlefield Trust, Simple History); preview first.

KEY TERMS

bluff

A high, steep bank beside a river.

gunboat

A small warship with cannons, built to fight on rivers.

siege

Surrounding a city or fort and cutting it off until it gives up.

Ulysses S. Grant

The Union general who captured Vicksburg. He later led all the Union armies and became President.

CORE IDEAS

The map. The Mississippi River is the great highway through the middle of America. In 1863 the Confederacy, formed by states that left the Union to protect slavery, still held the city of Vicksburg, Mississippi. It sat on high **bluffs** at a sharp bend in the river, with rows of cannons pointing down at the water. Swamps and bayous guarded the land to the north. President Lincoln called Vicksburg “the key.”

The people. General **Ulysses S. Grant** was a quiet, stubborn man who did not give up. All winter his men tried to reach Vicksburg: they dug canals and pushed boats through narrow, tree-choked bayous. Nothing worked. Admiral David Dixon Porter commanded the Union **gunboats**. Inside the city, Confederate General John C. Pemberton and his soldiers were just as determined to hold on.

The plan. Grant made a bold new plan. His army would march south on the far side of the river. On the dark night of April 16, 1863, Porter’s gunboats, with bales of hay and cotton

piled on their decks for protection, steamed right past the cannons of Vicksburg. The Confederates lit bonfires to see them. Nearly all the boats made it. Then the boats carried Grant's army across the river south of the city.

What happened. Grant marched fast, won five battles in a few weeks, and came at Vicksburg from the land side, where it was weakest. Two attacks on the city's walls failed, so Grant began a **siege**. For about six weeks no food came in. Many townspeople dug caves in the hillsides to stay safe from the shells. At last, on July 4, 1863, Pemberton surrendered about 29,000 hungry soldiers.

Why it mattered. Now the whole Mississippi River belonged to the Union, and the Confederacy was split in two. Texas, Arkansas and most of Louisiana were cut off from the rest of the South. Lincoln wrote that "the Father of Waters again goes unvexed to the sea," meaning the river flowed freely again. Grant had shown he was a general who would find a way.

PICTURE STUDY



*Admiral Porter's Fleet Running the Rebel Blockade of the Mississippi at Vicksburg, April 16th 1863, Currier & Ives, 1863 · Hand-colored lithograph · Library of Congress
Wikimedia Commons · Public domain*

Currier & Ives was a print shop in New York that made cheap, colorful pictures of the news for families to hang on their walls. This print shows the night Porter's boats ran past Vicksburg's cannons.

Look closely

- Find the bonfires on the shore. Why were they lit?
- Count the boats you can see in the line.

- Find the high bluffs. Where are the cannons?

Talk about it

1. Why would the boats try to pass at night instead of in the daytime?
2. How do you think the sailors felt as they steamed past?

HANDS-ON: TABLETOP VICKSBURG: RUNNING THE BATTERIES

Build the river bend and the bluffs, then run your boats past the cannons in the dark.

You will need

- A long blue ribbon or strip of blue paper (the Mississippi)
- A row of books (the bluffs)
- Small toy boats, bottle caps or folded paper boats
- A flashlight, and blocks for Grant's army

Steps

1. Lay the river on the floor or table with one big bend. Set the books on the bend for the bluffs of Vicksburg.
2. Put a few blocks on top of the books for the cannons. Put Grant's army on the far side of the river, north of the city.
3. Turn down the lights. One person sits by the bluffs with the flashlight. Slide the boats slowly down the river past the bluffs. Boats caught in the light go back.
4. When the boats are past, march Grant's army down the far side, ferry it across south of the city, and come at Vicksburg from the land side.

Check your work

- My river has a bend with bluffs.
- I ran my boats past the bluffs and crossed the army below the city.
- I can tell why Grant came at Vicksburg from the land side.

FIELD NOTEBOOK

1. **Terrain map.** Draw the Mississippi River from the top of your page to the bottom with a sharp bend in the middle. Put Vicksburg on the bluffs at the bend. Draw a dotted line for the boats running past, an arrow for Grant's army marching down the far side and crossing below the city, and a curved arrow coming to Vicksburg from behind.
2. Write: "Vicksburg, July 4, 1863. The river is open."

Did you know? During the siege, the people of Vicksburg ran so short of food that some ate mule meat. Some families lived in their caves for weeks, with rugs and beds inside. The day after Vicksburg surrendered, news came that the Union had also won at Gettysburg, far away in Pennsylvania (Stop D7).

Goes deeper in. History, the American unit on the Civil War (coming soon); and Geography, for the Mississippi River and its bends.

For families. Lincoln's "Vicksburg is the key" comes from Admiral Porter's later recollection; "The Father of Waters again goes unvexed to the sea" is from Lincoln's letter to James Conkling, August 26, 1863. The siege lasted about 47 days (May 18 to July 4); about 29,500 Confederates were surrendered and paroled. One transport was lost during the April 16 run. The secession declaration of Mississippi itself says, "Our position is thoroughly identified with the institution of slavery." The story that Vicksburg did not celebrate the Fourth of July for many decades is often told but its details are debated.

PRACTICE

1. **MEDIUM Choose your move.** You are General Grant. Vicksburg sits on high bluffs with swamps to the north, and your canals have failed. Will you (a) charge straight up the bluffs from the river, (b) march south down the far side of the river, have the gunboats run past the cannons at night, cross below the city and come at it from the land side, or (c) go back to Memphis and wait for next year?
2. **EASY** What is a siege?
3. **MEDIUM** Why did taking Vicksburg matter so much?

Make it a game • Run the Batteries. In a dim room cleared of things to trip on, one player sits on a chair (the bluff) with a flashlight. The others are boats and crawl slowly and quietly from one end of the room to the other, past the bluff. Anyone caught in the flashlight beam goes back to the start. A grown-up should be there. Take turns holding the light.

Scripture. "When thou passest through the waters, I will be with thee; and through the rivers, they shall not overflow thee: when thou walkest through the fire, thou shalt not be burned; neither shall the flame kindle upon thee." (Isaiah 43:2, KJV)

God spoke these words to His people Israel. Whatever rivers or dangers His people pass through, He goes with them.

Practice: answers

1. Grant chose (b). It was risky, but it worked, and Vicksburg surrendered on July 4, 1863.
2. Surrounding a city and cutting it off until it gives up.
3. The Union now held the whole Mississippi River, and the Confederacy was split in two.

3.7 GETTYSBURG (1863): THE HIGH GROUND, LITTLE ROUND TOP, PICKETT’S CHARGE AND THE GETTYSBURG ADDRESS

OBJECTIVES

- Find Gettysburg, Pennsylvania, on a map, and name the hills the Union army held.
- Tell what happened on Little Round Top and in Pickett’s Charge.
- Say the first words of the Gettysburg Address and tell why Lincoln gave it.

Warm-up. Stand at the bottom of a staircase or a hill and have someone stand at the top. Who can see farther? Who would have to work harder to reach the other? At Gettysburg, the army on the high ground had the advantage.

Video slot. Video coming. The Battle of Gettysburg, July 1–3, 1863, for young viewers: Little Round Top, Pickett’s Charge and the Gettysburg Address. Search approved channels (National Park Service, American Battlefield Trust, Simple History); preview first.

KEY TERMS

high ground

Hills and ridges. Soldiers on high ground can see farther, and attackers must climb to reach them.

Little Round Top

A rocky hill at the south end of the Union line at Gettysburg.

bayonet

A long blade fixed to the end of a rifle.

address

A speech given to a crowd on a special occasion.

CORE IDEAS

The map. In the summer of 1863, General Robert E. Lee led the Confederate army north into Pennsylvania. On July 1 it met the Union army, led by General George G. Meade, at the little town of Gettysburg. After the first day, the Union army held the **high ground** south of town: Culp’s Hill, Cemetery Hill, a long ridge called Cemetery Ridge, and two rocky hills at the end, Big Round Top and **Little Round Top**. From above, the Union line looked like a fishhook.

Little Round Top. On July 2, the Confederates attacked the south end of the line. A Union officer, General Gouverneur Warren, climbed Little Round Top and saw that almost no one was guarding it. Soldiers were rushed up the hill just in time. At the very end of the line stood the 20th Maine, led by Colonel Joshua Lawrence Chamberlain, a college teacher.

Alabama soldiers, hot and thirsty after a long march, charged up the hill again and again. When the men of Maine ran low on bullets, Chamberlain ordered **bayonets** fixed, and they charged down the hill. The hill was held.

Pickett's Charge. On July 3, Lee made one last great attack on the middle of the Union line. First, the cannons of both armies roared for over an hour. Then about 12,500 Confederate soldiers, including General George Pickett's men, marched out in long, straight lines across a mile of open fields toward a small grove of trees on Cemetery Ridge. They showed great courage, but the Union line held. About half of them were killed, wounded or captured. Lee rode out to meet the survivors and said, "It is all my fault."

Why it mattered. Lee's army went back to Virginia and never again invaded the North. About 50,000 men on both sides were killed, wounded, captured or missing in three days, more than in any other battle of the war. Together with Vicksburg, which surrendered the next day, Gettysburg was a turning point. The war had come because Southern states left the Union to protect slavery, and now the Union was winning.

The Gettysburg Address. That November a cemetery was made for the Union soldiers who died there. President Lincoln spoke for about two minutes, only about 270 words. He began, "Four score and seven years ago our fathers brought forth on this continent, a new nation, conceived in Liberty, and dedicated to the proposition that all men are created equal." He asked the living to finish the work so that "this nation, under God, shall have a new birth of freedom." It is one of the most famous speeches ever given.

PICTURE STUDY



The Battle of Gettysburg (the Gettysburg Cyclorama), Paul Philippoteaux, 1883 · Oil on canvas, a round painting about 377 feet long · Gettysburg National Military Park Museum and Visitor Center, Pennsylvania
Wikimedia Commons · Public domain

A cyclorama is a giant painting that goes all the way around a round room, so you stand in the middle and feel as if you are on the battlefield. The French painter Paul Philippoteaux visited Gettysburg, made sketches and photographs, and talked with men who had fought. This painting shows Pickett's Charge, seen from Cemetery Ridge. In front of the painting, real dirt, rocks and fence rails make it look even more real.

Look closely

- Find the small grove of trees and the low stone wall. That is where the charge was aimed.
- Find the puff of white smoke and the zigzag wooden fence.
- Look far across the fields to the hills. How far did the Confederate soldiers have to walk?

Talk about it

1. Why do you think the painter made a picture you could stand inside?
2. Looking at the open fields, why was the charge so hard?

HANDS-ON: GETTYSBURG TERRAIN MODEL: THE FISHHOOK AND THE ROUND TOPS

Build the hills of Gettysburg and set up both armies in their lines on July 3.

You will need

- A tray or a large piece of cardboard
- Play dough or clay in green or brown (the hills)
- A few twigs or small pieces of green sponge (the grove of trees)
- Blocks or toy soldiers in blue and gray, or two other colors

Steps

1. Make Culp's Hill and Cemetery Hill at the top of the tray, then a long low ridge running down the middle, then Little Round Top and a bigger Big Round Top at the bottom. Together they should look like a fishhook.
2. Put the grove of trees in the middle of the ridge. Set the Union soldiers along the whole fishhook.
3. Set the Confederate soldiers on a lower ridge across from it, with open ground between.
4. Move Pickett's men across the open ground toward the grove. Put your eye at table level: what would the soldiers on the ridge see coming?

Check your work

- My model has the two hills, the ridge and both Round Tops.
- My Union line makes a fishhook shape.
- I can point to Little Round Top and to the grove of trees.

FIELD NOTEBOOK

1. **Terrain map.** Draw the Union line as a fishhook: Culp's Hill at the hook, Cemetery Hill at the bend, Cemetery Ridge as the long shank, and Little Round Top and Big Round Top at the end. Draw the town of Gettysburg above it, the Confederate line on Seminary Ridge across from it, and an arrow for Pickett's Charge toward the grove of trees.

2. Copy the first sentence of the Gettysburg Address: “Four score and seven years ago our fathers brought forth on this continent, a new nation, conceived in Liberty, and dedicated to the proposition that all men are created equal.”

Did you know? “Four score and seven” means 87, because a score is 20. Lincoln was counting back from 1863 to 1776, the year of the Declaration of Independence. Another speaker, Edward Everett, spoke for about two hours that day, but it is Lincoln’s two minutes that everyone remembers. Joshua Chamberlain later received the Medal of Honor for Little Round Top.

Goes deeper in. History, the American unit on the Civil War (coming soon); and Literature, for memorizing and reciting the Gettysburg Address.

For families. Total losses are usually given as about 46,000 to 51,000 killed, wounded, captured and missing. Pickett’s Charge numbers are usually given as about 12,500 to 13,000 men, with losses of roughly half or more. The 15th Alabama, led by Col. William C. Oates, attacked the 20th Maine. Lee’s words “It is all my fault” are recorded by witnesses, including British observer Arthur Fremantle. The address quotations follow the Bliss copy (about 272 words). The cyclorama includes battle scenes and some fallen soldiers seen at a distance; preview the section you show, near the copse of trees. The secession declarations of South Carolina, Mississippi, Georgia and Texas name slavery as the central cause of secession (see Stop D4).

PRACTICE

1. **MEDIUM Choose your move.** You are Colonel Chamberlain at the end of the Union line on Little Round Top. You have been told to hold at all costs. Your men are almost out of bullets, and the enemy is getting ready to charge up the hill again. Will you (a) retreat, (b) surrender, or (c) fix bayonets and charge down the hill?
2. **EASY** How many years is “four score and seven”?
3. **MEDIUM** Why was the high ground such a help to the Union army?

Make it a game • Swing the Door. Players hold hands in a line. The player at one end stands still like a door hinge. On “Swing!” the line walks forward together and swings around the hinge like a door closing, the way the 20th Maine swung down the hill. Try to keep the line straight. Walk, don’t run.

Scripture. “Greater love hath no man than this, that a man lay down his life for his friends.” (John 15:13, KJV)

Lincoln honored the men who “gave their lives” at Gettysburg. Jesus spoke these words about the greatest love, and He showed it by laying down His own life for us.

Practice: answers

1. Chamberlain chose (c). His men charged down the hill, the attackers were driven back, and Little Round Top was held.
2. 87 years (a score is 20).
3. From the hills they could see farther, and the Confederates had to climb or cross open ground to reach them.

3.8 APPOMATTOX (1865): GRANT'S TERMS AND LEE'S SURRENDER

OBJECTIVES

- Find Richmond, Petersburg and Appomattox Court House on a map of Virginia.
- Tell how Lee's army was trapped and why he chose to surrender.
- Name two of the generous terms Grant gave Lee's soldiers.

Warm-up. Shake hands with someone in your family and look them in the eye. Now say something kind to them. When two generals who had fought for four years met at Appomattox, they shook hands and spoke kindly to each other.

Video slot. Video coming. The surrender at Appomattox Court House, April 9, 1865, for young viewers: Grant, Lee and the McLean House. Search approved channels (National Park Service, American Battlefield Trust, Simple History); preview first.

KEY TERMS

surrender

To give up and stop fighting.

terms

The rules both sides agree to when a battle or war ends.

parole

A soldier's promise not to fight again, given in return for being let go home.

Robert E. Lee

The general of the Confederate Army of Northern Virginia.

CORE IDEAS

The map. By the spring of 1865, the war that began when Southern states left the Union to protect slavery had lasted four years. Grant's army had surrounded Petersburg, the city that guarded Richmond, for nine months. On April 2, Lee's thin lines broke. His hungry army slipped away west, hoping to reach trains loaded with food at Appomattox Station and then turn south.

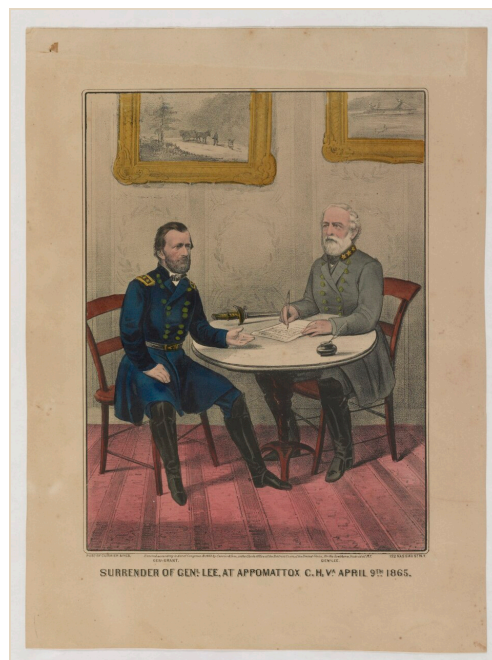
The plan. Grant did not let them go. Union horsemen under General Philip Sheridan raced ahead and reached the station first. On the morning of April 9, Lee's men tried to break through, but behind the horsemen stood long lines of Union foot soldiers. The Confederate army was surrounded on three sides. Lee said that there was nothing left for him to do but to go and see General Grant, though he would rather die a thousand deaths.

The people. The two generals met that afternoon in the parlor of Wilmer McLean's brick house in the village of Appomattox Court House. **Robert E. Lee** came in his finest gray uniform with a sword at his side. Ulysses S. Grant came in a muddy private's coat with a general's straps on the shoulders. They talked about old times in the army in Mexico, and then got down to business.

Grant's terms. Grant's **terms** were kind. Lee's soldiers would give up their guns, sign a **parole** and go home, and they would not be put in prison or on trial. Officers could keep their swords and horses. When Lee mentioned that many of his soldiers owned their own horses, Grant said any man who claimed a horse or mule could take it home for the spring planting. He also sent food for 25,000 hungry men. Lee said the terms would have "a very happy effect" on his army.

Why it mattered. When the news spread, Union soldiers began to cheer and fire salutes, but Grant stopped them: "The war is over; the rebels are our countrymen again." Three days later, as Lee's men marched up to lay down their guns, Union General Joshua Chamberlain, the hero of Little Round Top, ordered his soldiers to salute them, and the Confederates saluted back. Other Southern armies soon surrendered, slavery was ended, and the nation began to heal. Five days after Appomattox, President Lincoln was shot, and he died the next morning.

PICTURE STUDY



*Surrender of Genl. Lee, at Appomattox C.H. Va. April 9th 1865, Currier & Ives, 1865 · Hand-colored lithograph · Library of Congress
Wikimedia Commons · Public domain*

Currier & Ives made this print very soon after the surrender so families could hang it on their walls. The artists were not in the room, so they had to imagine it. Some of the details are not quite right.

Look closely

- Find General Lee in gray and General Grant in blue.
- Count the officers watching. Are they on one side or both?
- Look at how Grant is dressed in the print. Is it the muddy private's coat from the true story?

Talk about it

1. Why do you think the artists made both generals look so fine and calm?
2. How do the faces show that the war is ending?

HANDS-ON: TABLETOP APPOMATTOX: TRAPPED, THEN TERMS

Set up Lee's last march and see how he was trapped. Then set up the McLean parlor and act out the surrender.

You will need

- A strip of paper or yarn (the road west from Petersburg)
- A small box (Appomattox Station) and another box (the McLean house)
- Blocks or toy soldiers in gray and blue, including a few horses if you have them
- Two chairs and a small table, paper and a pencil

Steps

1. Lay the road across the table. Put Petersburg at one end and Appomattox Station at the other.
2. March Lee's gray army along the road. March the blue horsemen along a different road beside it and get them to the station first. Put blue foot soldiers right behind them.
3. Bring more blue soldiers up behind Lee. How many sides is Lee's army trapped on?
4. Now set up two chairs and a table for the McLean parlor. One person is Grant, one is Lee. Grant writes the terms on paper; Lee reads them and they shake hands.

Check your work

- I showed how the Union got ahead of Lee to the station.
- We acted out the meeting in the McLean parlor.
- I can name two of Grant's terms.

FIELD NOTEBOOK

1. **Terrain map.** Draw a road running from Petersburg on the right side of your page to Appomattox Station on the left. Draw Lee's army on the road, Union horsemen blocking the road ahead, and Union soldiers coming from behind. Mark the village of Appomattox Court House and the McLean house with a little square.
2. Write two of Grant's terms in your own words.

Did you know? Wilmer McLean had once lived beside Bull Run, where the first big battle of the war was fought (Stop D4). He moved to Appomattox to get away from the war, and the war ended in his parlor. Grant's military secretary, Ely Parker, a Seneca Indian, wrote out the final copy of the terms in his fine handwriting.

Goes deeper in. History, the American unit on the Civil War and Reconstruction (coming soon).

For families. Lee surrendered about 28,000 men, who were paroled. The terms letter says officers and men may "return to their homes, not to be disturbed by United States authority so long as they observe their paroles and the laws in force where they may reside." Lee's "rather die a thousand deaths" and Grant's "the rebels are our countrymen again" are reported in the memoirs and accounts of those present (Grant's Personal Memoirs). The formal laying down of arms was April 12, 1865; Chamberlain's salute and John B. Gordon's return of it come from Chamberlain's own account. The Thirteenth Amendment, ending slavery, was ratified in December 1865. Lincoln was shot on April 14 and died on April 15. The secession declarations named slavery as the central cause of secession (see Stop D4). The Currier & Ives print is an imagined scene.

PRACTICE

1. **MEDIUM Choose your move.** You are General Grant. Lee's army is trapped and he has asked to surrender. Will you (a) send all his soldiers to prison camps, (b) take their guns, let them sign a promise not to fight again and go home, keeping their horses for planting, and send them food, or (c) make them march to Washington in a victory parade?
2. **EASY** In whose house did Grant and Lee meet?
3. **EASY** Why did Grant let Lee's men take their horses and mules home?

Make it a game • The Salute. Players make two lines facing each other across the room. One line marches slowly past the other. As they pass, the standing line salutes them, and the marching line salutes back. Then switch. Do it slowly and quietly, with respect, the way Chamberlain's soldiers did on April 12, 1865.

Scripture. "Blessed are the peacemakers: for they shall be called the children of God." (Matthew 5:9, KJV)

Grant fought hard to win, but when the fighting ended he chose kindness. Making peace with those who were once enemies is a blessed work.

Practice: answers

1. Grant chose (b). He wanted the soldiers to go home in peace and the country to be one again.
2. Wilmer McLean's house, in the village of Appomattox Court House.

3. So they could plow and plant their farms in the spring.

TRACK 3 BADGE QUIZZES

The badge quizzes are optional. Read each question aloud; the child may answer by talking, pointing or drawing. Four right out of five earns each badge. Badges and the certificate are earned by doing the stops, not by scores.

Badge quiz 1 (Stops 1–5)

1. At Waterloo, where did Wellington hide most of his soldiers, and whose army came to help him?
2. What did Andrew Jackson build from the river to the swamp at New Orleans?
3. What did the Texians shout at San Jacinto?
4. How did Thomas Jackson get the name “Stonewall”?
5. What was special about the Monitor’s guns?

Badge quiz 2 (Stops 6–8)

6. On what day did Vicksburg surrender, and what river did the Union then hold?
7. What did Colonel Chamberlain and the 20th Maine do when they ran low on bullets on Little Round Top?
8. How does the Gettysburg Address begin?
9. Where did Grant and Lee meet to end the fighting?
10. Name one kind thing Grant’s terms allowed Lee’s soldiers.

TRAIL CERTIFICATE: MY BATTLE MAP BOOK AND TRAIL D CERTIFICATE

Gather the terrain maps from this trail into one booklet: “My Battle Map Book: The Nineteenth Century,” with your name and dates. Add a timeline page with all eight battles in order, from Waterloo (1815) to Appomattox (1865).

Copy the first sentence of the Gettysburg Address on its own page in your best handwriting, and say it from memory to your family.

Pick one person from the trail (Wellington, Andrew Jackson, Sam Houston, Stonewall Jackson, John Worden, Grant, Chamberlain or Lee) and write or tell one sentence about a virtue they showed: courage, patience, faith, perseverance or mercy.

When the booklet is done, a parent signs the Trail D certificate.

- **Eight maps:** A labeled terrain map for each battle, with a title and a date.
- **Timeline:** The battles are placed in the right order with their years.
- **Virtue and words:** One person’s virtue is named and explained, and the first sentence of the Gettysburg Address is copied or recited.
- **Care:** Maps are neat and labeled.

Answer key

1. Just behind the top of a ridge; the Prussians, under Blücher.

2. A long wall of mud (a rampart) behind an old canal.
3. "Remember the Alamo! Remember Goliad!"
4. He and his men stood firm on Henry House Hill at Bull Run, "like a stone wall."
5. They were in a round turret that could turn in any direction.
6. July 4, 1863; the Mississippi River.
7. They fixed bayonets and charged down the hill.
8. "Four score and seven years ago ..."
9. In Wilmer McLean's house at Appomattox Court House, Virginia.
10. Any one: to go home on parole; to keep their horses and mules for planting; officers to keep their swords; food for the hungry men.