

SCHOOL LAUNCH • EXPLORE TRACKS

EXPLORE TRAVEL AND FARAWAY PLACES • RANGER

Track 8 of the Explore Tracks at the Ranger level: four trails for young travelers who are ready for more facts, real maps, figures and notebook entries about reading the world, planning a trip, great journeys of history, and an armchair tour of faraway places.

First edition

But ye shall receive power, after that the Holy Ghost is come upon you: and ye shall be witnesses unto me both in Jerusalem, and in all Judæa, and in Samaria, and unto the uttermost part of the earth.

Acts 1:8 (KJV)

COURSE GUIDE

Explore Tracks are for children who want more of what they love. Each track is a set of short, stand-alone stops. At the Ranger level every stop adds to the story: more facts and figures, a map or labelled diagram, a picture to study closely, a hands-on task, a game, and a short written entry in the Travel Journal.

The Travel track has four trails of eight stops. Trail A reads the world: why every flat map stretches the globe, how latitude and longitude fix a place, how to work a map scale and a time-zone chart, and how mapmakers from Ptolemy to Mercator drew the earth. Trail B plans a real-feeling trip, with a reasoned choice of destination, a costed budget, a day-by-day itinerary, a one-bag packing list, passports and currency, courtesy abroad and staying safe. Trail C follows great journeys on the map, from Abraham's road out of Ur and Paul's missionary journeys to Marco Polo, Columbus, Lewis and Clark, Isabella Bird, Nellie Bly and Amelia Earhart. Trail D takes an armchair tour from Jerusalem and Rome to Mount Fuji and the Grand Canyon, and ends with a set of postcards written from every stop.

Along the way the Ranger measures distances with a scale bar, works out the time in Tokyo, converts dollars to euros, reads the journals of real explorers, and learns what the Bible says about the Lord who goes with His people to the uttermost parts of the earth.

WHO IT IS FOR

Written for children about ages 10–13 who read on their own and can write a paragraph. Younger brothers and sisters working at the  Scout level, and older ones at the  Expert level, can do the same stops together, each at their own depth. No trip is needed. Nothing earlier is required.

HOW TO USE THIS COURSE

1. **One stop at a time.** A stop takes 20–30 minutes: read the story, study the picture or map, do the hands-on part, play the game and write the journal entry. Two or three stops a week works well.
2. **Any order.** The four trails are independent, and every stop stands on its own, though Trail A's map skills make the other trails richer.
3. **Travel Journal.** Each stop ends with a short entry: a labelled map, a table, a sketch or a paragraph in the child's own words. Each trail builds something: a hand-drawn map of your town, a full trip plan with budget, itinerary and packing checklist, a map of Paul's journeys and a timeline of great travelers, or a postcard set from the armchair tour. A parent signs each trail certificate.
4. **Goes deeper in.** Each stop names the School Launch course that covers the same ground in full, most often Geography (Grade 4, Grade 8, or Technology Overcoming Geography), and also History, Earth Science, Small Business & Economics, Arithmetic, Art or Literature.

5. **Badge quizzes.** Each trail has a short, optional quiz, oral or written. They are for review and fun, not grades.

SCOPE AND SEQUENCE

Trail 1: Travel and Faraway Places 🗺️ **Trail A: Reading the World** (Self-paced)

Trail 2: Travel and Faraway Places 🗺️ **Trail B: Planning a Trip** (Self-paced)

Trail 3: Travel and Faraway Places 🗺️ **Trail C: Great Journeys** (Self-paced)

Trail 4: Travel and Faraway Places 🗺️ **Trail D: Armchair Tour of Faraway Places** (Self-paced)

MATERIALS

- **Travel Journal (a sketchbook or composition book)** One for the whole track.
- **Colored pencils, a ruler, string, scissors, glue, envelopes and index cards** For maps, measuring routes, pressed tickets and postcards.
- **A globe, a world atlas and a road map of your state** Library atlases and free printed maps work well; printable outline maps are fine too.
- **A calculator** For scale, time-zone, budget and currency figures.
- **A small bag or backpack (optional)** For the one-bag packing challenge.
- **A Bible (KJV)** For the verse at each stop.

GRADING

Explore Tracks are not graded. A Ranger stop is done when the child has read the story, done the hands-on part and written a journal entry that is neat, labelled and in his or her own words.

Badges and trail certificates are earned by finishing the stops.

- Every five stops earns a printable badge; finishing a trail earns a certificate.

A NOTE TO PARENTS

You do not need to be a traveler. Let the child read the story, then talk it over: “What did you learn? What would you have packed? What would you ask the traveler who was there?” Each stop has a short *For families* note with sources and any facts that are uncertain or disputed.

Safety: no stop requires a real trip. Trail B plans a pretend trip with sample prices; if you do travel, the safety stop’s rules for staying together and knowing what to do if separated are worth practicing first. Map walks around the neighborhood should be done with an adult, and no child should share real travel plans or personal details online.

Money: the budget and currency stops use sample prices to learn what a trip really costs. Nothing in the track involves real buying or selling; if a child turns a project (such as

postcards or hand-drawn maps) into a sale, a parent should approve it first.

Scripture is quoted from the King James Version and read as true; the journeys of Abraham and Paul are told as real history. Explorers are told plainly and judged by the standards of their own day: Columbus's seamanship and courage and his real wrongs in the Caribbean are both named, and Sacagawea's part in the Lewis and Clark expedition is drawn from the expedition's journals, with uncertain details (such as her birth year and the spelling of her name) marked as uncertain. Hardship and danger on the road are told without graphic detail.

Pictures are public-domain works by Claude Lorrain, Canaletto, Thomas Moran, Albert Bierstadt and Hokusai, along with old maps such as the Hereford Mappa Mundi and historic photographs. Explorers' journals and older travel books in the public domain are quoted; copyrighted travel books are summarized, not quoted; borrow them from the library.

CONTENTS

Trail 1: Travel and Faraway Places 🗺️ **Trail A: Reading the World**

- 1.1 Globe and Map: Why Maps Stretch
- 1.2 The Compass Rose and Cardinal Directions
- 1.3 Latitude and Longitude
- 1.4 Scale and Distance
- 1.5 Time Zones
- 1.6 Reading a Road Map and a Subway Map
- 1.7 Old Maps: Ptolemy, the Hereford Mappa Mundi and Mercator
- 1.8 Draw a Map of Your Town

Trail 2: Travel and Faraway Places 🗺️ **Trail B: Planning a Trip**

- 2.1 Choose a Destination and Why
- 2.2 Getting There: Train, Car, Ship or Plane
- 2.3 A Budget: Travel, Rooms, Food, Extras
- 2.4 An Itinerary, Day by Day
- 2.5 Packing Lists and the One-Bag Challenge
- 2.6 Passports, Customs and Currency
- 2.7 Courtesy Abroad: Greetings, Manners and Being a Good Guest
- 2.8 Safety and Staying Together

Trail 3: Travel and Faraway Places 🗺️ **Trail C: Great Journeys**

- 3.1 Abraham Leaves Ur
- 3.2 Paul's Missionary Journeys
- 3.3 Marco Polo to China
- 3.4 Columbus Crosses the Atlantic, 1492
- 3.5 Lewis and Clark, with Sacagawea
- 3.6 Isabella Bird in the Rockies, 1873
- 3.7 Nellie Bly Around the World in 72 Days
- 3.8 Amelia Earhart over the Atlantic, 1932

Trail 4: Travel and Faraway Places 🗺️ **Trail D: Armchair Tour of Faraway Places**

- 4.1 The Holy Land: Jerusalem, Bethlehem, Galilee
- 4.2 Rome and the Colosseum
- 4.3 London and the Tower
- 4.4 Paris and the Eiffel Tower
- 4.5 The Swiss Alps
- 4.6 Egypt and the Pyramids
- 4.7 Japan and Mount Fuji
- 4.8 America's National Parks: Yellowstone and the Grand Canyon

Trails may be done in any order.

TRAVEL AND FARAWAY PLACES TRAIL A: READING THE WORLD

The first trail of the Travel track teaches the skills every traveler needs before leaving home: why every flat map stretches the round earth, the compass rose and the four directions, latitude and longitude, map scale and distance, time zones, road maps and subway maps, three great maps from history (Ptolemy, the Hereford Mappa Mundi and Mercator's map of 1569), and finally how to survey and draw a map of your own town.

This is the  **Ranger** level, for ages 10 to 13. The student reads each stop alone, in about 25 to 35 minutes, then does the project, a map or diagram, and a short written paragraph in the Field Notebook. Practice questions have answers for checking. Every stop stands by itself, and the maps and diagrams become the first section of the student's **travel journal** for the whole track.

Five stops earn the **Travel Ranger badge, part 1**; eight stops earn part 2 and the **Trail A certificate**.

BEFORE YOU BEGIN

- Read a page of about 500 words alone and write a paragraph about it.
- Multiply and divide whole numbers, and measure with a ruler and protractor.

MASTERY CHECKLIST

- ☐ I can explain why every flat map stretches something and compare a Mercator map with a globe.
- ☐ I can give directions as compass points and as bearings in degrees, and tell true north from magnetic north.
- ☐ I can find a place by latitude and longitude and explain how John Harrison solved the longitude problem.
- ☐ I can use a map scale, a legend and an index to measure distance and plan a route, and work out the time in another time zone.
- ☐ I have surveyed by pacing and drawn a labeled map of my town with all six TODALS parts.

OPTIONAL BOOKS AND RESOURCES

- **Library of Congress, Geography and Map Division** (<https://www.loc.gov/maps/>): Free high-resolution maps: Ptolemy editions, Ogilby's Britannia, Braun and Hogenberg, Sanborn town maps. Good for Stops A6–A8.
- **Royal Museums Greenwich** (<https://www.rmg.co.uk>): John Harrison's sea clocks, the prime meridian and the history of time. For Stops A3 and A5.

- **The Mappa Mundi Trust and Hereford Cathedral**
(<https://www.themappamundi.co.uk>): An interactive Hereford Mappa Mundi with close-ups and explanations. For Stop A7.
- **U.S. Geological Survey topoView** (<https://ngmdb.usgs.gov/topoview/>): Free topographic maps of your own area, old and new, for scale (Stop A4) and your town map (Stop A8).
- **NOAA Magnetic Field Calculators**
(<https://www.ngdc.noaa.gov/geomag/calculators/magcalc.shtml>): Find the magnetic declination for your town. For Stop A2.

1.1 GLOBE AND MAP: WHY MAPS STRETCH

OBJECTIVES

- Explain why no flat map can show the round earth without stretching or squeezing something.
- Name the four things a map projection can bend: shape, area, distance and direction.
- Compare Greenland and Africa on a Mercator map and on a globe, and say which is true.

Warm-up. Draw a rough circle on an orange or clementine with a marker, then peel it in as few pieces as you can. Try to press the peel flat on the table. Can you make it lie flat without tearing or squashing it? Keep the peel for the project.

Video slot. Video coming. Why every flat map of the earth is distorted; map projections; the Mercator map and the true size of Greenland and Africa. Search approved channels (National Geographic Education, Royal Museums Greenwich, Library of Congress, Homeschool Pop); preview first.

KEY TERMS

globe

A ball-shaped model of the earth. It is the only map that shows shape, size, distance and direction all correctly at once.

map projection

A mapmaker's rule for moving every place from the curved earth onto a flat sheet.

distortion

The stretching, squeezing or bending that happens when the round earth is drawn flat.

equal-area projection

A map that keeps every land at its true size compared with the others, though shapes get squeezed.

hemisphere

Half of the earth, such as the Northern Hemisphere (north of the equator) or the Western Hemisphere.

CORE IDEAS

The earth is a ball, very nearly a sphere, about 7,900 miles across and about 24,900 miles around at the equator. Educated people have known it was round for more than two thousand years. Around 240 B.C. a Greek scholar in Egypt named **Eratosthenes** measured the shadows of the sun in two cities and worked out the size of the earth surprisingly well. The oldest **globe** that still survives was made in Nuremberg, Germany, in 1492 by Martin

Behaim. It was finished just before news of Columbus's voyage reached Europe, so it has no Americas on it at all.

A globe is the truest map there is. But globes are awkward. You cannot fold one into a pocket. You can see only one **hemisphere** at a time. To show your own street, you would need a globe bigger than a house. So for most work we use flat maps, and every flat map of the world is made with a **map projection**: a rule for moving each point from the curved earth onto paper. Picture a lamp inside a glass globe, throwing the shadows of the continents onto a sheet of paper wrapped around it.

Your orange peel shows the problem. A curved surface cannot lie flat unless it tears, squashes or stretches. In 1827 the German mathematician Carl Friedrich Gauss proved this for certain: no flat map of a sphere can keep every distance true. Every world map has **distortion**. A mapmaker must choose what to keep right, whether shape, area, distance or direction, and what to let bend.

The most famous choice is the Mercator projection. It keeps the shapes of small areas and the compass directions true, which made it wonderful for sailors. But it stretches lands more and more the farther they are from the equator. On a Mercator map Greenland looks about as big as Africa. In truth Africa (about 11.7 million square miles) is roughly **14 times** bigger than Greenland (about 836,000 square miles). Alaska looks larger than Mexico, though Mexico is bigger. Antarctica becomes a huge white band across the whole bottom of the map.

An **equal-area projection** makes the opposite choice. Every land keeps its true size, but shapes get squeezed: Africa and South America look long and thin, and the lands near the poles are flattened. Many atlases use compromise maps that bend a little of everything. The Robinson projection (1963) was used by the National Geographic Society from 1988, and in 1998 the Society switched to the Winkel Tripel projection.

No projection is "wrong." Each is a tool for a job, as a hammer and a saw are both good tools for different work. A wise map reader always asks two questions: *What is this map for?* and *What does this map stretch?* And when you want to know how big a country really is, or how far apart two cities are, go back to the globe.

PICTURE STUDY



The Geographer, Johannes Vermeer, c. 1669 · Oil on canvas · Städel Museum, Frankfurt, Germany
Wikimedia Commons · Public domain

Johannes Vermeer lived in Delft in the Netherlands, when Dutch mapmakers led the world and atlases printed in Amsterdam were sold all over Europe. Here a scholar pauses in his work. He has a globe for the whole world and flat charts for the details. Art historians think the globe in the painting shows a real Dutch globe of the time.

Look closely

- Find the globe. Where is it, and which way is it turned?
- Find the dividers in his hand. Mapmakers used them to measure distances on a map.
- Find where the light comes from. What does it fall on most brightly?

Talk about it

1. Why would a geographer need both a globe and flat maps?
2. What do you think he has just noticed as he looks out the window?

HANDS-ON: THE ORANGE-PEEL PROJECTION

Make your own “projection” from an orange and see the distortion with your own eyes. Then draw a labeled diagram of what happened.

You will need

- An orange or large clementine (a fresh one if your warm-up peel is in pieces)
- A fine washable marker
- A globe or world atlas

- Plain paper, a pencil and a ruler

Steps

1. Look at the globe. On the orange, draw a line around the middle for the equator, then sketch rough shapes of Africa, South America and Greenland in about the right places.
2. Score the peel with a butter knife from top to bottom into four to six sections, joined at the equator. (Ask a grown-up to help with the knife.)
3. Peel it carefully and press it flat on the paper. Trace around the outside.
4. Look at your traced shapes. Which ones split apart? Which stretched? Which stayed most like the drawing on the orange?
5. Make your diagram: draw the flattened peel, label the equator, the gaps, and the place where shapes stretched most. Title it “My Orange-Peel Projection” and add one sentence saying where the distortion is worst.

Check your work

- My diagram shows the flattened peel with the equator labeled.
- I labeled at least one gap and one stretched place.
- I can say why the lands near the poles changed most.

TRAVEL JOURNAL

1. **Map or diagram: True size.** Draw Greenland and Africa side by side as they look on a Mercator map (about the same size). Beside them, draw them at true size: Africa about 14 times the area of Greenland. Label each pair “Mercator” and “True size (globe).”
2. **Notebook entry.** In one paragraph, explain why every flat map stretches something. Then say which kind of map you would give to a sailor steering by compass, and which you would use to compare the sizes of countries, and why.

Did you know? Many online street maps use a version of the Mercator projection when you zoom in close, because it keeps streets meeting at true right angles. In 2018 Google Maps on desktop computers began showing a 3-D globe when you zoom all the way out, so Greenland no longer looks as big as Africa.

Map or diagram. Lay a string across Greenland on a globe and mark its length. Then do the same on a flat world map in an atlas, using the atlas scale. Compare how the two maps treat Greenland.

Goes deeper in. Geography, Grade 4, “Maps and Globes,” and Geography, Grade 8, “Map Projections” (coming soon). Arithmetic, “Area,” for comparing sizes.

For families. Sources: National Geographic Society on projections (Robinson adopted 1988, Winkel Tripel 1998); Germanisches Nationalmuseum, Nuremberg, for the Behaim globe (1492); Britannica on Eratosthenes and on Gauss’s Theorema Egregium (1827). Areas are rounded: Africa about 11.7 million sq mi (30.4 million km²), Greenland about

836,000 sq mi (2.17 million km²). The identification of the globe in Vermeer's painting with a particular Hondius globe is the view of many art historians and is left general here.

PRACTICE

1. **EASY** What is the only kind of map that shows shape, size, distance and direction all correctly at once?
2. **EASY** What is a map projection?
3. **MEDIUM** On a Mercator map Greenland looks about as big as Africa. About how many times bigger is Africa really?
4. **MEDIUM** Why does the Mercator map stretch Greenland and Antarctica so much more than Brazil or Kenya?
5. **CHALLENGE** A globe is 12 inches across. About how many inches is it around the equator (use 3.14 for pi)? If the real equator is about 24,900 miles, about how many miles does each inch of the globe's equator stand for?

Make it a game • Stretched or True?. One player names a map and a thing, such as "Mercator map, size of Greenland" or "globe, shape of Africa." Everyone else stretches their arms wide if the map stretches it, or stands straight and still if the map keeps it true. Anyone who guesses wrong becomes the next caller.

Scripture. "It is he that sitteth upon the circle of the earth, and the inhabitants thereof are as grasshoppers; that stretcheth out the heavens as a curtain, and spreadeth them out as a tent to dwell in:" (Isaiah 40:22, KJV)

Our maps must stretch and squeeze the world to fit it on a page. God, who made the earth and sits above it, sees the whole of it at once, true and without distortion.

Practice: answers

1. A globe.
2. A rule for moving places from the curved earth onto a flat map.
3. About 14 times bigger.
4. Mercator stretches lands more the farther they are from the equator. Greenland and Antarctica are near the poles; Brazil and Kenya lie on or near the equator.
5. $12 \times 3.14 \approx 37.7$ inches around. $24,900 \div 37.7 \approx 660$ miles per inch.

1.2 THE COMPASS ROSE AND CARDINAL DIRECTIONS

OBJECTIVES

- Name the cardinal and intermediate directions and give each as a bearing in degrees.
- Explain how a magnetic compass works and how magnetic north differs from true north.
- Find north without a compass, using the sun by day or the North Star by night.

Warm-up. Go outside or to a window. Point to where the sun rose this morning and to where it will set tonight. Now turn so the sunrise is on your right hand. Which way are you facing?

Video slot. Video coming. How a magnetic compass works; the compass rose; true north and magnetic north; finding the North Star with the Big Dipper. Search approved channels (Royal Museums Greenwich, National Geographic Education, NOAA, Homeschool Pop); preview first.

KEY TERMS

cardinal directions

The four main directions: north, east, south and west.

intermediate directions

The directions halfway between the cardinal ones: northeast, southeast, southwest and northwest.

compass rose

A star-shaped drawing on a map that shows the directions.

magnetic north

The place in the far north toward which a compass needle points. It is not exactly at the North Pole, and it slowly moves.

bearing

A direction given in degrees, counted clockwise from north: north is 0°, east 90°, south 180°, west 270°.

CORE IDEAS

The four **cardinal directions** are not made up; they come from the spinning earth. North and south point to the two ends of the earth's axis, the North and South Poles. East is the way the earth turns, which is why the sun appears to rise in the east and set in the west. Between them lie the **intermediate directions**: northeast, southeast, southwest and northwest. Sailors divided the circle still finer, into 32 "points," and a young sailor who could recite them all in order was said to be able to "box the compass."

A **compass rose** is the star-shaped drawing on a map that shows these directions. It is called a rose because its points spread out like the petals of a flower. The **Catalan Atlas**, made on the island of Majorca around 1375, has the earliest known ornate compass rose drawn on a map. On many old charts the north point was marked with a fleur-de-lis, a lily shape, and the east point was sometimes marked with a cross, toward the Holy Land. Straight lines spread out from the rose across the sea so that a navigator could lay a ruler along one and set a course.

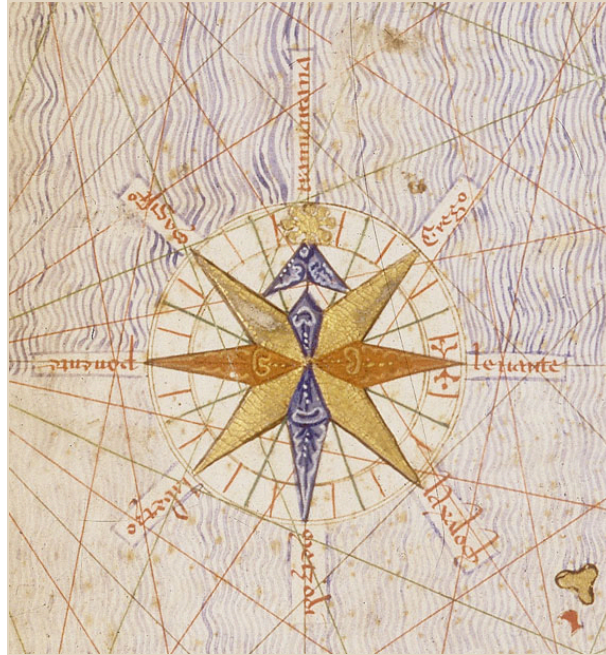
How do we find north at sea under a cloudy sky? With a magnetic compass. The earth acts like a giant magnet, and a magnetized needle that is free to turn will swing to line up roughly north and south. The Chinese scholar Shen Kuo described such a needle in 1088. About a century later, around 1190, the English scholar Alexander Neckam wrote of sailors in Europe using a needle to find their way.

There is a catch. A compass points to **magnetic north**, not to the true North Pole. In 1831 the explorer James Clark Ross reached the north magnetic pole in the islands of northern Canada. Since then it has wandered hundreds of miles, out across the Arctic Ocean toward Siberia. The angle between true north and magnetic north where you stand is called the *declination*. In parts of the United States it is more than 10 degrees, enough to put a hiker far off course over a few miles. Good topographic maps print the declination in the margin.

Navigators, pilots and hikers give directions as a **bearing**, in degrees clockwise from north. North is 0°, east 90°, south 180° and west 270°; northeast is 45°. Airport runways are named this way: runway 27 points to about 270°, due west, and its other end is runway 9, pointing east.

You can also find direction with no compass at all. In the United States, the midday sun stands in the southern part of the sky, so at noon your shadow points north. At night, find the Big Dipper; the two stars at the end of its bowl, called the pointers, lead to **Polaris**, the North Star, which sits almost exactly above the North Pole. Travelers and sailors have trusted it for thousands of years.

PICTURE STUDY



The Catalan Atlas, Attributed to Cresques Abraham (Abraham Cresques) of Majorca, c. 1375 · Ink, color, gold and silver on vellum panels · Bibliothèque nationale de France, Paris
Wikimedia Commons · Public domain

This great medieval map was made on the island of Majorca, probably by Cresques Abraham, a Jewish mapmaker and illuminator famous for both world maps and compasses. By 1380 it was in the library of King Charles V of France. Its western panels are drawn like a sailor's chart, and there you find the first ornate compass rose known on any map.

Look closely

- Find the compass rose. Count the points you can see. Which one is marked differently from the rest?
- Follow one of the thin straight lines across the sea. Where does it lead?
- Find a ship or a painted city. Why might the mapmaker add pictures to a chart?

Talk about it

1. How would the straight lines have helped a sailor set a course?
2. Why do you think the mapmaker made the compass rose so beautiful, with color and gold?

Safety first. Needle safety: a sewing needle is sharp. Hold it by the middle, keep the point away from your face, and let a grown-up push it through the cork. Put the needle back in a pincushion when you finish.

HANDS-ON: MAKE A FLOATING COMPASS AND A 16-POINT COMPASS ROSE

Build a working compass like the first sailors' compasses, then draw a compass rose with degrees for your Field Notebook.

You will need

- A steel sewing needle
- A strong magnet (a refrigerator magnet works if it is strong)
- A thin slice of cork, a bottle cap or a small leaf
- A shallow bowl of water (not metal)
- Paper, a ruler, a protractor and colored pencils

Steps

1. Stroke the needle with one end of the magnet 40 times, always in the same direction, lifting the magnet away at the end of each stroke.
2. With a grown-up's help, push the needle through the cork slice (or lay it on top), and float it in the middle of the bowl, away from metal.
3. Watch it turn and settle. Check which end points north using the noon shadow or a phone compass, and mark that end with a dot of marker.
4. Now draw your compass rose: a circle about 4 inches across. With the protractor, mark N at 0°, NE 45°, E 90°, SE 135°, S 180°, SW 225°, W 270°, NW 315°.
5. Add the eight in-between points (NNE 22.5°, ENE 67.5° and so on). Draw long points for the cardinal directions, medium ones for the intermediate, short ones for the rest. Mark north with a fleur-de-lis. Label every point with its letters and its bearing.

Check your work

- My floating needle turned to line up north and south.
- My compass rose has 16 points, each labeled with letters and degrees.
- North is marked with a fleur-de-lis.

TRAVEL JOURNAL

1. **Map or diagram.** Glue in or copy your 16-point compass rose. Beside it, draw a small arrow labeled "true north" and a second arrow a little to one side labeled "magnetic north," with the angle between them labeled "declination."
2. **Notebook entry.** In one paragraph, explain the difference between true north and magnetic north, and why a hiker or sailor must know it.

Did you know? If you walk north long enough you reach the North Pole, and then every step is south. But if you walk east you never reach a place where east turns into west. You can keep going east forever around the world.

Map or diagram. Find three maps in your house or library: a road map, a park map and an atlas page. Does each have a compass rose or a north arrow? Is north at the top on all three?

Goes deeper in. Geography, Grade 4, “Maps and Globes,” and Earth Science, “Earth’s Magnetism” (coming soon).

For families. Sources: Bibliothèque nationale de France and Britannica on the Catalan Atlas (dated c. 1375; some scholars place it a few years later; attribution to Cresques Abraham is probable, not certain); NOAA National Centers for Environmental Information on magnetic declination and the drifting north magnetic pole; Britannica on Shen Kuo (1088) and Alexander Neckam (c. 1190). Runway numbers follow magnetic bearings rounded to the nearest 10°. Declination changes with place and year; check NOAA’s free online calculator for your town.

PRACTICE

1. **EASY** Name the four cardinal directions in clockwise order, starting with north.
2. **EASY** What direction is halfway between south and west?
3. **MEDIUM** What is the bearing of southeast? Of northwest?
4. **MEDIUM** You are in Kansas at noon on a sunny day. Which way does your shadow point, and why?
5. **CHALLENGE** One end of an airport runway is numbered 9 (about 090°). What number is painted on the other end, and what direction does it face?

Make it a game • Compass Commands. Mark north on the floor with tape. A caller shouts a direction or a bearing, such as “Southwest!” or “Ninety degrees!” Everyone turns to face it. Anyone facing the wrong way sits down; the last one standing is the next caller. For a harder round, call only bearings.

Scripture. “As far as the east is from the west, so far hath he removed our transgressions from us.” (Psalm 103:12, KJV)

North and south meet at the poles, but east and west never meet; a traveler going east never turns into one going west. So when God forgives, He removes our sins completely and forever.

Practice: answers

1. North, east, south, west.
2. Southwest.
3. Southeast is 135°. Northwest is 315°.
4. North, because the midday sun is in the southern part of the sky.
5. 27, because $90^\circ + 180^\circ = 270^\circ$, which faces west.

1.3 LATITUDE AND LONGITUDE

OBJECTIVES

- Find a place on a globe or map from its latitude and longitude, and give the coordinates of a place.
- Explain why latitude can be found from the sky but longitude depends on knowing the time.
- Tell how John Harrison’s sea clocks solved the longitude problem.

Warm-up. On a checkerboard or a sheet of graph paper, the square “C5” is three across and five up. Everyone can find it. How could you give every spot on a round ball a name like that?

Video slot. Video coming. Latitude and longitude explained; the prime meridian at Greenwich; John Harrison and the longitude problem (H4 marine chronometer). Search approved channels (Royal Museums Greenwich, National Geographic Education, Science Museum London, Homeschool Pop); preview first.

KEY TERMS

latitude

How far a place is north or south of the equator, measured in degrees from 0° to 90°.

longitude

How far a place is east or west of the prime meridian, measured in degrees from 0° to 180°.

equator

The imaginary line around the middle of the earth, halfway between the poles, at 0° latitude.

prime meridian

The line of 0° longitude, running from pole to pole through Greenwich, England.

chronometer

A very accurate clock built to keep true time at sea, used to find longitude.

CORE IDEAS

Mapmakers wrap the globe in a grid of imaginary lines. Lines of **latitude**, also called parallels, circle the earth from east to west. They measure how far north or south of the **equator** a place lies: 0° at the equator, up to 90° N at the North Pole and 90° S at the South Pole. Each degree of latitude is about 69 miles. Every degree is split into 60 minutes, and one minute of latitude is one *nautical mile*, which is why ships and airplanes still measure in nautical miles.

Lines of **longitude**, called meridians, run from pole to pole. They measure how far east or west a place is from the **prime meridian**, 0° , which passes through the Royal Observatory at Greenwich, near London. They go up to 180° on the far side of the world. Because the meridians all meet at the poles, a degree of longitude is about 69 miles wide at the equator but shrinks to nothing at the poles. Coordinates give latitude first: Washington, D.C., is about 38.9° N, 77.0° W, and Jerusalem about 31.8° N, 35.2° E.

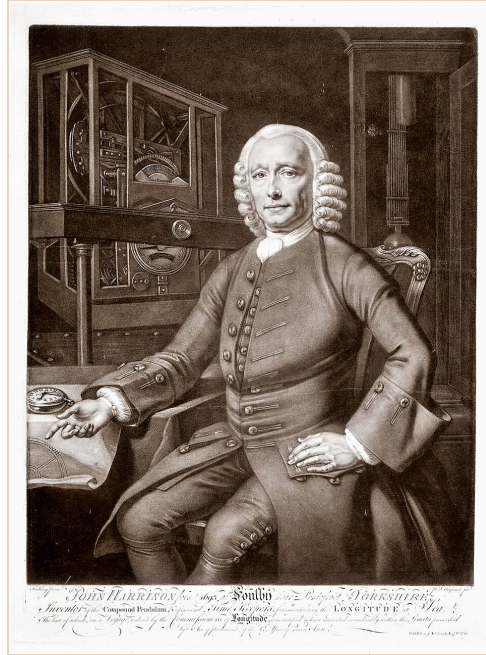
Latitude has been found from the sky for thousands of years. In the Northern Hemisphere, the height of the North Star above the horizon, in degrees, is nearly the same as your latitude. At noon, the sun's height gives it too, with the help of printed tables. Sailors measured these angles with the astrolabe and quadrant, and later with the sextant.

Longitude was far harder, because the earth spins. It turns 360° in 24 hours, which is **15° every hour**. So longitude is a question of time. If a ship's navigator knows it is noon where he is, and also knows that it is 3:00 p.m. at Greenwich, he is $3 \times 15 = 45^\circ$ west of Greenwich. But that means carrying the home port's time across the ocean, and the pendulum clocks of the 1600s could not keep time on a rolling, wet ship. Without longitude, ships ran aground. In 1707 a British fleet under Sir Cloudesley Shovell wrecked on the Isles of Scilly, and well over a thousand sailors were lost.

In 1714 the British Parliament passed the Longitude Act, offering a prize of up to £20,000, a fortune then, for a practical way to find longitude at sea. **John Harrison**, a Yorkshire carpenter who had taught himself clockmaking, spent about forty years on the problem. He built three large sea clocks, H1, H2 and H3, and then something surprising: H4, a large watch only about five inches across. On a trial voyage to Jamaica in 1761–1762 it lost only a few seconds. The Board of Longitude was slow to pay, but with help from King George III, Parliament granted Harrison a further reward in 1773. Captain James Cook carried a copy of H4 on his second great voyage (1772–1775) and praised it highly.

Today the satellites of the Global Positioning System (GPS) carry atomic clocks, and your phone finds its latitude and longitude by comparing their time signals. The longitude problem is still solved by keeping perfect time, Harrison's idea carried into space.

PICTURE STUDY



Portrait of John Harrison, Thomas King, c. 1767 · Oil on canvas · Science Museum, London
Wikimedia Commons · CC BY-SA 4.0

Thomas King painted John Harrison when he was in his seventies, near the end of his long struggle for the longitude prize. Harrison holds a watch made to his design in 1753, and in the background on the left is his third sea clock, H3. The painting honors a man who began as a village carpenter and solved one of the great problems of his age.

Look closely

- Find the watch in Harrison's hand. How does he hold it?
- Find the large clock in the background. How is it different from the watch?
- Look at his face. What does the painter tell you about him?

Talk about it

1. Why would a small watch be better on a ship than a big clock?
2. Harrison worked for about forty years on one problem. What does that tell you about him?

HANDS-ON: PLOT A VOYAGE BY COORDINATES

Use latitude and longitude to plot a real voyage on a hand-drawn grid map.

You will need

- A globe or a world atlas with latitude and longitude lines
- Graph paper and a pencil
- A ruler and colored pencils

Steps

1. Draw a grid on graph paper. Across the middle, draw a bold line and label it “Equator 0°.” Label lines above it 10° N, 20° N, 30° N, 40° N, 50° N, and below it 10° S and 20° S.
2. Down the paper, label vertical lines from 90° W on the left to 10° E on the right, every 10°. Make the 0° line bold and label it “Prime meridian (Greenwich).”
3. Plot these places with dots and labels: London (51.5° N, 0.1° W); Portsmouth (50.8° N, 1.1° W); Madeira (32.7° N, 16.9° W); Barbados (13.1° N, 59.6° W); Port Royal, Jamaica (17.9° N, 76.8° W).
4. Join Portsmouth to Madeira to Jamaica with a dotted line. This is roughly the route of H4’s trial voyage in 1761–1762. Add a compass rose and the title “The Voyage of H4.”
5. Using a globe or atlas, add your own town with its coordinates.

Check your work

- My grid has the equator and prime meridian labeled.
- Each place is plotted at the right coordinates and labeled.
- My map has a title, a compass rose and my own town.

TRAVEL JOURNAL

1. **Map or diagram.** Draw a circle for the earth. Draw and label the equator, the North and South Poles, two lines of latitude, two lines of longitude and the prime meridian. Write “parallels” beside the latitude lines and “meridians” beside the longitude lines.
2. **Notebook entry.** In one paragraph, explain why sailors could find latitude for centuries, but could not find longitude until they had a clock that kept true time at sea.

Did you know? Harrison’s H4 is about 5 inches (13 cm) across and weighs about 3 pounds. It and his first three sea clocks are kept at the Royal Observatory, Greenwich, where you can still stand with one foot in the Eastern Hemisphere and one in the Western.

Map or diagram. Look up the latitude of your town. On a clear night, hold your fist at arm’s length: one fist is about 10°. Count fists from the horizon up to the North Star. Is it close to your latitude?

Goes deeper in. Geography, Grade 4, “Latitude and Longitude,” and Geography, Technology Overcoming Geography, “The Longitude Problem” (coming soon). History, “The Age of Exploration.”

For families. Sources: Royal Museums Greenwich on John Harrison, H1–H4 and the Longitude Act (1714); Science Museum Group collection, portrait of John Harrison by Thomas King, c. 1767 (object 1884-217). The H4 trial result is given as “a few seconds” because accounts differ slightly (often about five seconds over the outward voyage of 81 days). The death toll at Scilly in 1707 is uncertain and is given as “well over a thousand.”

Coordinates are rounded. Dava Sobel's *Longitude* (1995) tells the story for older readers; it is in copyright, so it is summarized, not quoted.

PRACTICE

1. **EASY** What is the latitude of the equator? Of the North Pole?
2. **EASY** Where does the prime meridian pass?
3. **MEDIUM** About how many miles is one degree of latitude? About how far is it from the equator to 10° N?
4. **MEDIUM** Why does a degree of longitude get shorter as you go toward the poles?
5. **CHALLENGE** A navigator sees the sun at its highest (local noon). His chronometer says it is 4:00 p.m. at Greenwich. What is his longitude, and is it east or west?

Make it a game · Coordinates Hunt. One player chooses a city on a globe or atlas and reads out its latitude and longitude, rounded to the nearest degree. The others race to find it. The first to put a finger on it and name it chooses the next city.

Scripture. “If I take the wings of the morning, and dwell in the uttermost parts of the sea; Even there shall thy hand lead me, and thy right hand shall hold me.” (Psalm 139:9–10, KJV)

Sailors before Harrison could be lost on the open sea, not knowing their longitude. But no one is ever lost to God. At any latitude and longitude, His hand leads and holds His people.

Practice: answers

1. The equator is 0°. The North Pole is 90° N.
2. Through Greenwich, near London, England.
3. About 69 miles; 10° is about 690 miles.
4. Because the meridians come together and meet at the poles, so the space between them narrows.
5. 4 hours $\times$ 15° = 60°. Greenwich is later, so he is behind it: 60° W.

1.4 SCALE AND DISTANCE

OBJECTIVES

- Read a map scale written three ways: in words, as a ratio and as a bar.
- Measure a straight and a winding distance on a map and change it to real miles.
- Tell a large-scale map from a small-scale map and say what each is good for.

Warm-up. Your bedroom is real size. Draw it on a sheet of paper. How did you make it fit? Did you make everything smaller by the same amount?

Video slot. Video coming. How to read a map scale; ratio scale and bar scale; measuring distance on a map with string. Search approved channels (National Geographic Education, USGS, Ordnance Survey, Homeschool Pop); preview first.

KEY TERMS

scale

The rule that tells how much smaller the map is than the real land.

ratio scale

A scale written as two numbers, such as 1:24,000, meaning one unit on the map equals 24,000 of the same units on the ground.

bar scale

A small ruler printed on a map, marked to show real distances.

large-scale map

A map of a small area shown in great detail, such as a town or a park.

small-scale map

A map of a large area shown with little detail, such as a country or the whole world.

CORE IDEAS

Every map is smaller than the land it shows, and the **scale** tells how much smaller. Without a scale a map can show where things are, but not how far apart they are. With one, you can plan how long a walk or a journey will take.

Scales are written in three ways. A *word scale* says it plainly: “One inch equals one mile.” A **ratio scale** gives two numbers, such as 1:63,360. That means one unit on the map stands for 63,360 of the same units on the ground, and since there are 63,360 inches in a mile, it is the same as one inch to a mile. A **bar scale** is a little ruler printed on the map. The bar scale has one great advantage: if a map is enlarged or shrunk on a copier, the bar grows or shrinks with it, so it stays true, while the word and ratio scales become wrong.

Here is a puzzle that trips up many grown-ups. A **large-scale map** shows a *small* area in great detail. The U.S. Geological Survey’s classic topographic maps are 1:24,000, so one inch

is 2,000 feet; you can see single houses, streams and trails. A **small-scale map** shows a large area with little detail: a world map might be 1:30,000,000 or smaller. Think of the ratio as a fraction: $1/24,000$ is a much larger number than $1/30,000,000$, so it is the “larger” scale.

To measure a straight distance, lay a ruler between two places and multiply by the scale. If one inch is 50 miles and two cities are $3\frac{1}{2}$ inches apart, they are 175 miles apart, “as the crow flies.” Roads and rivers wind, so for them lay a piece of string along the curves, then straighten it against the ruler or the bar scale. The road will always be longer than the straight line.

Measuring land carefully is very old work. The Bible speaks of measuring lines and boundary stones. In 1620 the English mathematician Edmund Gunter designed a surveyor’s chain 66 feet long, made of 100 links. Eighty chains make a mile, and ten square chains make an acre. Surveyors in early America, George Washington among them, dragged Gunter’s chains through fields and forests, and many old property deeds still give distances in chains and links.

Once you know distance, you can work out time: time equals distance divided by speed. A family walking 3 miles an hour covers 6 miles in 2 hours. A car at 60 miles an hour covers 175 miles in just under 3 hours. A good traveler reads the scale before setting out, not after the sun goes down.

PICTURE STUDY



View of Venice, Jacopo de' Barbari, 1500 · Woodcut printed from six wooden blocks · The original blocks are in the Museo Correr, Venice; prints are in many museums, including the Metropolitan Museum of Art, New York, and the British Museum, London.

Wikimedia Commons · Public domain

In 1500 the artist Jacopo de' Barbari published this enormous view of Venice, more than nine feet wide, printed from six carved wooden blocks. It shows the city as a bird would see it from high above, with nearly every church, palace and canal. No one could fly in 1500, so the work must have been built up from careful measuring and drawing from towers. It is part picture and part map, which makes it a good place to think about scale.

Look closely

- Find the Grand Canal, the big S-shaped waterway through the city.
- Find a ship near the front and a building far at the back. Are they drawn to the same scale?
- Find the edge of the city. What is all around it?

Talk about it

1. Why is a bird's-eye view not quite the same as a map drawn straight down?
2. How do you think the artist measured a city he could not fly over?

HANDS-ON: DRAW YOUR ROOM TO SCALE

Make a true scale drawing, a floor plan of your bedroom or kitchen, with a bar scale of your own.

You will need

- A tape measure
- Graph paper (quarter-inch squares are best)
- A pencil, ruler and colored pencils

Steps

1. Measure the length and width of the room in feet. Measure the bed, table, door and window too.
2. Choose a scale: one square ($\frac{1}{4}$ inch) = 1 foot. Write it at the bottom as a word scale.
3. Draw the walls by counting squares. Then add the furniture, door and windows, each to scale.
4. Draw a bar scale: a line 2 inches long, marked every $\frac{1}{2}$ inch with 0, 2, 4, 6 and 8 feet.
5. Add a north arrow, a title and your name. Then use the bar scale to measure the distance from the door to the bed. Check it with the tape measure.

Check your work

- Every wall and piece of furniture is drawn to the same scale.
- My plan has a word scale and a bar scale.
- My measured distance on paper matches the real distance within about a foot.

TRAVEL JOURNAL

1. **Map or diagram.** Copy your room plan, or draw a small version, into the notebook with its bar scale and north arrow. Label two distances you measured.
2. **Notebook entry.** In one paragraph, explain the difference between a large-scale and a small-scale map, and give one example of when you would want each.

Did you know? A U.S. Geological Survey 7.5-minute topographic map covers an area one-eighth of a degree on each side. It takes about 55,000 of these maps to cover the forty-eight lower states. You can view and download them free from the USGS.

Map or diagram. On a state road map, use string to measure the road from your town to the state capital. Then measure the straight line. How much longer is the road?

Goes deeper in. Geography, Grade 4, “Maps and Globes,” and Arithmetic, “Ratios and Measurement” (coming soon).

For families. Sources: U.S. Geological Survey on the 1:24,000 topographic series; Britannica on Edmund Gunter and Gunter’s chain (66 ft; 80 chains to the mile); Museo Correr and the Metropolitan Museum of Art on de’ Barbari’s *View of Venice* (1500). The count of 7.5-minute maps is approximate. The woodcut includes classical wind heads and gods at the edges, drawn in the custom of the time; they are clothed and small.

PRACTICE

1. **EASY** Name the three ways a map scale can be written.
2. **EASY** A map’s scale is 1 inch = 10 miles. Two towns are 4 inches apart. How far apart are they?
3. **MEDIUM** Which is a larger-scale map: 1:24,000 or 1:1,000,000? Which shows more detail?
4. **MEDIUM** You enlarge a map on a copier. Which scale stays correct: the word scale or the bar scale? Why?
5. **CHALLENGE** On a 1 inch = 25 miles map, a winding road measured with string is 6 inches. A family drives it at 50 miles an hour. How far is it, and how long will it take?

Make it a game • Pace and Guess. Pick a tree, mailbox or door across the yard. Everyone guesses the distance in feet and writes it down. Then measure it with a tape measure (or with steps you have measured). The closest guesser picks the next target.

Scripture. “Who hath measured the waters in the hollow of his hand, and meted out heaven with the span, and comprehended the dust of the earth in a measure, and weighed the mountains in scales, and the hills in a balance?” (Isaiah 40:12, KJV)

We shrink the world down to fit a page, and need rulers and chains to measure it. God holds the oceans as if in the hollow of His hand. Our careful measuring is a small picture of His greatness.

Practice: answers

1. As words, as a ratio and as a bar scale.
2. 40 miles.
3. 1:24,000 is the larger scale, and it shows more detail.
4. The bar scale, because it is enlarged along with the map.
5. $6 \times 25 = 150$ miles; $150 \div 50 = 3$ hours.

1.5 TIME ZONES

OBJECTIVES

- Explain why the earth needs time zones, using 360° and 24 hours.
- Tell how the railroads brought standard time in 1883 and how Greenwich became the world's prime meridian in 1884.
- Work out the time in another zone and explain what happens at the International Date Line.

Warm-up. Shine a flashlight on a globe in a dark room. Find a place where it is noon (straight under the light) and a place where it is midnight. Turn the globe slowly from west to east. What happens to your town?

Video slot. Video coming. How time zones work; railroad standard time (1883); the International Meridian Conference and Greenwich (1884); the International Date Line. Search approved channels (Royal Museums Greenwich, Library of Congress, Smithsonian, Homeschool Pop); preview first.

KEY TERMS

time zone

A region where everyone sets their clocks to the same time.

local solar time

Time set by the sun at one place, so that noon comes when the sun is highest there.

standard time

One agreed time used across a whole time zone.

Greenwich Mean Time (GMT)

The time at the prime meridian in Greenwich, England, from which the world's time zones are counted.

International Date Line

A line running mostly along 180° longitude in the Pacific Ocean, where the calendar date changes.

CORE IDEAS

For most of history, every town kept its own time. Noon was when the sun stood highest over the town, and the church or courthouse clock was set to match. This is **local solar time**. Because the earth turns 360° in 24 hours, or 15° each hour, noon comes about four minutes later for every degree you travel west. When it was noon in Boston, it was about twelve minutes before noon in New York and more than an hour before noon in Chicago.

As long as people traveled by horse or by sailing ship, nobody minded. Then came the railroads. A train might pass through dozens of towns, each with a different time. American railroads ran on dozens of different “railroad times,” and a large station might have several clocks on the wall, each for a different line. Timetables were a puzzle, and a mistake about the time could put two trains on the same track.

At noon on **November 18, 1883**, the railroads of the United States and Canada changed over to **standard time**. They divided the country into zones about 15° wide, and every station in a zone set its clocks alike. Some towns had to set their clocks back a few minutes, so people called it “the day of two noons.” The plan was organized by William F. Allen, a railroad official, and many towns adopted railroad time for daily life. Congress did not make the zones law until the Standard Time Act of 1918.

The world needed one starting line. The Canadian engineer Sandford Fleming had urged a worldwide system of 24 zones. In October 1884, delegates from about two dozen nations met at the International Meridian Conference in Washington, D.C. They chose the meridian through the Royal Observatory at Greenwich as the prime meridian, 0° longitude. By then most of the world’s sea charts already used Greenwich. Time zones came to be counted from **Greenwich Mean Time**: an hour later for every 15° east, an hour earlier for every 15° west.

Halfway around the world, at about 180°, lies the **International Date Line**. If you sail west across it, you skip forward a day; sail east and you repeat a day. The line zigzags around islands and countries so that no country is split between two dates. Time-zone borders bend too, following state lines and county lines rather than straight meridians. The fifty states use six standard time zones: Eastern, Central, Mountain, Pacific, Alaska and Hawaii-Aleutian.

Working out the time elsewhere is simple arithmetic. Eastern Time is five hours behind Greenwich in winter; Pacific Time is three hours behind Eastern. When a family in Georgia sits down to supper at 6:00 p.m., cousins in California are just finishing lunch at 3:00 p.m., and in London it is already 11:00 p.m. Remember the rule: the sun rises in the east, so the east is always later.

PICTURE STUDY



The Railway Station, William Powell Frith, 1862 · Oil on canvas · Royal Holloway, University of London, Egham, England
Wikimedia Commons · Public domain

William Powell Frith painted the busy platform of Paddington Station in London, where trains of the Great Western Railway came and went. The painting was so popular that thousands of people paid to see it when it was first shown. Look closely: everyone is in a hurry. Railways made being on time matter more than ever before, and it was the railways that pushed nations to agree on standard time.

Look closely

- Find a family saying goodbye. Who is leaving?
- Find a porter with luggage. How is he helping?
- Look up at the roof. How did the builders let in light?

Talk about it

1. Why would a railway station need one clock that everyone trusts?
2. Which person in the painting looks most worried about missing the train? Why do you think so?

HANDS-ON: A TIME-ZONE CLOCK WHEEL

Make a paper wheel that shows what time it is around the world, then use it to plan a phone call.

You will need

- Two paper plates of different sizes, or two cardboard circles
- A brad (paper fastener)
- A ruler, protractor, pencil and colored pencils
- A world map that shows time zones

Steps

1. On the larger circle, divide the rim into 24 equal parts (15° each). Label them with hours: 12 midnight, 1 a.m., 2 a.m. and on around to 11 p.m. Shade the night hours dark and the day hours light.
2. On the smaller circle, divide the rim into 24 parts too. Label one part "Greenwich 0° ," then going around eastward: 15° E, 30° E and so on to 180° , and going westward 15° W, 30° W to 165° W.
3. Write city names at the right longitudes: London (0°), Jerusalem (about 30° E), Tokyo (about 135° E), New York (about 75° W), Chicago (about 90° W), Los Angeles (about 120° W).
4. Join the circles with the brad. Turn "Greenwich" to 12 noon and read the time in each city.
5. Draw and label a dotted line at 180° on your wheel: "International Date Line."

Check your work

- My wheel has 24 hour spaces and 24 longitude spaces of 15° each.
- When London is at noon, New York reads 7 a.m. (standard time).
- The Date Line is labeled.

TRAVEL JOURNAL

1. **Map or diagram.** Draw an outline of the forty-eight lower states. Divide them into four bands labeled Eastern, Central, Mountain and Pacific. Write the time in each band when it is 12 noon Eastern. Mark your own home with a star.
2. **Notebook entry.** In one paragraph, explain why the railroads, rather than towns or governments, first needed standard time, and what happened on "the day of two noons."

Did you know? China stretches across about 60° of longitude, enough for four or five time zones, but the whole country uses one time. In the far west of China the sun may not rise until about 10 a.m. by the clock.

Map or diagram. Find a world time-zone map in an atlas. Find a place where the zone border makes a big zigzag. Can you tell why it bends there?

Goes deeper in. Geography, Technology Overcoming Geography, "Railroads and Standard Time," and Earth Science, "Earth's Rotation" (coming soon). History, "The Railroad Age."

For families. Sources: Library of Congress and Smithsonian on the adoption of railroad standard time, November 18, 1883; Royal Museums Greenwich on the International Meridian Conference (Washington, October 1884; 25 or 26 nations are counted in different accounts, so the stop says “about two dozen”); the Standard Time Act of March 19, 1918. The number of separate railroad times before 1883 is given differently in different sources and is left as “dozens.” Daylight saving time moves clocks an hour in summer in most states; the example times are standard (winter) time.

PRACTICE

1. **EASY** How many degrees does the earth turn in one hour?
2. **EASY** In what year did American and Canadian railroads adopt standard time zones?
3. **MEDIUM** It is 4:00 p.m. Central Time. What time is it in the Eastern zone and in the Pacific zone?
4. **MEDIUM** Why did the 1884 conference choose Greenwich for the prime meridian?
5. **CHALLENGE** A ship crosses the International Date Line sailing west on Tuesday at noon. What day is it just after crossing? A place lies at 60° E. How many hours ahead of Greenwich is its sun time?

Make it a game • Around-the-World Clock. Stand in a circle; each player is a city in a different zone. The leader names a time in London. Going around the circle, each player must call out the time in their own city. A wrong answer moves that player to be the leader.

Scripture. “From the rising of the sun unto the going down of the same the LORD’s name is to be praised.” (Psalm 113:3, KJV)

Because of time zones, the sun is rising somewhere on earth at every moment of the day. Somewhere, God’s people are waking to pray, while others are closing the day with thanks. His praise goes around the world without stopping.

Practice: answers

1. 15°, because $360^\circ \div 24 \text{ hours} = 15^\circ$.
2. 1883 (November 18).
3. 5:00 p.m. Eastern; 2:00 p.m. Pacific.
4. Most of the world’s sea charts already used the Greenwich meridian, and the Royal Observatory there was a leading observatory, so it was the most practical choice.
5. Wednesday (sailing west, you skip ahead a day). $60 \div 15 = 4$ hours ahead.

1.6 READING A ROAD MAP AND A SUBWAY MAP

OBJECTIVES

- Use a map legend, an index grid and highway numbers to plan a route on a road map.
- Explain how Interstate highways are numbered and what mile markers tell you.
- Explain why a subway map is a diagram, not drawn to scale, and plan a trip with a transfer.

Warm-up. Think of the route from your house to church or the grocery store. Could you draw it as a straight line with only the turns and landmarks on it? What would you leave out?

Video slot. Video coming. How to read a road map: legend, grid index and highway numbers; Harry Beck and the London Underground map. Search approved channels (Library of Congress, London Transport Museum, National Geographic Education, Homeschool Pop); preview first.

KEY TERMS

legend

The box on a map that explains its symbols, lines and colors (also called the key).

grid index

Letters along one edge of a map and numbers along the other, so a place can be found in a square such as “D-4.”

Interstate highway

A divided, high-speed highway in the national system begun in 1956, marked with a red-white-and-blue shield.

transfer

A station where you change from one train line to another.

schematic map

A simplified diagram that shows the order of places and connections, not true distances or shapes.

CORE IDEAS

A road map is a working tool, and the first thing to read is the **legend**. It tells you that a thick red line might be an Interstate, a thin black line a county road, a small airplane an airport, a tent a campground. Next is the **grid index**. Look up a town in the index, find “Millersburg, D-4,” and then look where column D meets row 4. Most road maps also print a mileage chart and small red numbers between towns, so you can add up the distance of a route.

The first national road atlas of England and Wales was **John Ogilby's *Britannia***, published in London in 1675. Instead of showing the whole country, Ogilby drew each main road as a long strip, like a scroll unrolling, with towns, bridges, hills and churches along the way. A traveler simply followed the strip. He measured every road with a wheel and used the statute mile of 1,760 yards, which helped that mile become the standard in Britain.

In the United States, the **Interstate highway** system began with the Federal-Aid Highway Act of 1956, signed by President Dwight Eisenhower. As a young officer in 1919 he had crossed the country with an Army truck convoy that took about two months, and in World War II he had seen Germany's fast highways. Interstates follow a clever numbering plan. Odd numbers run north and south, growing from west to east: I-5 runs along the Pacific coast and I-95 along the Atlantic. Even numbers run east and west, growing from south to north: I-10 crosses the South, I-90 the North. Small green *mile markers* count the miles from the state's southern or western border, and exit numbers usually match them, so Exit 120 is about 120 miles into the state.

A subway map works in a completely different way. In 1931 Harry Beck, an engineering draftsman who worked for the London Underground, drew a new kind of map in his spare time. He reasoned that a passenger underground cannot see the streets and does not care about them. He only needs to know which line to take, in what order the stations come, and where to change trains. So Beck drew straight lines running only up and down, across, or at 45°, spaced the stations evenly, and enlarged the crowded center. It was printed in 1933, and passengers loved it. Nearly every subway map in the world now follows his idea.

Beck's map is a **schematic map**. It is not to scale, and it bends the true shape of the city. That is fine for riding trains, but it can fool you: two stations that look far apart may be a short walk from each other above ground. To use a subway map, find your starting station and your goal, see which colored lines serve each, and look for a **transfer** station where the lines meet. Then note the line's direction, which is usually named by its last station.

PICTURE STUDY



A strip road map from Britannia, John Ogilby, 1675 · Engraving on paper, often hand-colored · Copies in many libraries, including the British Library, London, and the Library of Congress, Washington, D.C.
Wikimedia Commons · Public domain

John Ogilby was a dancing master, theater manager, translator and publisher before he became the King's Cosmographer. His *Britannia* held 100 plates of road maps covering about 7,500 miles of English and Welsh roads. Each page shows a road as a ribbon of strips, read from the bottom of the left-hand strip upward, with a little compass on each strip because the road keeps changing direction.

Look closely

- Find the little compass on a strip. Why does each strip need its own?
- Find a bridge, a hill or a church drawn beside the road.
- Find the numbers along the road. What do you think they count?

Talk about it

1. How is a strip map like a subway map? How is it different?
2. Why would a traveler on horseback want a map like this rather than a map of all England?

Safety first. Travel safety: on any real trip by car, bus or subway, stay with your grown-up, agree ahead of time where to meet if you are separated (for example, at the station's ticket booth), stand back from the platform edge, and never cross tracks or road lanes on foot.

HANDS-ON: MAKE A SUBWAY MAP OF YOUR WEEK

Turn the places you go most often into a Beck-style subway diagram, then plan a trip on it.

You will need

- A large sheet of paper
- A ruler and colored markers
- A local road map or online map (with a parent's help)

Steps

1. List 10 to 15 places you go: home, church, library, grocery store, grandparents' house, park and so on.
2. Group them into three or four "lines" by route. For example, the Red Line might be every place along Main Street.
3. Draw each line in its own color using only straight lines that run up and down, across, or at 45°. Space the stations evenly, even if the real distances differ.
4. Where two lines share a place, draw a white circle with a black ring: that is a transfer station. Make your home a transfer if you can.
5. Add a legend that explains the colors and the transfer symbol, a title, and a note: "Not to scale." Then write directions for one trip: "Take the Blue Line toward the Library, change at Church to the Red Line..."

Check your work

- My lines are straight, at 0°, 45° or 90°, with evenly spaced stations.
- I have at least one transfer station and a legend.
- I wrote directions for a trip that uses a transfer.

TRAVEL JOURNAL

1. **Map or diagram.** Draw a simple outline of the United States. Draw and label I-5, I-95, I-10 and I-90 in about the right places, and add an arrow showing which way odd numbers grow and which way even numbers grow.
2. **Notebook entry.** In one paragraph, compare a road map and a subway map: what each shows, what each leaves out, and when each is the better tool.

Did you know? Harry Beck was paid only a small fee for his famous map, and he kept improving it for years. His original diagram is still under copyright, so it is not shown here; you can see it on the London Transport Museum's website.

Map or diagram. Get a free state highway map from a rest area, visitor center or your state's transportation department. Find your town in the index and plot a route to a place 100 miles away.

Goes deeper in. Geography, Technology Overcoming Geography, “Roads and Highways,” and Geography, Grade 8, “Reading Maps” (coming soon). History, “The Railroad Age.”

For families. Sources: British Library on Ogilby’s *Britannia* (1675; 100 plates; statute mile); Federal Highway Administration on the 1956 Act, the 1919 Army convoy, Interstate numbering and mile markers; London Transport Museum on Harry Beck (first drawn 1931, issued 1933). The 1919 convoy took 62 days from Washington, D.C., to San Francisco. Some states number exits in order rather than by mile, and a few markers count from another border; the stop says “usually.”

PRACTICE

1. **EASY** What part of a map explains its symbols and colors?
2. **EASY** Does an odd-numbered Interstate usually run north–south or east–west?
3. **MEDIUM** You are at mile marker 42 and need Exit 87. About how far is it? At 60 miles an hour, about how long will it take?
4. **MEDIUM** Why did Harry Beck leave out the streets and true distances on his Underground map?
5. **CHALLENGE** Which is farther north in the U.S., I-20 or I-80? Which is farther east, I-35 or I-75? Explain using the numbering rules.

Make it a game • Grid Index Race. Using one road map, a caller reads out a town name and its index square, such as “Fairview, C-6.” Players race to find it. Then make it harder: the caller names only the town, and players must look it up in the index first.

Scripture. “In all thy ways acknowledge him, and he shall direct thy paths.” (Proverbs 3:6, KJV)

A good map helps us find the right road. But Solomon reminds us that the One who truly directs our paths is God. Before a trip, and in every choice, we can ask Him to lead us.

Practice: answers

1. The legend (or key).
2. North–south.
3. About 45 miles; about 45 minutes.
4. Passengers underground cannot see the streets; they only need the order of stations, the lines and where to change, so a simple diagram is clearer.
5. I-80 is farther north, because even numbers grow from south to north. I-75 is farther east, because odd numbers grow from west to east.

1.7 OLD MAPS: PTOLEMY, THE HEREFORD MAPPA MUNDI AND MERCATOR

OBJECTIVES

- Tell who made three great maps, when, and what each was for: Ptolemy's *Geography* (c. A.D. 150), the Hereford Mappa Mundi (c. 1300) and Mercator's world map (1569).
- Read the Hereford Mappa Mundi as its makers meant it: a map of history and faith, with Jerusalem at the center and east at the top.
- Explain how Ptolemy's errors and Mercator's design changed the way people traveled.

Warm-up. Imagine you must draw a map of the whole world, but you have never seen a photograph from space and no one has sailed around it. What would you put in the middle? What would you put at the top? What would you do about the places nobody has visited?

Video slot. Video coming. The Hereford Mappa Mundi; Ptolemy's *Geography*; Gerardus Mercator and his 1569 world map. Search approved channels (Hereford Cathedral / The Mappa Mundi Trust, British Library, Library of Congress, Royal Museums Greenwich); preview first.

KEY TERMS

mappa mundi

Latin for “map of the world”; the name for the great world maps of the Middle Ages.

vellum

Fine writing material made from calfskin, used for books and maps before paper was common.

coordinates

A pair of numbers, latitude and longitude, that fix a place on the earth. Ptolemy listed them for thousands of places.

rhumb line

A course that keeps the same compass bearing the whole way. On a Mercator map it is a straight line.

atlas

A bound book of maps. Mercator was the first to use the word this way.

CORE IDEAS

Claudius Ptolemy was a Greek scholar who lived in Alexandria, Egypt, under the Roman Empire. Around A.D. 150 he wrote the *Geography*, a guide to drawing the known world. He listed some 8,000 places, each with its latitude and longitude, and explained how to project a

round earth onto a flat sheet. But Ptolemy made the earth too small and stretched Asia too far east. For Western Europe his book was lost for centuries; Greek copies were treasured in Constantinople, and it was translated into Latin around 1406 and printed with maps in Bologna in 1477. Columbus studied such figures and believed Asia lay only a few thousand miles west of Spain. Ptolemy's mistake helped send him across the Atlantic.

The **Hereford Mappa Mundi** was made in England about 1300. It is the largest medieval map that survives: a single sheet of **vellum** about 5 feet 2 inches tall and 4 feet 4 inches wide. It names its maker as "Richard of Haldingham and Lafford." It is crowded with about 1,100 inscriptions and some 500 drawings: cities, rivers, animals, the people of far lands, and scenes from the Bible such as Noah's ark, the Tower of Babel and the crossing of the Red Sea. Strange creatures from ancient Roman writers crowd the edges of the world.

To read it, remember what it was for. East is at the top, where the sun rises and where the Garden of Eden is drawn. **Jerusalem** is at the center, the city where Christ died and rose again. Above the whole world sits Christ in judgment. The map was not for finding the road to London; it was a picture of the world as the stage of God's story, from Creation to the Last Day. Medieval scholars knew the earth was round; this map shows the lived-in lands as a circle, by custom, to teach rather than to steer.

Gerardus Mercator was born in Flanders in 1512. He was a fine engraver, globe-maker and student of mathematics. In 1544 he was arrested on suspicion of Protestant heresy and spent about seven months in prison before he was released; he later moved to Duisburg in Germany. In 1569 he published a great world map on 18 sheets, about 6½ feet wide, "for the use of navigators." His idea was to space the lines of latitude farther and farther apart toward the poles, so that a **rhumb line**, a course of one steady compass bearing, is a straight line on the map. A navigator could lay a ruler from port to port, read the bearing and sail by it.

Mercator did not explain the mathematics behind his spacing; the Englishman Edward Wright worked it out and published tables in 1599. After that, sailors adopted Mercator's map, and it is still used for sea charts today. Mercator also gave us a word. He planned a great collection of maps and named it **Atlas**, after a wise king of old legend; it was published in 1595, the year after his death. Three mapmakers, three purposes: Ptolemy to measure, Hereford to teach, Mercator to steer.

PICTURE STUDY



The Hereford Mappa Mundi, Attributed to Richard of Haldingham and Lafford, c. 1300 · Ink and paint on a single sheet of vellum · Hereford Cathedral, Hereford, England
Wikimedia Commons · Public domain

This map has hung in Hereford Cathedral for about seven hundred years. Pilgrims and churchgoers could stand before it and see the whole world they knew, from the British Isles squeezed into the lower left corner to Paradise at the top. Its colors have faded to brown, but the drawings are still sharp.

Look closely

- Find Jerusalem at the center. What shape marks it?
- Find the top of the map. Who is shown above the world?
- Find the British Isles near the bottom left edge. Why are they squeezed so small?

Talk about it

1. If you used this map to travel, what problems would you have? What was it good for instead?
2. Why did the makers put Jerusalem in the middle?

HANDS-ON: THREE MAPS, THREE PURPOSES

Draw a small copy-sketch of each of the three great maps and label how each was made to be used.

You will need

- A sheet of paper folded into three columns

- A pencil, fine pen and colored pencils
- Pictures of the three maps (from a library book or the websites in this trail's kits)

Steps

1. Head the columns "Ptolemy, c. 150," "Hereford, c. 1300" and "Mercator, 1569."
2. Ptolemy: sketch a curved grid with a fan shape and the Mediterranean in the middle. Label "latitude," "longitude" and "Asia stretched too far east."
3. Hereford: draw a circle. Draw a T shape inside it (the Mediterranean and the rivers dividing the three known continents). Label Asia at the top, Europe lower left, Africa lower right, Jerusalem in the center, and "East" at the top.
4. Mercator: draw a rectangle with latitude lines getting farther apart toward the top and bottom. Draw a straight ruled line across an ocean and label it "rhumb line: one compass bearing."
5. Under each, write one line: what the map was for (to measure, to teach, to steer).

Check your work

- Each column has a sketch, a date and labels.
- My Hereford sketch has east at the top and Jerusalem at the center.
- My Mercator sketch shows the widening latitude lines and a rhumb line.

TRAVEL JOURNAL

1. **Map or diagram.** Glue in your "Three Maps, Three Purposes" page, or redraw the Hereford circle with Jerusalem, east and the three continents labeled.
2. **Notebook entry.** In one paragraph, explain which of the three maps you would most want to have on a voyage and which you would most want to hang in your home, and why.

Did you know? The word "orient" comes from the Latin for "rising" or "east." Because so many medieval maps put east at the top, to "orient" a map first meant turning it to face east. Today we orient a map by turning it to match north.

Map or diagram. The Mappa Mundi Trust has an interactive online version of the Hereford map. Zoom in on Noah's ark and on the Red Sea, which the mapmaker colored red.

Goes deeper in. History, "The Middle Ages" and "The Age of Exploration," and Geography, Grade 8, "The History of Mapmaking" (coming soon).

For families. Sources: Hereford Cathedral and the Mappa Mundi Trust (date c. 1300; about 1.59 × 1.34 m; maker's inscription naming Richard of Haldingham and Lafford); Britannica on Ptolemy (c. A.D. 100–170) and on Mercator (1512–1594; 1569 map; heresy arrest of 1544; *Atlas*, 1595); Library of Congress on the Bologna Ptolemy of 1477 (the printed date reads 1462, a misprint). The numbers of places, inscriptions and drawings

are approximate. The stop corrects the common myth that medieval people thought the earth was flat. The map's fanciful creatures come from Pliny and Solinus and are drawn modestly.

PRACTICE

1. **EASY** What city is at the center of the Hereford Mappa Mundi, and which direction is at the top?
2. **EASY** In what year did Mercator publish his world map, and who was it designed for?
3. **MEDIUM** What two errors did Ptolemy make, and how did they affect Columbus?
4. **MEDIUM** Why is it unfair to call the Hereford map a "bad map"?
5. **CHALLENGE** On a Mercator map, why can a navigator draw a straight line from port to port and sail by one compass bearing? What did Mercator change to make this work?

Make it a game • Measure, Teach or Steer?. A caller describes a map: "It has Paradise at the top," "It lists 8,000 places with coordinates," "Its straight lines are compass courses." Players answer "Ptolemy!", "Hereford!" or "Mercator!" Add other maps the family knows, such as a road map or a subway map, and ask what they are for.

Scripture. "The earth is the LORD's, and the fulness thereof; the world, and they that dwell therein." (Psalm 24:1, KJV)

The makers of the Hereford map drew Christ above the whole world because they believed this verse. Every map, old or new, shows lands that belong to the Lord, and people He made.

Practice: answers

1. Jerusalem; east is at the top.
2. 1569; for navigators (sailors).
3. He made the earth too small and stretched Asia too far east, so Columbus thought Asia was only a short voyage west across the Atlantic.
4. It was not made for travel but to teach the history of the world and the Christian faith; it does that job well.
5. He spaced the lines of latitude farther apart toward the poles, stretching north-south in step with the east-west stretching. This keeps compass angles true, so a course of one steady bearing (a rhumb line) is straight on the map.

1.8 DRAW A MAP OF YOUR TOWN

OBJECTIVES

- Plan a map with the six parts every good map needs: title, orientation, date, author, legend and scale.
- Measure your own pace and use it to measure real distances.
- Draw a labeled map of your neighborhood or town center with a legend, north arrow and bar scale.

Warm-up. Without looking at any map, draw the route from your front door to the nearest corner or crossroads. Then walk it (with a grown-up) and see what you forgot.

Video slot. Video coming. How to draw a map for kids: title, legend, compass rose and scale; pacing and simple surveying. Search approved channels (National Geographic Education, USGS, Ordnance Survey, Homeschool Pop); preview first.

KEY TERMS

pace

In surveying, the distance covered by two steps (one with each foot). Counting paces is a simple way to measure ground.

survey

To measure land carefully, its distances, directions and boundaries, in order to map it.

orientation

Which way a map faces. Most maps show it with a north arrow and put north at the top.

symbol

A small mark or picture on a map that stands for a real thing, such as a cross for a church.

landmark

An easy-to-see feature that helps people find their way, such as a water tower, steeple or big oak tree.

CORE IDEAS

Every map in this trail was once a blank sheet in front of someone who had to decide what to put on it. Now it is your turn. A good mapmaker starts by asking, “Who will use this map, and for what?” A map for a visiting cousin who must walk from your house to the park will look very different from a map of every tree in your yard.

Mapmakers remember the parts of a finished map with the word **TODALS**: *Title* (what and where), *Orientation* (a north arrow), *Date*, *Author* (your name), *Legend* (what the symbols mean) and *Scale* (how much smaller the map is than the land). A map missing any of these can confuse its reader or be out of date without anyone knowing.

To draw to scale you must measure, and the oldest measuring tool is your own legs. The Romans counted a **pace** as two steps, one with each foot, about five Roman feet. A thousand paces, *mille passus* in Latin, made a Roman mile, which is where our word “mile” comes from. To find your own pace, walk 100 feet at a normal speed and count every time your right foot lands. Divide 100 by that number. A ten-year-old’s pace is often about 4 feet.

Young men in colonial America learned to **survey** for a living. In 1749, at the age of 17, George Washington was appointed surveyor of Culpeper County, Virginia. With a compass, a Gunter’s chain and a notebook, he measured farms and wild land on the frontier, and he made careful maps of what he found. The skills he learned there, reading the land, judging distance and sketching what he saw, served him later as a soldier.

When you map your town, start with a few big **landmarks**: your house, the main road, the church, a creek, the school or library. Use a compass or the sun to fix north, and set the main road at the right angle on the page. Pace the distances between landmarks and turn them into feet. Fill in smaller things last. Use simple **symbols** and explain each in the legend. Do not try to show everything; a map is a careful choice.

Finally, test your map. Give it to someone who does not know the way and see whether they can follow it. Real mapmakers do this too: they send “field checkers” to walk the ground and find mistakes before a map is printed. A map that someone can actually use is a gift of clear thinking and care for your neighbor.

PICTURE STUDY



Map of London from Civitates Orbis Terrarum, Georg Braun and Frans Hogenberg, 1572 · Hand-colored engraving on paper · Copies in many libraries, including the British Library, London, and the Library of Congress, Washington, D.C.

Wikimedia Commons · Public domain

Civitates Orbis Terrarum (“Cities of the World”) was a great atlas of town maps published in Cologne beginning in 1572. Georg Braun gathered and wrote the descriptions, and Frans Hogenberg engraved many of the plates. The London map shows the city in the days of Queen Elizabeth I. The mapmakers added people in local dress to show what the townsfolk looked like.

Look closely

- Find the River Thames and London Bridge. How many boats can you count?
- Find open fields at the edge of the city. What might people do there?
- Find the people in the foreground. What do they tell you about life in London?

Talk about it

1. Which landmarks would you use to find your way in this London?
2. How is this map like the one you will draw of your own town? How is it different?

Safety first. Travel safety: walk your mapping routes only with a grown-up or with permission and a buddy. Stay on sidewalks and paths, stop at every crossing, never pace distances in a road, and do not go onto private property without asking the owner.

HANDS-ON: MY TOWN MAP

Survey a small part of your town, such as your street and two or three nearby blocks, a town square or your church grounds, and draw a finished map with all six TODALS parts.

You will need

- A clipboard, pencil and eraser
- A tape measure or a 100-foot measured string
- A compass (or the noon shadow from Stop A2)
- A large sheet of paper or poster board, a ruler and colored pencils

Steps

1. Measure your pace: walk 100 feet and count paces. Divide 100 by the number of paces. Write "My pace = ___ feet."
2. With a grown-up, walk your area with the clipboard. Make a rough sketch with north marked. Pace each street or path between landmarks and write the paces beside it.
3. At home, change paces to feet (paces $\times$ your pace length). Choose a scale that fits your paper, such as 1 inch = 100 feet.
4. Draw the main roads first, then the landmarks, then the smaller things. Invent clear symbols: a cross for a church, a blue line for a creek, small squares for houses.
5. Add all six parts: Title, Orientation (north arrow), Date, Author, Legend and Scale (draw a bar scale). Then test the map: give it to a family member and ask them to find one place with it.

Check your work

- My map has a title, north arrow, date, my name, a legend and a bar scale.
- Distances come from my own pacing and are drawn to one scale.
- Someone else used my map to find a place.

TRAVEL JOURNAL

1. **Map or diagram.** Draw a small copy of your town map in the notebook, or fold the large one in. Label at least five landmarks and include the legend and bar scale.
2. **Notebook entry.** In one paragraph, describe how you made your map: how you measured, what you chose to leave out, and what the person who tested it found confusing.

Did you know? George Washington was not the only famous American surveyor. Thomas Jefferson's father, Peter Jefferson, helped Joshua Fry draw a well-known map of Virginia (1751), and as a young man Abraham Lincoln worked as a deputy surveyor around New Salem, Illinois, in the 1830s.

Map or diagram. Find an old map of your town at the library or in the Library of Congress's free online collection of Sanborn fire insurance maps. Compare it with your own map. Which buildings are still there?

Goes deeper in. Geography, Grade 4, "My Community," Arithmetic, "Ratios and Measurement," and History, "Colonial America" (coming soon).

For families. Sources: Mount Vernon (George Washington's Mount Vernon) on Washington's appointment as surveyor of Culpeper County in July 1749; Britannica on the Roman mile (*mille passus*, about 5,000 Roman feet); Library of Congress on Braun and Hogenberg and on the Sanborn maps. The Fry-Jefferson map of Virginia is dated 1751 (printed 1753). TODALS is a common classroom checklist, not a historical term. Please supervise any outdoor pacing near roads.

PRACTICE

1. **EASY** What do the letters TODALS stand for?
2. **EASY** Where does the word "mile" come from?
3. **MEDIUM** You walk 100 feet in 25 paces. How long is your pace?
4. **MEDIUM** With a 4-foot pace, you count 150 paces from your house to the church. How far is it in feet?
5. **CHALLENGE** Your map scale is 1 inch = 100 feet. How long should you draw the 600-foot walk to church? Your paper is 18 inches wide; what is the longest distance you can fit across it?

Make it a game • Treasure Map. One player hides a small "treasure" in the yard or house and draws a map to it with a north arrow, a scale in paces and at least three landmarks. The others must find the treasure using only the map. Then switch mapmakers.

Scripture. "The LORD shall preserve thy going out and thy coming in from this time

forth, and even for evermore.” (Psalm 121:8, KJV)

Your map shows the paths you walk every day, your going out and coming in. The Lord watches over every one of them, at home and in faraway places.

Practice: answers

1. Title, Orientation, Date, Author, Legend, Scale.
2. From the Latin *mille passus*, “a thousand paces.”
3. $100 \div 25 = 4$ feet.
4. $150 \times 4 = 600$ feet.
5. $600 \div 100 = 6$ inches. $18 \times 100 = 1,800$ feet.

TRAIL 1 BADGE QUIZ

The badge quizzes are optional and may be done orally or in writing, without notes. Four right out of five earns the first badge; five right out of six earns the second. Badges and the certificate are earned by doing the stops; the quizzes are a check, not a gate.

Badge quiz 1 (Stops 1-5)

1. Why does a Mercator map make Greenland look about as large as Africa, and which is really larger?
2. Give the bearing in degrees for east, south and northwest.
3. Why is finding longitude a matter of time? Who built the first sea clock good enough to solve it?
4. A map's scale is 1 inch = 20 miles. Two towns are 4½ inches apart. How far apart are they?
5. It is 9:00 a.m. Pacific Time. What time is it Eastern Time? What happened on November 18, 1883?

Badge quiz 2 (Stops 6-8)

6. Which way does I-70 run, and is it north or south of I-90? Explain.
7. Why is a subway map like Harry Beck's not drawn to scale?
8. What is at the center and what is at the top of the Hereford Mappa Mundi, and what was the map for?
9. What did Mercator design his 1569 map to do?
10. Your pace is 5 feet. You count 120 paces to the library. How far is it, and how long would you draw it at 1 inch = 100 feet?
11. Name the six parts of a finished map (TODALS).

TRAIL CERTIFICATE: MY MAP BOOK AND TRAIL A CERTIFICATE

Gather the maps and diagrams from all eight stops into the first section of your travel journal: "Reading the World," with your name and dates. Include the orange-peel projection, the compass rose, the voyage of H4, the room plan, the time-zone wheel, the subway diagram, the three old maps and your town map.

Write a short preface (one paragraph) saying which skill you found hardest and how you would use these skills on a real trip.

Show your town map to someone outside the family and let them try to use it. When the section is complete, a parent signs the Trail A certificate.

- **Accuracy:** Directions, coordinates, scales and times are correct; maps are drawn to a stated scale.
- **Map parts:** Maps have a title, north arrow, date, author, legend and scale where they apply.

- **Writing:** Each notebook paragraph explains an idea clearly in the student's own words, with at least one fact or number.
- **Care:** Drawings are neat, labels are readable, and the town map can be used by someone else.

Answer key

1. Mercator stretches lands more the farther they are from the equator, and Greenland is near the North Pole. Africa is about 14 times larger.
2. East 90°, south 180°, northwest 315°.
3. The earth turns 15° every hour, so comparing local time with the time at Greenwich gives your longitude. John Harrison (H4, tested 1761–1762).
4. 90 miles.
5. 12:00 noon Eastern. The U.S. and Canadian railroads adopted standard time zones ("the day of two noons").
6. East–west, because even numbers run east–west; it is south of I-90, because even numbers grow from south to north.
7. Riders need only the lines, the order of stations and where to change trains, so a simple diagram is clearer than true distances.
8. Jerusalem at the center and east (with Paradise, and Christ above the world) at the top. It was made to teach the history of the world and the Christian faith, not to guide travelers.
9. To let navigators draw a straight line that is a course of one steady compass bearing (a rhumb line).
10. 600 feet; 6 inches.
11. Title, Orientation, Date, Author, Legend, Scale.

TRAVEL AND FARAWAY PLACES TRAIL B: PLANNING A TRIP

The second trail of the Travel track teaches the skills of planning a real journey: choosing a destination for a good reason, comparing train, car, ship and plane, building a budget, writing a day-by-day itinerary, packing one bag, crossing borders with passports, customs and foreign money, being a courteous guest abroad, and keeping a family safe and together. Along the way students meet Grand Tourists, Thomas Cook's first excursion, the golden spike of 1869, the Roman Peutinger Table, Nehemiah's letters from the king, and the travelers of Emmaus.

This is the  **Ranger** level, for ages 10 to 13. The student reads each stop alone and works the numbers: distances, speeds, budgets, clock times and exchange rates. Every stop has a map or diagram, a short notebook paragraph and five practice questions with answers. Each stop also adds one section to a **complete trip plan** for a real or dreamed-of journey, kept in the Field Notebook and the travel journal.

Five stops earn the **Travel Ranger badge, part 1**; eight stops earn part 2 and the **Trail B certificate**.

BEFORE YOU BEGIN

- Read a page of about 500 words alone and tell back the main points.
- Multiply and divide with whole numbers and money, and add clock times.

MASTERY CHECKLIST

- ☐ I can choose a destination by its purpose and test it against time, money, distance and season.
- ☐ I can compare modes of transport by door-to-door time and cost using $\text{distance} \div \text{speed} = \text{time}$.
- ☐ I can build a trip budget with four categories and a cushion, and a day-by-day itinerary with fixed points and buffer time.
- ☐ I can pack for a week in one bag and explain passports, customs and exchange rates.
- ☐ I can greet people politely in several countries and tell what to do if I am separated from my group.

OPTIONAL BOOKS AND RESOURCES

- **U.S. Department of State: Travel.State.Gov** (<https://travel.state.gov>): Passport rules for children, and a page for every country with entry rules, travel advisories and local emergency numbers (Stops B1, B6 and B8).
- **Transportation Security Administration: "What Can I Bring?"** (<https://www.tsa.gov/travel/security-screening/whatcanibring/all>): The official list of what may go in a carry-on or checked bag, and the 3-1-1 liquids rule (Stop B5).

- **U.S. Customs and Border Protection: Travel** (<https://www.cbp.gov/travel>): What travelers must declare and which foods and plants may not be brought into the United States (Stop B6).
- **OmnesViae: Roman Route Planner** (<https://omnesviae.org>): A free route planner built from the Peutinger Table; plan a trip across the Roman Empire (Stop B4).
- **National Park Service: Golden Spike National Historical Park** (<https://www.nps.gov/gosp>): History and photographs of the 1869 transcontinental railroad (Stop B2).

2.1 CHOOSE A DESTINATION AND WHY

OBJECTIVES

- Name four reasons people travel and give a historical example of each.
- Test a possible destination against time, money, distance and season.
- Compare three destinations on a map and a chart and choose one with reasons.

Warm-up. Write down three places you would like to go someday. Next to each, write one word that says why: people, places, past or purpose. Did all three have the same reason?

Video slot. Video coming. The Grand Tour of Europe in the 1700s; the Pantheon in Rome; why travelers chose Rome. Search approved channels (National Gallery of Art, Smithsonian, a museum or university channel); preview first.

KEY TERMS

destination

The place a journey is going to.

purpose

The reason for doing something; for a trip, the reason for going.

pilgrimage

A journey to a holy or important place, made out of devotion.

Grand Tour

A long journey through France and Italy made by young British gentlemen in the 1600s and 1700s to finish their education.

peak season

The busiest time of year at a destination, when prices are highest and crowds are largest.
The quiet time is the off-season.

CORE IDEAS

Every journey begins with two questions: *Where?* and *Why?* The second question matters most, because the reason shapes everything else. In the Bible, the Queen of Sheba made the long trip to Jerusalem because she had heard of the fame of Solomon and came “to prove him with hard questions” (1 Kings 10:1). She chose her destination for its wisdom. In the Middle Ages, Christian pilgrims walked for weeks or months to Jerusalem, to Rome, to Santiago de Compostela in Spain, or to Canterbury in England, which Geoffrey Chaucer made famous in *The Canterbury Tales* in the late 1300s.

In the 1600s and 1700s, wealthy British families sent their sons on the **Grand Tour**. A young man, often with a tutor, crossed to France, went over the Alps and spent months in Italy, learning languages and studying Roman ruins and Renaissance art. Some tours lasted two or

three years. The name appears in Richard Lassels's guidebook *The Voyage of Italy* (1670). Rome was the prize, and one building every traveler visited was the **Pantheon**, finished under the Emperor Hadrian about A.D. 125 and dedicated as a church in 609.

People still travel for the same few reasons. A simple way to remember them is the four P's: **people** (visiting grandparents or cousins), **places** (mountains, seashores, famous landmarks), the **past** (battlefields, old towns, museums) and **purpose** (worship, work, a mission trip, learning). A good planner writes the **purpose** down first, in one sentence. "We want to see where the Declaration of Independence was signed" leads to Philadelphia; "we want to see Grandma" leads to wherever Grandma lives.

Next, test each idea against four limits. **Time:** how many days do you have, and how many will be spent getting there and back? **Money:** farther usually costs more. **Distance:** a family driving 300 miles a day can reach a place 600 miles away in two days. **Season:** the North Rim of the Grand Canyon is normally open only from mid-May to mid-October, and the Atlantic hurricane season runs from June 1 to November 30. A place visited in **peak season** is crowded and costly; the off-season is cheaper, but some things may be closed.

Finally, make a short list of three destinations and compare them side by side on a map and in a chart. Count the miles, note the best season, and give each one a score for how well it fits your purpose. Then talk it over with your family and pray about it. A trip chosen for a good reason is a trip remembered for a lifetime.

PICTURE STUDY



Interior of the Pantheon, Rome, Giovanni Paolo Panini, c. 1734 · Oil on canvas · National Gallery of Art, Washington, D.C.

Wikimedia Commons · CC0

Panini (1691–1765) lived in Rome and painted its ruins and churches. Many of his buyers were travelers on the Grand Tour who wanted a picture to take home, the way we buy a postcard. Here he shows the Pantheon’s huge dome, which is about 142 feet across, with its round opening at the top, called the oculus.

Look closely

- Find the patch of sunlight. Where is the light coming from?
- Find the visitors. Which ones look like local people, and which look like travelers from far away?
- Find a sign that this ancient Roman temple had become a church.

Talk about it

1. Why would a traveler in 1734 want to buy this painting?
2. If you could stand in this room, what would you look at first, and why?

Safety first. Travel safety: choose destinations with a parent, and check the U.S. State Department’s travel advisory for any foreign country before making plans.

HANDS-ON: THREE DESTINATIONS: A MAP AND A DECISION CHART

Pick three places your family could really visit and decide, with reasons, which one fits best. This is the first page of your Trail B trip plan.

You will need

- A road atlas, a printed map or an online map
- A ruler and a pencil
- Colored pencils
- A sheet of paper for the chart

Steps

1. Write your trip’s purpose in one sentence at the top of the page.
2. Draw a simple outline map of your state or region. Mark your home with a star and label it “Home.”
3. Choose three possible destinations. Mark each with a colored dot and label it with its name.
4. Draw a straight line from home to each dot. Use the map’s scale to find each distance and write the miles on the line.
5. Add a compass rose and a scale bar in a corner.
6. Make a chart with a row for each place and columns for: Miles, Best season, Cost (low, medium or high), Fits our purpose (1–5).
7. Circle the winner and write two sentences explaining your choice.

Check your work

- My map has home, three labeled destinations, distances, a compass rose and a scale bar.
- My chart compares all three places in four columns.
- I gave reasons for my choice, starting with the purpose.

TRAVEL JOURNAL

1. **Map or diagram.** Copy your destination map into the Field Notebook, or glue it in. Label home, the three places and the miles to each.
2. **Notebook entry.** Write a paragraph of five to seven sentences: “I would choose ____ because ____.” Name your purpose, one of the four P’s, and one limit (time, money, distance or season) that helped you decide.

Did you know? Grand Tourists often traveled with a tutor nicknamed a “bear-leader,” because his job was to lead a rough young “bear” safely around Europe. Many brought home crates of paintings, books and copies of statues, and some of those collections later became parts of British museums.

Map or diagram. On a world map, trace the Grand Tour route: London, Dover, Calais, Paris, Lyon, over the Alps by the Mont Cenis pass, Turin, Florence, Rome, Naples, and home by Venice. Label each city.

Goes deeper in. Geography, Grade 4, “Maps, Places and Regions,” and History, “Ancient Rome” (coming soon).

For families. Sources: 1 Kings 10:1–13; National Gallery of Art, object page for Panini, *Interior of the Pantheon, Rome*, c. 1734 (1939.1.24); Britannica, “Grand Tour” and “Pantheon.” The Pantheon’s present building dates from Hadrian’s reign (about A.D. 113–125); it was consecrated as the church of Santa Maria ad Martyres in 609. Grand Canyon North Rim season dates are the National Park Service’s usual dates and can change with weather. Some of Panini’s other buyers were Romans and churchmen, not only tourists.

PRACTICE

1. **EASY** What is a destination?
2. **EASY** According to 1 Kings 10:1, why did the Queen of Sheba travel to Jerusalem?
3. **MEDIUM** Name the four P’s, the four common reasons people travel, with one example of each.
4. **MEDIUM** Give one advantage and one disadvantage of visiting a beach town in its off-season.
5. **CHALLENGE** On a map where 1 inch = 50 miles, three places are 3 inches, 5½ inches and 8 inches from home. How many miles away is each? If your family drives at about 50 miles per hour for no more than 6 hours a day, which places can you reach in one day?

Make it a game · Destination Twenty Questions. One player secretly picks a real destination. The others ask up to twenty yes-or-no questions, such as “Is it north of us?”, “Would we go there for the past?” or “Is it best in summer?” Whoever guesses it picks the next place. Keep an atlas open to check answers.

Scripture. “Commit thy works unto the LORD, and thy thoughts shall be established.” (Proverbs 16:3, KJV)

Choosing where to go is a plan like any other. Solomon, whom the Queen of Sheba traveled to see, wrote that we should hand our plans to the Lord first. Pray before you choose.

Practice: answers

1. The place a journey is going to.
2. She heard of Solomon’s fame and came to prove (test) him with hard questions.
3. People (visiting family), places (a national park or landmark), the past (a battlefield or museum), purpose (worship, work, a mission trip, learning). Any fitting examples.
4. Advantage: lower prices or fewer crowds. Disadvantage: colder weather, or some shops, boats and attractions may be closed.
5. 150 miles, 275 miles and 400 miles. Six hours at 50 mph is 300 miles, so the first two (150 and 275 miles) can be reached in one day; the 400-mile place cannot.

2.2 GETTING THERE: TRAIN, CAR, SHIP OR PLANE

OBJECTIVES

- Put key dates in the history of travel in order, from the first railways to the jet age.
- Use $\text{distance} \div \text{speed} = \text{time}$ to estimate how long a trip takes.
- Compare modes of transport by door-to-door time, cost, comfort and what you see.

Warm-up. Think of the farthest trip you have taken. How did you get there? Make a guess: how long would the same trip have taken on foot, at about 20 miles a day?

Video slot. Video coming. The first transcontinental railroad and the golden spike at Promontory Summit, 1869; the Wright brothers' first flight, 1903. Search approved channels (Smithsonian, National Park Service, Library of Congress, Golden Spike National Historical Park); preview first.

KEY TERMS

mode of transport

A way of traveling, such as walking, riding, car, train, ship or plane.

transcontinental railroad

A railroad that crosses a whole continent. America's first was finished in 1869.

timetable

A printed schedule showing when trains, buses, ships or planes leave and arrive.

average speed

The total distance divided by the total time. $\text{Distance} \div \text{speed} = \text{time}$.

door-to-door time

The whole time a trip takes, from leaving your front door to reaching your room, including waiting and transfers.

CORE IDEAS

For almost all of history, a traveler had four choices: walk, ride an animal, ride in a wagon or sail. A strong walker covers about 20 miles in a day. A Roman legion was trained to march about that far and then build a camp. Wind and current decided a ship's speed, so a sea voyage could take days or months. The *Mayflower* needed 66 days to cross the Atlantic in 1620.

Steam changed everything. In 1829 George and Robert Stephenson's locomotive *Rocket* won a contest at Rainhill, England, and in 1830 the Liverpool and Manchester Railway opened as the first railway between two cities to run passenger trains by steam on a **timetable**. In America, the Central Pacific built east from Sacramento and the Union Pacific built west from Omaha. On May 10, 1869, the two lines met at Promontory Summit, Utah, and a golden

spike was tapped in. A trip from coast to coast that had taken four to six months by wagon now took about a week.

On December 17, 1903, at Kitty Hawk, North Carolina, Orville Wright flew the brothers' airplane for 12 seconds and 120 feet. In 1908 Henry Ford began selling the Model T, and over the next nineteen years more than 15 million were built, so ordinary families could drive. In 1956 Congress approved the Interstate Highway System. In 1958 jet airliners began crossing the Atlantic, and today a flight from New York to London takes about seven hours.

How do you choose? Start with **average speed**: $\text{distance} \div \text{speed} = \text{time}$. A car on the highway averages about 60 miles per hour, so 240 miles takes about 4 hours. An airliner cruises at about 550 miles per hour, but planes add time on the ground: getting to the airport, security, boarding, waiting for bags. That is why travelers compare **door-to-door time**, not just time in the air. For a trip of 200 or 300 miles, driving or a train is often as fast as flying.

Speed is only one question. Ask also: What does it cost for the whole family? (A car costs about the same for one person or five; plane tickets are paid per person.) How much luggage can we bring? Who gets tired? And what will we see? A train or car shows you the country between here and there; a plane shows you clouds. Wise travelers weigh all of it.

PICTURE STUDY



East and West Shaking Hands at the Laying of the Last Rail, Andrew J. Russell, May 10, 1869 · Photograph (glass-plate negative) · Prints survive in several American libraries and museums.
Wikimedia Commons · Public domain

Andrew J. Russell was the Union Pacific's official photographer. Moments after the last spike, he made this picture of the Central Pacific engine *Jupiter* (left) and Union Pacific No. 119 (right) touching front to front, with the chief engineers of the two lines shaking hands.

Thousands of Chinese workers built much of the Central Pacific through the Sierra Nevada mountains, but few of them appear in this famous picture.

Look closely

- Find the two men shaking hands in the middle. Why put them there?
- Find the two engines. How are they different in shape?
- Find men standing on the engines. Why do you think they climbed up?

Talk about it

1. Why was this handshake a fitting picture for the joining of East and West?
2. How would this railroad change a family's choice of how to travel west?

Safety first. Travel safety: in a car, wear a seat belt every time; on a train platform, stay behind the marked line; on a ship, learn where your life jackets are; on a plane, keep your seat belt fastened while seated.

HANDS-ON: FOUR WAYS THERE: A COMPARISON CHART AND BAR GRAPH

Pick a real trip (your destination from Stop B1 is ideal) and compare four ways of getting there.

You will need

- Graph paper and a ruler
- Colored pencils
- A map or online map for the distance
- A calculator (optional)

Steps

1. Find the distance from home to the destination in miles.
2. Use these average speeds: walking 3 mph, car 60 mph, train 50 mph, plane 500 mph. Divide the distance by each speed to get travel time.
3. Add ground time: car, add 1 hour for stops; train, add 1 hour to get to and from stations; plane, add 3 hours for getting to the airport, security, boarding and bags.
4. Make a chart with columns: Mode, Travel time, Ground time, Door-to-door time, What we would see.
5. Draw a bar graph. Label the bottom "Mode of transport" with four bars (car, train, plane, walking) and the side "Hours door to door." Give it a title.
6. Circle the mode you would choose and write why in two sentences.

Check your work

- I used $\text{distance} \div \text{speed} = \text{time}$ correctly.
- I added ground time to find door-to-door time.

- My bar graph has a title, labeled axes and four labeled bars.

TRAVEL JOURNAL

1. **Map or diagram.** Draw a timeline from 1620 to 1958. Mark and label: *Mayflower* (1620), *Rocket* (1829), Liverpool and Manchester Railway (1830), golden spike (1869), Wright brothers (1903), Model T (1908), interstate highways (1956), jets cross the Atlantic (1958).
2. **Notebook entry.** Write a paragraph: Which mode of transport would you choose for your trip, and why? Use at least one number (miles, hours or dollars) as evidence.

Did you know? Before 1883, American towns kept their own local time, which made railroad timetables a puzzle. On November 18, 1883, the railroads began using standard time zones. The railroads, not Congress, made the change; Congress made time zones law in 1918.

Map or diagram. On a map of the United States, draw the first transcontinental line: Omaha, Nebraska, to Promontory Summit, Utah (Union Pacific, in one color) and Sacramento, California, to Promontory Summit (Central Pacific, in another). Label the Rocky Mountains and the Sierra Nevada.

Goes deeper in. Geography, “Technology Overcoming Geography” (coming soon), and Arithmetic, “Rate, Time and Distance” (coming soon).

For families. Sources: National Park Service, Golden Spike National Historical Park; Smithsonian National Air and Space Museum (1903 Wright Flyer); Britannica, “Liverpool and Manchester Railway.” Coast-to-coast times are approximate: overland wagon trips commonly took four to six months, and early transcontinental rail trips from New York to San Francisco about a week. Regular transatlantic jet service began in October 1958. Speeds in the project are round numbers for practice, not exact figures for any route.

PRACTICE

1. **EASY** On what date was America’s first transcontinental railroad completed, and where?
2. **EASY** How long and how far was the Wright brothers’ first flight on December 17, 1903?
3. **MEDIUM** A family drives 240 miles at an average of 60 miles per hour. How long does the drive take?
4. **MEDIUM** The Mayflower took 66 days to cross the Atlantic. How many hours is that? About how many times longer is it than a 7-hour jet flight?
5. **CHALLENGE** A family of four is going 420 miles. Driving: 60 mph plus 1 hour of stops; gas costs \$49 for the whole trip. Flying: 1 hour to the airport, 2 hours before the flight, a 1¼-hour flight and 1 hour to the hotel; tickets are \$180 each. Find the door-to-door time and cost for each. Which saves time, and how much? Which saves money, and how much?

Make it a game • Fastest Way There. A caller names a trip and a distance, such as “across town, 5 miles,” “to the next state, 250 miles,” or “across the ocean, 3,500 miles.” Players hold up a card (walk, car, train, ship, plane) for the best mode and must give one reason. Anyone who gives a good reason scores a point, even if others chose differently.

Scripture. “If I take the wings of the morning, and dwell in the uttermost parts of the sea; Even there shall thy hand lead me, and thy right hand shall hold me.” (Psalm 139:9–10, KJV)

David could not have imagined a jet airliner, yet he knew that no speed or distance can carry us beyond God’s care. Whether by car, train, ship or plane, His hand leads us.

Practice: answers

1. May 10, 1869, at Promontory Summit, Utah.
2. 12 seconds and 120 feet.
3. $240 \div 60 = 4$ hours.
4. $66 \times 24 = 1,584$ hours. $1,584 \div 7 \approx 226$, so about 226 times longer.
5. Driving: $420 \div 60 = 7$ hours + 1 = 8 hours, \$49. Flying: $1 + 2 + 1\frac{1}{4} + 1 = 5\frac{1}{4}$ hours, $4 \times \$180 = \720 . Flying saves $2\frac{3}{4}$ hours; driving saves \$671.

2.3 A BUDGET: TRAVEL, ROOMS, FOOD, EXTRAS

OBJECTIVES

- Sort trip costs into four categories plus a cushion.
- Figure costs per night and per person per day, and add them into a total.
- Adjust a budget that runs over by cutting or changing one category.

Warm-up. Guess: for a family trip of three days, which costs the most, the travel, the rooms, the food or the extras? Write your guess down and check it at the end of the stop.

Video slot. Video coming. Thomas Cook and the first railway excursion of 1841; how to make a simple budget for kids. Search approved channels (Smithsonian, a museum or library channel, a personal-finance channel for children); preview first.

KEY TERMS

budget

A plan for how money will be spent, made before it is spent.

category

A group of things that belong together, such as all the food costs of a trip.

per person per day

The cost for one traveler for one day. Multiply by the number of people and days to find the total.

cushion

Extra money set aside for surprises, often about one tenth of the budget.

excursion

A short trip or outing, often arranged for a group at a set price.

CORE IDEAS

A **budget** is a plan for money before it is spent. Without one, a trip can cost twice what a family expected. Nearly every trip budget has four **categories**: **travel** (gas, tickets, parking), **rooms** (a hotel, a rented cabin, a campsite), **food**, and **extras** (admission tickets, souvenirs, tips). Wise planners add a fifth line, a **cushion**, for flat tires and rainy-day surprises.

One man who understood travel budgets was Thomas Cook, a Baptist preacher and cabinetmaker from England. On July 5, 1841, he arranged a special train to carry about 500 people the eleven or so miles from Leicester to Loughborough for a temperance meeting. By booking the whole train, he got a low group price: one shilling for the round trip. That **excursion** was the start of a business that took ordinary people to the seaside, to the Great Exhibition in London in 1851, to Europe, to the Holy Land and, in 1872, around the world.

Start with travel and rooms, because they are usually the largest costs. A drive's gas cost is the miles divided by the car's miles per gallon, times the price of a gallon. Plane and train tickets are paid per person. For rooms, remember that a trip of 3 days usually has only 2 nights, so $\text{nights} = \text{days} - 1$. Multiply the nightly price by the nights, and remember taxes and fees.

Next comes food, figured **per person per day**. If breakfast costs \$8, lunch \$12 and dinner \$20, one person eats \$40 a day; four people for three days eat $4 \times 3 \times \$40 = \480 . Packing picnic lunches or choosing a room with a small kitchen can cut that a great deal. Extras come last: museum tickets, a boat ride, a few postcards. Decide the extras ahead of time, so the gift shop does not decide for you.

Here is a whole budget for a family of four, three days and two nights: travel \$90, rooms $2 \times \$140 = \280 , food $4 \times 3 \times \$35 = \420 (with picnic lunches), extras \$160. That adds to \$950. A cushion of about 10 percent, \$95, makes \$1,045. If the family has only \$1,000, something must change: cheaper rooms, more picnics or fewer extras. During the trip, keep receipts and write down every expense. Checking the budget each evening keeps small leaks from becoming a flood.

PICTURE STUDY



The Travelling Companions, Augustus Leopold Egg, 1862 · Oil on canvas · Birmingham Museum and Art Gallery, England
Wikimedia Commons · Public domain

Augustus Egg was an English painter. Here two young women, probably sisters, ride in a comfortable first-class railway compartment along a sunny coast, often thought to be the Mediterranean near Menton in the south of France. In the 1800s railways sold first-, second- and third-class tickets. First class cost the most and gave soft seats, space and quiet.

Look closely

- Find three signs that this is an expensive, first-class compartment.
- Find what each traveler is doing. How are the two sides of the picture alike, almost like a mirror?
- Find the view through the window. Is the sitter who is asleep missing it?

Talk about it

1. Would you rather pay for first class or use the money for something at the destination? Why?
2. What would a third-class carriage of 1862 have looked like by comparison?

Safety first. Travel safety: carry only the cash you need for the day, keep it in a front pocket or zipped bag, and let a parent hold the cards and the rest of the money.

HANDS-ON: MY TRIP BUDGET AND BUDGET GRAPH

Build a real budget for your Trail B trip. Ask a parent to help you find honest prices.

You will need

- Lined paper or a spreadsheet
- A calculator
- Colored pencils and a ruler
- Prices from a parent, a map site, a hotel site or a restaurant menu

Steps

1. Write the number of travelers, days and nights at the top.
2. Travel: find the miles (from Stop B2) and figure gas, or find ticket prices per person.
3. Rooms: price per night $\times$ number of nights.
4. Food: decide a cost per person per day, then multiply by people and days.
5. Extras: list each ticket or activity with its price, plus a small souvenir amount.
6. Add the four categories. Add a 10 percent cushion. Write the grand total.
7. Draw a bar graph with five labeled bars: Travel, Rooms, Food, Extras, Cushion. Label the side in dollars and give the graph a title.
8. If the total is more than your family's limit, change one category and show the new total.

Check your work

- My budget has all four categories and a cushion.
- I used per night and per person per day correctly.
- My bar graph has a title, labeled bars and a dollar scale.

TRAVEL JOURNAL

1. **Map or diagram.** Copy your budget bar graph into the Field Notebook. Shade the largest category in red and the smallest in green.
2. **Notebook entry.** Write a paragraph: Which category cost the most? Was your warm-up guess right? Name one way your family could save money without spoiling the trip's purpose.

Did you know? Thomas Cook's company printed "circular notes" in 1874 that travelers could exchange for local money at banks and hotels abroad, an early form of the traveler's check. American Express introduced its own traveler's cheques in 1891.

Map or diagram. On a map of England, mark Leicester and Loughborough and draw the railway line between them. Use the map's scale to check the distance of Cook's first excursion.

Goes deeper in. Small Business & Economics, "Saving and Spending," and Arithmetic, "Money and Percent" (coming soon).

For families. Sources: Britannica, "Thomas Cook"; Thomas Cook Archive histories. Accounts of the 1841 excursion give the crowd as about 500 (Cook later said 570); the distance is about 11-12 miles. Prices in the stop are round sample numbers; use real local prices for the project. Egg's painting is in the Birmingham collection; the identification of the coast as near Menton is traditional. The 10 percent cushion is a common rule of thumb, not a fixed rule.

PRACTICE

1. **EASY** Name the four main categories in a trip budget and the extra line wise planners add.
2. **EASY** A trip lasts 5 days. How many nights of rooms are needed?
3. **MEDIUM** A cabin costs \$125 a night. What is the cost for 3 nights?
4. **MEDIUM** Food is planned at \$30 per person per day. What is the food budget for 5 people for 4 days?
5. **CHALLENGE** A family has \$1,200. Travel is \$180, rooms \$420, food \$360 and extras \$150. Add a 10 percent cushion. Is the family over or under its limit, and by how much? Suggest one change that fixes it.

Make it a game • Budget Shopkeeper. Give each player \$200 in play money for an imaginary day in a city. A shopkeeper lays out priced cards: museum \$25, boat ride \$40, lunch \$15, dinner \$25, souvenir \$12, taxi \$20, bus pass \$6. Each player must buy two meals and a way to get around, then plan the rest of the day. Whoever has the fullest day and still has money left wins.

Scripture. “The thoughts of the diligent tend only to plenteousness; but of every one that is hasty only to want.” (Proverbs 21:5, KJV)

A careful budget is diligence with money. Planning ahead brings enough; spending in a hurry brings want. Good stewards count the cost before they go.

Practice: answers

1. Travel, rooms, food and extras, plus a cushion for surprises.
2. 4 nights (days – 1).
3. $3 \times \$125 = \375 .
4. $5 \times 4 \times \$30 = \600 .
5. $180 + 420 + 360 + 150 = \$1,110$. Cushion: \$111. Total: \$1,221, which is \$21 over. Any change that saves at least \$21 works, such as cutting extras to \$125 or packing picnic lunches.

2.4 AN ITINERARY, DAY BY DAY

OBJECTIVES

- Explain where the word *itinerary* comes from and how Roman and early Christian travelers used itineraries.
- Build a day-by-day plan that starts with fixed points and leaves buffer time.
- Add and subtract clock times to schedule a day.

Warm-up. Write down everything you did yesterday with the time you started each thing. That list is an itinerary of the past. Today you will learn to write one for the future.

Video slot. Video coming. The Peutinger Map (Tabula Peutingeriana) and Roman roads and milestones. Search approved channels (Austrian National Library, British Museum, a university classics channel, Smithsonian); preview first.

KEY TERMS

itinerary

A plan of a journey, listing places, times and travel day by day.

itinerarium

Latin for a Roman road list or map giving towns, stopping places and the miles between them.

fixed point

A part of a plan that cannot move, such as a train departure, a ticket for a set time or Sunday worship.

buffer time

Extra time left in a plan for delays, rest or surprises.

opening hours

The days and times a place is open to visitors.

CORE IDEAS

The word **itinerary** comes from the Latin *iter*, meaning “journey” or “road.” Roman travelers used an *itinerarium*, a list of towns and stopping places along a road with the distance between them in Roman miles. Along the great roads stood stone milestones, and about a day’s journey apart there were stations where travelers and messengers could sleep, eat and change horses. A Roman with a good itinerary knew where he would spend each night before he set out.

Two famous Roman itineraries survive. The *Antonine Itinerary*, probably first put together in the A.D. 200s, lists hundreds of routes across the empire. The **Peutinger Table** is a long, narrow painted road map: a copy made around A.D. 1200 of a Roman original, now kept in

the Austrian National Library in Vienna. In A.D. 333 a Christian pilgrim from Bordeaux, in what is now France, wrote down every stop on his journey to Jerusalem. The *Bordeaux Itinerary* is the oldest surviving account of a Christian pilgrimage to the Holy Land.

Your itinerary begins with **fixed points**, the things that cannot move: when you leave and return, tickets for set times, Sunday worship, and the **opening hours** of places you want to see. Many museums close one day a week, often Monday or Tuesday, and many national park visitor centers keep shorter hours in winter. Write the fixed points in first; everything else fits around them.

Then fill each day. A good rule is **one big thing** a day, such as a long hike or a large museum, plus one or two smaller things. Plan meals, since hungry travelers make poor decisions, and plan travel time between places. Then add **buffer time**: if a museum visit should take 2 hours, leave 2½. If the walk to lunch is 20 minutes, allow 30. Trains are missed and children get tired, and a plan with no spare minutes breaks at the first delay.

Write the plan as a table, one section per day, with columns for time, place, activity, how you will get there, cost and notes. Give a copy to someone at home, so they know where you will be. Then hold the plan with an open hand. The apostle James warned travelers who said, “To day or to morrow we will go into such a city,” that they should say instead, “If the Lord will.” Plan carefully, then let God direct the day.

PICTURE STUDY



The Peutinger Table (Tabula Peutingeriana), Unknown copyist, after a Roman original, Copy made about 1200 of a map from late Roman times · Ink and color on parchment, eleven sheets, about 22 feet long and 13 inches high · Austrian National Library, Vienna
Wikimedia Commons · Public domain

The map is named for Konrad Peutinger, a scholar of Augsburg, Germany, who received it in 1508. It shows Roman roads from Britain to India, but squeezes everything into a strip like a long scroll. It was not drawn to show true shapes. It was drawn to show which road leads to which town, and how far, which is exactly what an itinerary needs.

Look closely

- Find the red road lines. Look for the little kinks or steps in them: each step marks a stopping place, with a number for the miles.
- Find small pictures of buildings. These marked important towns and places to stay.
- Find the seas. Why are they drawn as thin ribbons?

Talk about it

1. Why would a traveler care more about roads and miles than about the true shape of the land?
2. How is this map like a subway map today?

Safety first. Travel safety: leave a copy of your itinerary, with hotel names and phone numbers, with a relative or friend at home, and tell them if your plans change.

HANDS-ON: A THREE-DAY ITINERARY GRID

Write a three-day itinerary for your Trail B trip, using what you planned in Stops B1-B3.

You will need

- Graph paper or a ruled table
- A ruler and colored pencils
- Opening hours and prices for places you want to visit (a parent can help find them)

Steps

1. Draw a grid with three columns (Day 1, Day 2, Day 3) and rows for each hour from 7 a.m. to 9 p.m. Label the top and the side.
2. Color the fixed points first in red: departure, arrival, tickets with set times, worship, closing times.
3. Choose one big thing for each day and color its block in blue.
4. Add meals in green and travel time between places in gray.
5. Leave at least one empty half-hour each morning and afternoon as buffer time, colored yellow.
6. Add a key (legend) showing what each color means.
7. Under the grid, list for each place: address, cost and how you will get there.

Check your work

- My grid has three labeled days and hour-by-hour rows.
- Fixed points went in first, and each day has one big thing.
- I left buffer time and made a color key.

TRAVEL JOURNAL

1. **Map or diagram.** Draw a strip map in the style of the Peutinger Table: one long straight line for your route, with a small kink and a town drawing at each stop, and the miles written between stops. Label start and finish.
2. **Notebook entry.** Write a paragraph describing the best day of your itinerary as if it had already happened. Then write one sentence: what might go wrong, and how does your buffer time help?

Did you know? A Roman mile was 1,000 paces, *mille passus*, where a pace was two steps. It came to about 1,480 meters, a little shorter than our mile of 1,609 meters. Our word “mile” comes from that Latin *mille*, a thousand.

Map or diagram. Try the free website OmnesViae, which turns the Peutinger Table into a Roman route planner. Plan a trip from Rome to Jerusalem and list the stops it gives.

Goes deeper in. History, “The Roman Empire” (coming soon), Geography, Grade 4, “Maps and Distance,” and Arithmetic, “Telling Time and Elapsed Time” (coming soon).

For families. Sources: Austrian National Library (Codex 324, Tabula Peutingeriana; UNESCO Memory of the World, 2007); Britannica, “Peutinger Table” and “Antonine Itinerary”; the *Itinerarium Burdigalense* (A.D. 333). The date of the Roman original behind the Peutinger Table is debated (suggestions range from the 300s to the 400s), and the copy itself is dated to the late 1100s or early 1200s; the stop says “about 1200.” The map’s westernmost sheet, with most of Britain and Spain, is lost. The Scripture quotation in the story is James 4:13 and 4:15.

PRACTICE

1. **EASY** What Latin word does “itinerary” come from, and what does it mean?
2. **EASY** What is the Bordeaux Itinerary, and when was it written?
3. **MEDIUM** A museum opens at 9:30 a.m. You plan 2½ hours inside, then a 20-minute walk to lunch. What time do you reach lunch?
4. **MEDIUM** Your train leaves at 10:45 a.m. The station is 25 minutes from the hotel, and you want 15 minutes of buffer at the station. When must you leave the hotel?
5. **CHALLENGE** You arrive in a town on Monday at 4 p.m. and must leave Wednesday at 11 a.m. The town museum is closed Tuesdays and open 9 a.m. to 5 p.m. other days; a visit takes 3 hours, and you need 1 hour to check out and reach the station. Can you fit in the museum? If so, when?

Make it a game • Itinerary Scramble. Write ten activity cards with times and lengths, such as “Train leaves 9:15,” “Lunch, 1 hour,” “Castle tour, 2 hours, last entry 3 p.m.,” “Church at 10:00.” Shuffle and deal them out. Players race to arrange the cards into a workable day with no overlaps. The first correct plan wins; the judge checks every time.

Scripture. “For that ye ought to say, If the Lord will, we shall live, and do this, or that.” (James 4:15, KJV)

James was writing to people who planned trips to other cities for business. He did not forbid planning; he taught that every plan belongs to God. A Christian itinerary is written in pencil, held with an open hand.

Practice: answers

1. *Iter*, meaning journey or road.
2. A record of every stop of a Christian pilgrim’s journey from Bordeaux to Jerusalem, written in A.D. 333; the oldest surviving account of a Christian pilgrimage to the Holy Land.
3. $9:30 + 2:30 = 12:00$; $12:00 + 0:20 = 12:20$ p.m.

4. $25 + 15 = 40$ minutes before 10:45, so by 10:05 a.m.
5. Monday: only 1 hour left before closing, not enough. Tuesday: closed. Wednesday: you must leave the museum by 10 a.m. to check out and reach the station by 11, which gives only 1 hour. So the museum cannot fit; the family must drop it, or change the arrival or departure time.

2.5 PACKING LISTS AND THE ONE-BAG CHALLENGE

OBJECTIVES

- Write a packing list organized by categories.
- Know the carry-on rules for liquids and what must stay in your own bag.
- Pack for a week in one bag you can carry yourself.

Warm-up. Without looking anything up, list everything you would need for a week away. Set the list aside. At the end of the stop, see what you forgot and what you did not really need.

Video slot. Video coming. How to pack a carry-on bag for a week; rolling versus folding clothes; the TSA liquids rule. Search approved channels (TSA, a scouting channel, a family travel channel); preview first.

KEY TERMS

packing list

A written list of everything to bring, checked off as each thing goes into the bag.

carry-on

A bag small enough to take onto a plane and keep with you.

checked bag

A larger bag handed to the airline to ride in the hold of the plane.

layering

Wearing several thin pieces of clothing that can be added or taken off as the weather changes.

3-1-1 rule

The U.S. airport rule for liquids in a carry-on: containers of 3.4 ounces (100 milliliters) or less, in 1 quart-size bag, 1 bag per traveler.

CORE IDEAS

Travelers have always had to decide what to carry. In the 1800s, well-to-do families traveled with great wooden trunks that porters lifted onto trains and ships. A “steamer trunk” was built low so it would slide under a bed in a ship’s cabin. Suitcases had no wheels at all until Bernard Sadow patented a rolling suitcase in 1972, and in the late 1980s an airline pilot named Robert Plath designed the upright “Rollaboard” with a pull handle, the shape most carry-ons have today.

Good packing starts with a **packing list**, written days before you go, in categories:

documents and money; medicines; clothes; toiletries (toothbrush, soap, comb); **gear** (charger, water bottle, flashlight); and **comfort** (a book, a journal, a small pillow). Check off

each item as it goes in. Keep the list in the bag and use it again when you pack to come home, so nothing is left in the hotel drawer.

Clothes take the most room. Look at the itinerary and the weather forecast, and choose clothes that mix and match. One handy rule for a week is **5-4-3-2-1**: five pairs of socks and underwear, four tops, three bottoms, two pairs of shoes, one jacket or hat. Four tops and three bottoms make $4 \times 3 = 12$ different outfits. Use **layering** instead of a heavy coat, roll soft clothes tightly, and wear your bulkiest shoes and jacket on travel day.

Flying has its own rules. A **carry-on** on most U.S. airlines must be about 22 by 14 by 9 inches or smaller, and a **checked bag** is often limited to 50 pounds. Liquids in a carry-on follow the **3-1-1 rule**. Things you cannot do without, such as passports, medicine, money, glasses and keys, always stay in the bag you keep with you, never in a checked bag that could be lost. Rules change, so check the Transportation Security Administration's website before each trip.

Now the **one-bag challenge**: pack for a whole week in a single bag you can carry yourself, up stairs, for ten minutes. Doctors often suggest that a child's loaded backpack weigh no more than about 10 to 20 percent of the child's body weight. A light traveler moves faster, never waits at baggage claim, loses less and has hands free to hold a younger brother or sister. The writer of Hebrews urged Christians to "lay aside every weight" to run their race well. It is good advice for suitcases too.

PICTURE STUDY



The Last of England, Ford Madox Brown, 1852–1855 · Oil on panel · Birmingham Museum and Art Gallery, England

Wikimedia Commons · Public domain

In the 1850s many British families left home for good, sailing to Australia, America or Canada. Ford Madox Brown painted this couple after his friend, the sculptor Thomas Woolner, sailed for Australia in 1852. Brown and his wife posed for the faces, and he painted much of it outdoors to catch the cold, gray light. Everything this family would need in a new land had to be packed for a voyage of months.

Look closely

- Find the cabbages hanging on the rail. Why would travelers pack them for a long voyage?
- Find the umbrella and the shawl. How are the travelers dressed for the weather?
- Find the white cliffs in the distance. What are the travelers leaving behind?

Talk about it

1. If your family were moving across the world and could take only a few trunks, what would you be sure to pack?
2. How does the painter show the feelings of the travelers without any words?

Safety first. Travel safety: keep medicine in its original labeled bottle in your carry-on, never pack anything a grown-up has not checked, and never carry a bag for a stranger.

HANDS-ON: THE ONE-BAG CHALLENGE

Pack for a real or pretend seven-day trip in one carry-on or backpack, then prove you can carry it.

You will need

- A carry-on suitcase or backpack
- A tape measure and a bathroom scale
- Your clothes and travel things
- A pencil and your packing list

Steps

1. Write a packing list in six categories: documents and money, medicines, clothes, toiletries, gear, comfort.
2. Measure your bag. Write its length, width and depth. Is it $22 \times 14 \times 9$ inches or smaller?
3. Lay everything on a bed first. Remove anything you cannot name a use for.
4. Pack heavy things (shoes) at the wheel or bottom end, rolled clothes in the middle, and things you need on the way at the top.
5. Weigh yourself, then weigh yourself holding the bag. Subtract to find the bag's weight. Find what percent of your body weight it is.

6. Carry the bag up and down stairs or around the yard for ten minutes. Could you do it on a real trip?
7. Unpack, check off the list and write what you would change.

Check your work

- My list has six categories, and everything was checked off.
- My bag fit the carry-on size, and I found its weight and percent.
- I carried it myself for ten minutes.

TRAVEL JOURNAL

1. **Map or diagram.** Draw your open suitcase seen from above. Label each zone: shoes, rolled clothes, toiletries bag, documents pocket, things needed on the way. Write the bag's measurements along two edges.
2. **Notebook entry.** Write a paragraph about the one-bag challenge: What was hardest to leave behind? What did you pack that you did not need? Compare your warm-up list with your final list.

Did you know? In the 1800s ocean liners had “hold” luggage stored below and “wanted on voyage” luggage delivered to the cabin. Travelers labeled their trunks so porters would know which was which. Our carry-on and checked bag are the same idea.

Map or diagram. On a world map, trace the sea route from England to Australia in the 1850s: south past Africa's Cape of Good Hope and east across the Indian Ocean. Label England, the Cape, the Indian Ocean and Melbourne. Ships took about three months.

Goes deeper in. Geography, “Technology Overcoming Geography” (coming soon), and Arithmetic, “Volume and Measurement” (coming soon).

For families. Sources: Birmingham Museums Trust (*The Last of England*, 1852–55); U.S. Patent 3,653,474 (Sadow, 1972); Transportation Security Administration, “What Can I Bring?” and the 3-1-1 liquids rule. Carry-on sizes and checked-bag weights vary by airline, and TSA rules can change; check before you fly. Pediatric guidance on backpack weight is commonly given as 10 to 20 percent of body weight. The story of Plath's Rollaboard (about 1987) is widely told by the company he founded. The sailing time to Australia varied; about three months was typical in the 1850s.

PRACTICE

1. **EASY** What do the three numbers in the 3-1-1 rule stand for?
2. **EASY** Name three things that should always go in the bag you keep with you, never in a checked bag.
3. **MEDIUM** Using the 5-4-3-2-1 rule, how many different top-and-bottom outfits can you make?

4. **MEDIUM** A student weighs 80 pounds. Using the 10 to 20 percent guide, what is the heaviest backpack the student should carry?
5. **CHALLENGE** A carry-on is $22 \times 14 \times 9$ inches inside. A packing cube is $12 \times 9 \times 4$ inches. Find the volume of each. By volume alone, how many cubes could fit? Why might fewer fit in real life?

Make it a game • Pack It or Leave It. A caller holds up or names an item: “a fourth pair of shoes,” “toothbrush,” “a full-size shampoo bottle,” “passport,” “a heavy dictionary,” “a rain jacket.” Players shout “Pack it!” or “Leave it!” and must give a reason. For a carry-on round, the caller adds the airport rules. Anyone with a good reason scores a point.

Scripture. “Wherefore seeing we also are compassed about with so great a cloud of witnesses, let us lay aside every weight, and the sin which doth so easily beset us, and let us run with patience the race that is set before us.” (Hebrews 12:1, KJV)

A runner does not carry a suitcase. The writer of Hebrews tells Christians to put down whatever slows them on the road of faith, especially sin. Traveling light is a picture of living free.

Practice: answers

1. Containers of 3.4 ounces (100 mL) or less, in 1 quart-size bag, 1 bag per traveler.
2. Any three: passport or ID, medicine, money or cards, glasses, keys, phone.
3. $4 \text{ tops} \times 3 \text{ bottoms} = 12 \text{ outfits}$.
4. $10\% \text{ of } 80 = 8 \text{ pounds}$; $20\% \text{ of } 80 = 16 \text{ pounds}$. No more than about 16 pounds, and closer to 8 is easier.
5. Bag: $22 \times 14 \times 9 = 2,772 \text{ cubic inches}$. Cube: $12 \times 9 \times 4 = 432 \text{ cubic inches}$. $2,772 \div 432 \approx 6.4$, so 6 cubes by volume. Fewer may fit because the shapes do not fill every corner, and the handle and wheels take room inside.

2.6 PASSPORTS, CUSTOMS AND CURRENCY

OBJECTIVES

- Explain what a passport, a visa and customs are, with an example from Scripture and from history.
- Tell why many foods and plants may not cross borders.
- Convert prices between two currencies using an exchange rate.

Warm-up. Look at a coin or a bill. Find three things printed on it that show which country made it. Why would a shop in another country not take it?

Video slot. Video coming. What happens at passport control and customs; the USDA Beagle Brigade detector dogs at airports; how exchange rates work. Search approved channels (U.S. Customs and Border Protection, USDA, U.S. Department of State, Federal Reserve Education); preview first.

KEY TERMS

passport

An official booklet from your own country's government that proves who you are and which nation you belong to, so you can travel abroad and come home.

visa

Permission from another country to enter it, often a stamp or page added to your passport.

customs

The government office at a border that checks what travelers bring in, and the taxes it collects.

duty

A tax charged on certain goods brought into a country.

exchange rate

How much of one country's money you get for one unit of another's. It changes every day.

CORE IDEAS

Asking a ruler for a letter of safe travel is very old. About 445 B.C., Nehemiah, cupbearer to the Persian king Artaxerxes, asked for letters "to the governors beyond the river, that they may convey me over till I come into Judah" (Nehemiah 2:7). The king agreed and sent army captains and horsemen with him. In the Middle Ages, kings issued "safe-conduct" letters, and in England such papers came to be called passports. The word is usually explained as coming from the French for passing through a port or gate.

The modern **passport** booklet with a photograph took shape after the First World War. In 1920 a League of Nations conference in Paris agreed on a standard design that most

countries soon followed. A U.S. passport book is good for 10 years for adults and 5 years for children under 16, and children under 16 usually must apply in person with both parents. The data page shows your photo, name, birth date and nationality, and at the bottom are two lines of letters and arrows that a machine can read. Since the mid-2000s, U.S. passports have also held a small chip. Some countries also require a **visa**, and many require that your passport be valid for six months after your trip ends.

At the border you meet **customs**. Officers ask what you are bringing in, and you must answer truthfully. Some goods over a set value owe a **duty**. Many fresh fruits, meats, plants and even soil are banned, because they can carry insects or diseases that could ruin a nation's farms. At American airports, beagles of the U.S. Department of Agriculture's "Beagle Brigade" sniff luggage for forbidden food.

Every country has its own currency. Euro coins and notes first appeared on January 1, 2002, and today more than twenty European countries use them. Britain uses the pound sterling, Japan the yen, Mexico the peso. The **exchange rate** tells you how to convert. If 1 dollar buys 0.90 euros, then \$50 buys $50 \times 0.90 = €45$. Going the other way, if 1 euro costs \$1.10, a €20 museum ticket costs $20 \times 1.10 = \$22$. Rates change daily, so look up the real one before you go.

Changing money costs something too. Counters at airports often give a worse rate or charge a fee, so compare. Many travelers use a bank card and carry only a little local cash. Keep receipts, count your change and be honest, as you would at home. The money changers of old weighed coins on small scales, and the Bible teaches that "a just weight is his delight" (Proverbs 11:1).

PICTURE STUDY



The Money Changer and His Wife, Marinus van Reymerswaele, 1539 · Oil on panel · Museo del Prado, Madrid

Wikimedia Commons · Public domain

Marinus van Reymerswaele worked in the Netherlands in the 1500s, when the busy port of Antwerp was full of merchants with coins from many lands. A money changer had to know what each coin was worth and whether it was full weight or had been clipped or worn. Reymerswaele painted this subject several times, following an earlier picture by Quentin Massys.

Look closely

- Find the scale. What is the man checking?
- Find the coins. Do they all look alike?
- Find the book. What do you think the woman is writing or reading?

Talk about it

1. Why did a traveler of 1539 need a money changer?
2. What would make a money changer honest or dishonest? Read Proverbs 11:1.

Safety first. Travel safety: keep your passport in a zipped inside pocket or a pouch worn under your clothes, give it only to officials and your parents, and leave a photocopy of it at home.

HANDS-ON: MY PRACTICE PASSPORT AND CURRENCY CARD

Make a practice passport data page (clearly marked SPECIMEN) and a pocket card to convert prices for your trip.

You will need

- Cardstock and a ruler
- A small photo or a self-portrait drawing
- Colored pencils and a fine pen
- Today's exchange rate for one foreign currency (a parent can look it up)

Steps

1. Draw a rectangle about 5 by 3½ inches, the size of a passport page. Write SPECIMEN across the top.
2. Place your photo or drawing on the left. On the right, add labeled lines: Surname, Given names, Nationality, Date of birth, Place of birth, Date of issue, Date of expiration.
3. At the bottom, draw two lines of letters and "<" arrows for the machine-readable zone. Label it.
4. Draw and label a small gold rectangle for the chip symbol on the cover side.
5. On a second card, write the exchange rate. Make a two-column table: dollars (\$1, \$5, \$10, \$20, \$50) and the matching foreign amounts.
6. Add a third column showing what three real items cost there, in both currencies.

Check your work

- My data page has every label, a photo and a machine-readable zone, and says SPECIMEN.
- My currency card uses a real rate and correct multiplication.
- I can explain what each part of a passport is for.

TRAVEL JOURNAL

1. **Map or diagram.** Draw a simple map of a traveler's path through an airport on arrival from abroad: plane, passport control, baggage claim, customs, exit. Label each station and draw arrows.
2. **Notebook entry.** Write a paragraph explaining why countries check passports and bags at the border. Use one example from Nehemiah 2 and one from today, such as the Beagle Brigade.

Did you know? The USDA began its "Beagle Brigade" in 1984. Beagles are used because they have keen noses, are gentle with crowds and are small enough not to frighten travelers. Each dog learns dozens of food smells, and when it finds one it simply sits down beside the bag.

Map or diagram. On a map of Europe, color the countries that use the euro in one color and label three that do not, such as the United Kingdom, Switzerland and Norway. Write the currency name in each country you label.

Goes deeper in. Geography, Grade 8, “Countries and Borders,” and Small Business & Economics, “Money and Trade” (coming soon).

For families. Sources: Nehemiah 2:1–9 (the twentieth year of Artaxerxes I, usually dated 445 or 444 B.C.); U.S. Department of State, travel.state.gov (passport validity and minors’ applications); U.S. Customs and Border Protection and USDA APHIS (Beagle Brigade); European Central Bank (euro banknotes and coins from January 1, 2002). The origin of the word “passport” is not certain. The number of euro countries has grown over time, so the stop says “more than twenty.” The exchange rates in the stop are sample numbers for practice.

PRACTICE

1. **EASY** What is the difference between a passport and a visa?
2. **EASY** Why are many fresh fruits, meats and plants not allowed through customs?
3. **MEDIUM** If 1 dollar buys 0.90 euros, how many euros do you get for \$50?
4. **MEDIUM** A souvenir costs €18. If 1 euro costs \$1.10, what is the price in dollars?
5. **CHALLENGE** You want to change \$200. Counter A takes a \$5 fee first, then gives 0.92 euros per dollar. Counter B charges no fee and gives 0.88 euros per dollar. Which gives more euros, and how many more?

Make it a game • Border Crossing. One player is the customs officer at a table; the others are travelers with a bag holding three item cards (for example “a book,” “an apple,” “a sausage,” “a scarf,” “a potted plant,” “chocolate”). Each traveler declares what is in the bag. The officer must say which items may enter and which must be left behind, with a reason. Anyone who declares honestly earns a stamp in a paper passport.

Scripture. “Moreover I said unto the king, If it please the king, let letters be given me to the governors beyond the river, that they may convey me over till I come into Judah;” (Nehemiah 2:7, KJV)

Nehemiah prayed first (Nehemiah 2:4), then asked the king for letters of safe passage. He trusted God and also used the proper papers. Christians obey good laws at borders as everywhere.

Practice: answers

1. A passport comes from your own country and proves who you are and your nationality. A visa is permission from another country to enter it.
2. They can carry insects or diseases that could harm a country’s farms, animals and forests.
3. $50 \times 0.90 = €45$.

4. $18 \times 1.10 = \$19.80$.

5. A: $(200 - 5) \times 0.92 = 195 \times 0.92 = \text{€}179.40$. B: $200 \times 0.88 = \text{€}176.00$. Counter A gives €3.40 more.

2.7 COURTESY ABROAD: GREETINGS, MANNERS AND BEING A GOOD GUEST

OBJECTIVES

- Describe greetings and manners from at least four countries.
- Say hello, please and thank you in three languages.
- Explain from Scripture why a Christian traveler should be a gracious guest.

Warm-up. Act out three ways to greet someone: a handshake, a wave and a small bow. Which feels most natural to you? Which might feel most natural to a boy in Tokyo, or a grandmother in Paris?

Video slot. Video coming. Greetings around the world: bowing in Japan, the wai in Thailand, “Bonjour” in France; table manners in other countries. Search approved channels (a museum or embassy channel, Smithsonian, a geography channel for children); preview first.

KEY TERMS

courtesy

Polite, kind behavior that shows respect for others.

custom

A way of doing things that a people have kept for a long time.

etiquette

The accepted rules of polite behavior in a place (from a French word).

bow

A greeting made by bending forward from the waist; in Japan, a deeper bow shows more respect.

host

The person who welcomes and cares for a guest.

CORE IDEAS

Being a good guest is an old Christian duty. When Jesus sent out seventy disciples two by two, He told them, “into whatsoever city ye enter, and they receive you, eat such things as are set before you” (Luke 10:8). When Paul came to Athens, he walked the city and studied its altars before he spoke, and he began his sermon from what he had seen (Acts 17:22–23). A traveler who watches carefully and accepts kindness gratefully honors both the host and the Lord.

Greetings differ from country to country. In Japan people **bow**; a slight nod is casual, and a deep bow shows great respect. In Thailand people greet with the *wai*, palms pressed

together near the chest, with a small bow. In France, a shopper says “Bonjour, madame” or “Bonjour, monsieur” on entering even a small shop; to walk in silently seems rude. Friends and family in France often greet with light kisses on the cheeks. In the United States, Britain and many other places, a firm handshake and a look in the eye are polite.

Homes and holy places have **customs** too. In Japan, shoes come off at the entrance of a home, and slippers wait inside. Many churches in Europe, including St. Peter’s Basilica in Rome, ask visitors to cover their shoulders and knees. In parts of the Middle East and India, the right hand is used to give, receive and eat. At a Japanese table, chopsticks are never stood upright in a bowl of rice or used to pass food from one pair to another, because both are done at funerals.

Money has manners as well. In American restaurants, a tip of about 15 to 20 percent is expected. In Japan, tipping is not customary and may cause confusion. In much of Europe, service is often included in the bill, and diners may simply round up. In Britain, people wait their turn in an orderly line called a queue, and cutting in is a serious breach of **etiquette**.

You do not need to learn everything. Learn five words in the local language: hello, please, thank you, excuse me and goodbye. Watch what local people do and follow them. Eat what is offered with thanks, or decline gently. Ask before taking pictures of people. When you get home, write a thank-you note to any **host** who helped you. Wherever you go, you represent your family, your country and your Lord, and the Golden Rule works in every language.

PICTURE STUDY



The Supper at Emmaus, Michelangelo Merisi da Caravaggio, 1601 · Oil and tempera on canvas · The National Gallery, London

Wikimedia Commons · Public domain

In Luke 24, two disciples walking to the village of Emmaus met a stranger on the road and invited Him to stay, because evening was coming. At the table He took bread, blessed it and broke it, and they knew Him: it was the risen Jesus. Caravaggio, an Italian painter, shows the very moment they recognize Him. The guests had been good hosts to a stranger, and the stranger was their Lord.

Look closely

- Find the shell pinned to one traveler's coat. A scallop shell was the badge of a pilgrim.
- Find the basket of fruit. Where is it sitting, and why does it look ready to fall?
- Find the innkeeper. Does he understand what is happening?

Talk about it

1. How did the two travelers show courtesy to the stranger before they knew who He was?
2. Why might Caravaggio have painted the arms reaching right out toward us?

Safety first. Travel safety: if you have a food allergy, learn the words for it in the local language and carry a printed card that explains it, and let your parents check unfamiliar dishes.

HANDS-ON: A GREETINGS-OF-THE-WORLD MAP AND PHRASE CARD

Make a labeled world map of greetings and a pocket phrase card for your trip.

You will need

- A blank world map (printed or traced)
- Colored pencils and a fine pen
- An index card
- A dictionary or phrase book (library or online)

Steps

1. Color and label these countries: United States, Mexico, France, Italy, Germany, Japan, Thailand, Israel.
2. Beside each, draw a tiny stick figure showing the usual greeting (handshake, bow, wai, cheek kiss) and write the word for hello: Hello, Hola, Bonjour, Buongiorno, Guten Tag, Konnichiwa, Sawasdee, Shalom.
3. Add a key at the bottom explaining your symbols, and a title.
4. On the index card, write five phrases for your Trail B destination's language: hello, please, thank you, excuse me, goodbye. Write how to say each one.
5. Practice the card aloud with a family member until you can say all five without looking.

Check your work

- My map has eight labeled countries, a greeting symbol and a hello word for each, a key and a title.
- My phrase card has five phrases with pronunciation.
- I can say all five phrases from memory.

TRAVEL JOURNAL

1. **Map or diagram.** Glue in or copy your greetings map. Circle the country of your Trail B destination.
2. **Notebook entry.** Write a paragraph: Read Luke 10:8 and Luke 24:28-31. What do these verses teach about being a guest and welcoming strangers? Name one way you will be a good guest on your trip.

Did you know? In Japan, it is polite to hand and receive a business card, a gift or money with both hands, and to look at a card before putting it away. Japanese children learn bowing at school, and shop workers often bow to customers as they leave.

Map or diagram. Draw a “thank-you” chain around the edge of a page: Thank you (English), Gracias (Spanish), Merci (French), Grazie (Italian), Danke (German), Arigatō (Japanese), Obrigado (Portuguese), Toda (Hebrew). Put a small flag beside each.

Goes deeper in. Geography, Grade 8, “Peoples and Cultures of the World,” Literature, “Letters and Thank-You Notes,” and Art, “Caravaggio and Light” (coming soon).

For families. Sources: Luke 10:1-8; Luke 24:13-35; Acts 17:16-34; The National Gallery, London, *The Supper at Emmaus* (NG172), 1601; Vatican dress-code notices for St. Peter’s Basilica. Customs vary within countries and between generations, so the stop gives common practice, not fixed laws. Tipping norms are approximate. Portuguese speakers say “obrigado” or “obrigada” depending on whether the speaker is a man or a woman; the chain lists the first form for simplicity.

PRACTICE

1. **EASY** How do people usually greet each other in Japan? In Thailand?
2. **EASY** Say “thank you” in French, Spanish and Italian.
3. **MEDIUM** Why should a visitor in France say “Bonjour” when entering a small shop?
4. **MEDIUM** What did Jesus tell the seventy to do about food when someone welcomed them (Luke 10:8)? How does that apply to a traveler today?
5. **CHALLENGE** Name two chopstick habits to avoid at a Japanese table and explain why. Then name one custom from another country in this stop and explain the respect it shows.

Make it a game • Greeting Relay. Players stand in two lines. A caller names a country. The first player in each line runs to the caller and greets the caller the way people do in

that country, saying hello in the right language. A correct greeting scores a point for the team. Add “thank you” and “goodbye” rounds as players get better.

Scripture. “And into whatsoever city ye enter, and they receive you, eat such things as are set before you:” (Luke 10:8, KJV)

Jesus taught His messengers to be humble, grateful guests. A traveler who receives kindness with thanks shows Christ’s love in a strange land.

Practice: answers

1. In Japan, with a bow. In Thailand, with the wai: palms together near the chest and a small bow.
2. Merci (French), Gracias (Spanish), Grazie (Italian).
3. Because greeting the shopkeeper is expected; walking in silently seems rude there.
4. To eat such things as were set before them. A traveler should accept a host’s food gratefully, without complaining or demanding something else (and politely explain any true allergy).
5. Do not stand chopsticks upright in rice and do not pass food from chopsticks to chopsticks, because both are done at funerals. Any second custom with a reason, such as removing shoes in a Japanese home (keeping the home clean and honoring the host) or covering shoulders and knees in St. Peter’s (reverence in a church).

2.8 SAFETY AND STAYING TOGETHER

OBJECTIVES

- Set up a meeting point, a buddy system and a travel ID card before a trip.
- Know what to do, step by step, if you are separated from your group.
- Name emergency numbers and street-crossing rules in several countries.

Warm-up. Imagine you turn around in a crowded train station and your family is gone. Write down, in order, the first three things you would do. Keep the list; you will check it at the end.

Video slot. Video coming. What to do if you get lost: travel safety for children; the buddy system. Search approved channels (National Center for Missing & Exploited Children, a scouting channel, a national park ranger channel); preview first.

KEY TERMS

buddy system

Pairing travelers so that each person always knows where one other person is.

meeting point

A place chosen in advance where everyone goes if the group is separated.

headcount

Counting every member of the group before moving on.

emergency number

The short phone number that calls police, fire or ambulance, such as 911 in the United States.

safe helper

A person a lost child can ask for help, such as a uniformed worker, a ticket-window clerk or a mother with children.

CORE IDEAS

Travelers have always looked out for one another. In Bible times, families going up to Jerusalem for the Passover traveled together in large companies of relatives and neighbors. When Jesus was twelve, Mary and Joseph started home supposing He was “in the company” and went a day’s journey before they found He was missing. They searched three days before finding Him in the temple (Luke 2:41–46). Even the most careful families can be separated, so wise travelers plan for it.

Before you leave, set up four things. First, a **buddy system**: pair everyone, and keep your buddy in sight at all times. Second, a **headcount**: count everyone before leaving any bus, train, ride or restaurant. Third, a **meeting point** for each busy place, such as “the

information desk” or “the big clock,” chosen when you arrive. Fourth, a **travel ID card** in your pocket with your name, a parent’s cell phone number, and your hotel’s name and address, written in the local language too if you are abroad.

If you are separated, **stop**. Do not run or hide. Stay where you are, or go straight to the agreed meeting point. If no one comes, find a **safe helper**: a worker in uniform, a ticket-window clerk, a shop cashier, or a mother with children. Show your card. Never leave the place with anyone you do not know. Many families also keep a train rule: if one part of the family is on a train and the other part is left on the platform, the riders get off at the next station and wait there, and the others take the next train to meet them.

Learn the **emergency number** where you are going: 911 in the United States and Canada, 112 across the European Union, 999 in Britain (112 also works there), and in Japan 110 for police and 119 for fire or ambulance. Watch the traffic, too. About 75 countries and territories, including Britain, Ireland, Japan, Australia and India, drive on the left, so cars come from the right first. London paints “LOOK RIGHT” on many crossings to warn visitors.

In crowds, pickpockets look for open bags and back pockets, so carry valuables in front, zipped. In a hotel, find the two nearest exits and count the doors to them, in case of smoke. Drink water, wear a hat and rest when you are tired, since a worn-out traveler is a careless one. Then, having done your part, trust the Lord who keeps you. The psalmist promised that He “shall preserve thy going out and thy coming in.”

PICTURE STUDY



Ramsgate Sands (Life at the Seaside), William Powell Frith, 1852-1854 · Oil on canvas · Royal Collection, United Kingdom

Wikimedia Commons · Public domain

By the 1850s new railways carried crowds from London to seaside towns like Ramsgate in Kent. Frith filled this long painting with dozens of holiday-makers, each doing something different. Queen Victoria liked it so much that she bought it in 1854. It is a fine picture for practicing the traveler's habit of watching a crowd closely.

Look closely

- Find the children. Which ones have a grown-up close by, and which are on their own?
- Find a performer or a peddler. How would a crowd gather around them?
- Choose a good meeting point in the picture, something tall or easy to see that a separated child could find.

Talk about it

1. If a child wandered off on this beach, what would make finding the family hard?
2. What rules would you give your family before a day at a crowded beach?

Safety first. Travel safety: carry a travel ID card at all times, keep your buddy in sight, never leave with a stranger, and if lost, stop and go to the meeting point or a safe helper.

HANDS-ON: A SAFETY MAP AND TRAVEL ID CARD

Draw a safety map of a busy place your family will visit, and make the card you will carry.

You will need

- Paper, a ruler and colored pencils
- A map of a real station, airport, park or museum (often on its website)
- An index card and a pen
- A clear plastic sleeve or tape to protect the card

Steps

1. Draw an outline plan of the place as seen from above. Label the entrances and exits.
2. Mark and label the meeting point with a large star.
3. Mark and label where to find safe helpers: information desk, ticket windows, staff offices, first aid.
4. Draw arrows from two exits to the meeting point. Add a compass rose and a key.
5. On the index card write: your name; "If I am lost, please call:" and a parent's cell number; the hotel's name and address; one medical note if needed. If traveling abroad, ask a parent to add the hotel address in the local language.
6. Cover the card and keep it in a front pocket. Practice: walk the real place, or your house, to the meeting point with your buddy.

Check your work

- My map shows exits, the meeting point, safe helpers, arrows, a compass rose and a key.

- My card has my name, a phone number and the hotel address.
- I can say the four steps if I am lost: stop, stay or go to the meeting point, find a safe helper, show my card.

TRAVEL JOURNAL

1. **Map or diagram.** Copy your safety map into the Field Notebook, with the meeting point starred and the safe-helper places labeled.
2. **Notebook entry.** Read Luke 2:41–52. Write a paragraph comparing what happened to Mary, Joseph and Jesus with your own family’s plan. Then check your warm-up list: what would you now do differently?

Did you know? 112 was chosen as a single European emergency number in 1991 so travelers would not need to learn a different number in every country. Many mobile phones will connect 112 or 911 to the local emergency service in much of the world, but always learn the local number too.

Map or diagram. On a world map, color the countries that drive on the left (such as the United Kingdom, Ireland, Japan, India, Australia, New Zealand, South Africa and Kenya) and write “Look right first” across them.

Goes deeper in. Geography, Grade 4, “Finding Your Way” (coming soon), and Life Science, “Keeping Healthy and Safe” (coming soon).

For families. Sources: Luke 2:41–52; European Commission (112, adopted 1991); U.S. Department of State country pages for local emergency numbers; Royal Collection Trust, Frith, *Ramsgate Sands* (RCIN 405068). The count of left-driving countries and territories is approximate (about 75). The “next station” rule is common family advice, not an official rule; agree on your own plan. Parents may wish to talk through, calmly, who counts as a safe helper in your own town before the trip.

PRACTICE

1. **EASY** What number calls emergency help across the European Union? In the United States?
2. **EASY** What is the first thing to do if you are separated from your group?
3. **MEDIUM** In Luke 2, how far did Mary and Joseph travel before they noticed Jesus was missing, and how long did it take to find Him? Why did they not notice sooner?
4. **MEDIUM** You are crossing a street in London. Which way should you look first, and why?
5. **CHALLENGE** A group of 7 uses the buddy system. How can it be paired so nobody is alone? At a busy station, the train doors close with 3 of the group aboard and 4 on the platform. Using the train rule, what should each part do?

Make it a game • Lost and Found Drill. In a park or large room, choose a meeting point. Players walk about in buddy pairs. When the leader blows a whistle and calls

“Separated!”, everyone must stop, find their buddy and walk calmly to the meeting point. The leader does a headcount out loud. Next round, the leader plays a “safe helper,” and a player practices asking for help and showing an ID card.

Scripture. “The LORD shall preserve thee from all evil: he shall preserve thy soul. The LORD shall preserve thy going out and thy coming in from this time forth, and even for evermore.” (Psalm 121:7-8, KJV)

Psalm 121 is a song of pilgrims going up to Jerusalem. Careful plans are our part; keeping us is the Lord’s. We pack, count and watch, and then we rest in His care.

Practice: answers

1. 112 in the European Union; 911 in the United States.
2. Stop. Do not run or hide; stay where you are or go to the meeting point.
3. A day’s journey; they found Him after three days, in the temple. They supposed He was with the company of relatives and acquaintances traveling together.
4. Right, because in Britain cars drive on the left, so the nearest traffic comes from the right.
5. Three pairs and one group of three ($2 + 2 + 3 = 7$). The 3 on the train get off at the next station and wait on the platform; the 4 on the platform take the next train to that station and meet them.

TRAIL 2 BADGE QUIZ

The badge quiz is optional. The student answers in writing, showing work for any problem with numbers. Four right out of five earns the first badge; four right out of five on the second part earns the second. Badges and the certificate are earned by doing the stops, not by scores.

Badge quiz 1 (Stops 1-5)

1. Name the four P's, the common reasons people travel. Why should a planner write down the purpose first?
2. A train trip is 300 miles at an average of 50 miles per hour, with 1 hour to get to and from the stations. What is the door-to-door time?
3. A family of 4 plans 3 days and 2 nights. Rooms are \$150 a night and food is \$35 per person per day. What do rooms and food cost together?
4. What is a fixed point in an itinerary, and why do you write fixed points in first? Give two examples.
5. Explain the 3-1-1 rule, and name two things that must never go in a checked bag.

Badge quiz 2 (Stops 6-8)

6. What is the difference between a passport and a visa? What did Nehemiah ask King Artaxerxes for?
7. If 1 dollar buys 0.90 euros, how many euros do you get for \$120? If 1 euro costs \$1.10, what does a €30 ticket cost in dollars?
8. Describe a polite greeting in Japan and in France, and give the meaning of Luke 10:8 for a traveler.
9. Name one tipping custom and one custom for homes or holy places from another country.
10. List the four steps if you are separated from your group, and give the emergency number in the European Union.

TRAIL CERTIFICATE: MY COMPLETE TRIP PLAN AND TRAIL B CERTIFICATE

Gather the work from all eight stops into one trip plan with a cover page: the destination, your name and the dates you worked on it.

The plan should have these sections in order: Destination and purpose (map and decision chart), Getting there (comparison chart and bar graph), Budget (table and graph), Itinerary (three-day grid), Packing list, Passport and money (practice data page and currency card), Courtesy (phrase card and greetings map), and Safety (safety map and ID card).

Present the plan to your family in five minutes, as if you were the travel agent. When it is done, a parent signs the Trail B certificate.

- **Completeness:** All eight sections are present, in order, with a cover page.

- **Accuracy:** Distances, times, budget totals and currency conversions are correct, with work shown.
- **Maps and diagrams:** Every map, graph and grid has a title, labels and a key or scale where needed.
- **Reasoning and presentation:** Choices are explained with reasons and numbers, and the student presents the plan clearly and courteously.

Answer key

1. People, places, the past and purpose. Because the reason for the trip shapes every other choice: where to go, when, and what to do.
2. $300 \div 50 = 6$ hours + 1 hour = 7 hours.
3. Rooms: $2 \times \$150 = \300 . Food: $4 \times 3 \times \$35 = \420 . Together: \$720.
4. A part of the plan that cannot move. Everything else must fit around them. Examples: a train departure, a ticket for a set time, Sunday worship, a museum's opening hours or closing day.
5. Liquids in a carry-on must be in containers of 3.4 ounces (100 mL) or less, in 1 quart-size bag, 1 bag per traveler. Any two: passport, medicine, money, glasses, keys.
6. A passport comes from your own country and proves who you are and your nationality; a visa is another country's permission to enter. Nehemiah asked for letters to the governors beyond the river so they would let him pass through to Judah.
7. $120 \times 0.90 = €108$. $30 \times 1.10 = \$33$.
8. Japan: a bow. France: say "Bonjour, madame" or "Bonjour, monsieur," including when entering a shop (friends may greet with cheek kisses). Luke 10:8: eat such things as are set before you; be a grateful guest.
9. Tipping: about 15–20% in American restaurants, not customary in Japan, or rounding up in much of Europe. Homes or holy places: shoes off in Japanese homes, or shoulders and knees covered in churches such as St. Peter's.
10. Stop; stay put or go to the meeting point; find a safe helper; show your travel ID card. 112.

TRAVEL AND FARAWAY PLACES TRAIL C: GREAT JOURNEYS

The third trail of the Travel track follows eight great journeys across four thousand years: Abraham's walk of faith from Ur to Canaan, Paul's missionary journeys around the Mediterranean, Marco Polo's road to China, Columbus's voyage of 1492, Lewis and Clark's crossing of the continent with Sacagawea, Isabella Bird's ride through the Rockies, Nellie Bly's race around the world, and Amelia Earhart's solo flight over the Atlantic. Along the way the student sees travel change from flocks and footpaths to sail, steam and wing.

This is the  **Ranger** level, for ages 10 to 13. The student reads each stop alone and works through it in 25 to 35 minutes: a longer story with dates and numbers, five key terms, a picture study, a map or diagram, a paragraph in the travel journal, and five practice questions with answers for a parent to check. Every stop stands by itself and links to a full lesson in Geography or History. Each stop adds a hand-drawn route map and a journal entry to the **travel journal** kept through the track.

Five stops earn the **Travel Ranger badge, part 1**; all eight earn part 2 and the **Trail C certificate**.

BEFORE YOU BEGIN

- Read a page of about 500 words alone and tell back the main events in order.
- Find continents, oceans and countries on a world map or globe, and use a ruler and a map scale.

MASTERY CHECKLIST

- ☐ I can put the eight journeys in order on a timeline from about 2000 B.C. to A.D. 1932.
- ☐ I can trace each traveler's route on a map and name at least three places along it.
- ☐ I can explain how geography (deserts, rivers, mountains, winds and oceans) shaped each route.
- ☐ I can tell how new ways of travel, from sailing ships to steamships to airplanes, made long journeys faster.
- ☐ I have drawn eight maps or diagrams and written eight journal entries in my travel journal.

OPTIONAL BOOKS AND RESOURCES

- **Bible Gateway (King James Version)** (<https://www.biblegateway.com>): Read Genesis 11-12 and Acts 13-28 for Stops C1 and C2. A Bible with maps in the back is the best atlas for both.
- **National Park Service: Lewis and Clark National Historic Trail** (<https://www.nps.gov/lecl>): Route maps, journal excerpts and site guides for Stop C5.

- **Project Gutenberg** (<https://www.gutenberg.org>): Free public-domain texts: *The Travels of Marco Polo*, Isabella Bird's *A Lady's Life in the Rocky Mountains*, Nellie Bly's *Around the World in Seventy-Two Days* and Jules Verne's *Around the World in Eighty Days*.
- **Smithsonian National Air and Space Museum** (<https://airandspace.si.edu>): Photos and history of Amelia Earhart's Lockheed Vega 5B for Stop C8.
- **Library of Congress: Prints and Photographs Online Catalog** (<https://www.loc.gov/pictures>): Historic photographs of Nellie Bly and Amelia Earhart, and old maps of every route on this trail.

3.1 ABRAHAM LEAVES UR

OBJECTIVES

- Trace Abraham's route from Ur to Haran to Canaan on a map of the Fertile Crescent.
- Explain why travelers followed the rivers instead of crossing the desert.
- Tell what Genesis 12 and Hebrews 11:8 say about why Abraham went.

Warm-up. Imagine you were told to pack everything your family owns, leave your city forever, and walk toward a land no one would name for you yet. What would you take? What would you ask before you left? Write three questions in the margin of your notebook.

Video slot. Video coming. Abraham's journey from Ur to Canaan; the city of Ur and the Fertile Crescent; Leonard Woolley's excavations at Ur. Search approved channels (The British Museum, Penn Museum, Associates for Biblical Research, Answers in Genesis Kids); preview first.

KEY TERMS

Ur of the Chaldees

An old, wealthy city on the Euphrates River in southern Mesopotamia (today's Iraq), where Abram's family lived (Genesis 11:31).

Fertile Crescent

The curved band of well-watered land that runs from the Persian Gulf up the Tigris and Euphrates rivers and down the eastern shore of the Mediterranean Sea.

Haran

A trading town in the north of Mesopotamia (in today's Turkey) where Abram's family stopped and his father Terah died.

Canaan

The land between the Jordan River and the Mediterranean Sea that God promised to Abram's descendants; later called Israel.

covenant

A solemn, binding promise. God made a covenant with Abram to make of him a great nation and to bless all families of the earth through him.

CORE IDEAS

Around two thousand years before Christ, a man named Abram lived in **Ur of the Chaldees**, one of the richest cities of the ancient world. Ur stood near the Euphrates River, close to the head of the Persian Gulf. It had brick houses, busy markets, schools for scribes who wrote on clay tablets, and a great stepped temple tower called a ziggurat built for the moon god. When the archaeologist Leonard Woolley dug there from 1922 to 1934, he found gold

helmets, harps, games and thousands of tablets. Abram's family did not leave a poor village; they left a comfortable city.

Genesis tells us that Abram's father, Terah, took Abram, his wife Sarai and his grandson Lot and set out "to go into the land of Canaan" (Genesis 11:31). They did not walk straight west, because between Ur and Canaan lies the Syrian Desert, hundreds of miles of rock and sand with almost no wells. Instead they followed the **Fertile Crescent**, the arc of green land along the rivers where there was water for people, sheep and donkeys. That route led northwest up the Euphrates about 600 miles to **Haran**, a trading town on the caravan roads. There the family settled for a time, and there Terah died.

Then came the call: "Now the LORD had said unto Abram, Get thee out of thy country, and from thy kindred, and from thy father's house, unto a land that I will shew thee" (Genesis 12:1). With the command came a **covenant** promise: God would make of Abram a great nation, bless him, and in him "shall all families of the earth be blessed" (12:3). Stephen, in Acts 7:2, says God first appeared to Abraham while he was still in Mesopotamia, before he lived in Haran.

Abram was seventy-five years old when he left Haran (Genesis 12:4). He took Sarai, Lot, their flocks, their goods and the servants of the household. They traveled south roughly 400 miles more, probably by way of the region of Damascus, at the slow pace of sheep and goats, perhaps ten or fifteen miles on a good day. In **Canaan** they came to Shechem, to the oak of Moreh, and there the Lord appeared again and said, "Unto thy seed will I give this land." Abram built an altar. He moved on to a hill between Bethel and Ai, pitched his tent, built another altar, and "called upon the name of the LORD" (12:8).

Abram never owned a city in Canaan. He lived in tents for the rest of his life, and he waited twenty-five more years for the son God promised, Isaac. The New Testament explains why he went: "By faith Abraham, when he was called to go out into a place which he should after receive for an inheritance, obeyed; and he went out, not knowing whither he went" (Hebrews 11:8). Of all the great journeys on this trail, this is the oldest, and it is the one on which the whole story of Israel, and of the Savior born from Abraham's line, depends.

PICTURE STUDY



Abraham's Journey from Ur to Canaan, József Molnár, 1850 · Oil on canvas · Hungarian National Gallery, Budapest
Wikimedia Commons · Public domain

József Molnár was a Hungarian painter who studied in Vienna, Venice and Rome. He painted Abraham's caravan on the move, stretched out across open country, with the family's whole wealth walking beside them: herds, servants and tents packed on animals.

Look closely

- Find Abraham. How does the painter make him stand out from the rest of the caravan?
- Count the kinds of animals you can see. Which ones carry loads, and which ones are the family's wealth?
- Look at the light and the sky. What time of day might it be, and why would travelers in a hot land move then?

Talk about it

1. What does this painting show about how slow and heavy such a move would be?
2. Abraham is pointing ahead to a place he has never seen. What does that gesture say about faith?

HANDS-ON: MAP THE FERTILE CRESCENT ROUTE

Draw a map that shows why Abram's family went the long way around, and mark the places Genesis 11-12 names.

You will need

- A sheet of plain paper or a page in the Field Notebook
- A Bible atlas, the maps in the back of a Bible, or an online map of the Middle East
- Colored pencils (blue, green, tan and red)
- A ruler

Steps

1. Lightly sketch the coastlines: the Mediterranean Sea on the left and the Persian Gulf at the lower right. Color them blue.
2. Draw the Euphrates and Tigris rivers in blue, flowing from the mountains in the north down to the Persian Gulf. Label both. Draw the Jordan River running south into the Dead Sea.
3. Shade the curved band of land along the rivers and down the Mediterranean shore in green. Label it **Fertile Crescent**. Shade the space inside the curve tan and label it **Syrian Desert**.
4. Mark and label these places with dots: Ur, Haran, Damascus, Shechem, Bethel, Ai. Near Ur write “Genesis 11:31.” Near Shechem write “Genesis 12:6-7.”
5. Draw Abram’s route in red with arrows: Ur up the Euphrates to Haran, then south past Damascus to Shechem and Bethel.
6. Add a compass rose and a scale bar (use the atlas: about 100 miles per inch is a good choice). Measure the red line with the ruler and write the total distance in a corner.
7. Draw a thin dotted line straight from Ur to Canaan across the desert and write beside it: “Too dry: no wells.”

Check your work

- My map shows the two rivers, both seas and the desert.
- Ur, Haran, Shechem and Bethel are labeled, with Bible references.
- The route is drawn with arrows, and I have a compass rose, scale and total distance.

TRAVEL JOURNAL

1. **Travel journal, Stop C1.** Glue or draw your Fertile Crescent map on a left-hand page.
2. On the right-hand page write one paragraph as if you were a servant in Abram’s household on the road from Haran. Tell what you carry, what the land looks like, how far you walked today, and what you think of a master who is following a promise he cannot yet see. Use at least two true details from Genesis 12.

Did you know? Ur is now about 10 miles from the Euphrates, because the river has moved its course over the centuries. Woolley’s team found the “Standard of Ur,” a box covered in shell and blue lapis lazuli showing scenes of war and feasting; it is in the British Museum. Abram’s name was changed to Abraham, “father of a multitude,” and Sarai’s to Sarah, in Genesis 17.

Map or diagram. Compare straight-line and travel distance. Ur to Canaan as the crow flies is roughly 550 miles; along the Fertile Crescent by way of Haran it is about 1,000 miles. Draw both lines on your map and write each distance beside it.

Goes deeper in. Geography, Grade 4, “The Middle East and the Fertile Crescent,” and History, “Abraham and the Patriarchs” (coming soon).

For families. Sources: Genesis 11:27–12:9; Acts 7:2–4; Hebrews 11:8–10; British Museum and Penn Museum material on Woolley’s excavations at Ur (1922–1934). Dates for Abraham are given only as “around 2000 B.C.” because scholars who take Genesis as history place him at different points between about 2100 and 1800 B.C. Most identify Ur of the Chaldees with Tell el-Muqayyar in southern Iraq; a minority argue for a northern Ur near Haran. The stop follows the usual view. Distances are approximate. Picture: József Molnár, 1850, Hungarian National Gallery.

PRACTICE

1. **EASY** Name the three main stopping places on Abram’s journey, in order.
2. **EASY** How old was Abram when he departed out of Haran?
3. **MEDIUM** Why did the family travel northwest to Haran instead of straight west to Canaan?
4. **MEDIUM** If a flock-driving family covered 12 miles a day, about how many traveling days would 1,000 miles take?
5. **CHALLENGE** Abram was 75 when he left Haran and 100 when Isaac was born (Genesis 21:5). How long did he wait, and what does Hebrews 11:8–10 say kept him going?

Make it a game • Caravan Stops. Set four signs around the house or yard: UR, HARAN, SHECHEM, BETHEL. One player is the caravan leader and calls out a clue (“Here my father died,” “Here I built an altar under the oak of Moreh,” “The city of the ziggurat,” “Between this place and Ai I pitched my tent”). Everyone walks, leading imaginary flocks, to the right sign. A wrong turn means you are “lost in the desert” and must sit out one round.

Scripture. “Now the LORD had said unto Abram, Get thee out of thy country, and from thy kindred, and from thy father’s house, unto a land that I will shew thee:” (Genesis 12:1, KJV)

God did not give Abram a map; He gave him a promise. The journey began with obedience, and every step after it was a step of trust in the One who called him.

Practice: answers

1. Ur, then Haran, then Canaan (Shechem and Bethel).
2. Seventy-five years old (Genesis 12:4).

3. Straight west lay the Syrian Desert with almost no water. Following the rivers of the Fertile Crescent gave water and grass for people and flocks.
4. About 83 days ($1,000 \div 12 \approx 83$), and more in real life, with rest days, Sabbaths and stops for the animals.
5. Twenty-five years. Hebrews says he obeyed by faith, not knowing where he was going, and lived in tents because "he looked for a city which hath foundations, whose builder and maker is God."

3.2 PAUL'S MISSIONARY JOURNEYS

OBJECTIVES

- Name the three missionary journeys and the voyage to Rome, with their chapters in Acts.
- Locate Antioch, Cyprus, Philippi, Athens, Corinth, Ephesus, Malta and Rome on a map.
- Explain how Roman roads, sea lanes and the Greek language helped the gospel spread.

Warm-up. Open a Bible to the maps at the back and find one titled “Paul’s Journeys” or “Missionary Journeys.” How many different colored lines do you see? Put your finger on Antioch and on Rome. Which do you think is farther from Jerusalem?

Video slot. Video coming. The missionary journeys of the apostle Paul with an animated map; Roman roads and ships in the first century. Search approved channels (Bible Project, Crossway, Ligonier Ministries, Associates for Biblical Research); preview first.

KEY TERMS

apostle

“One who is sent.” A messenger chosen by Christ to carry the gospel; Paul was called the apostle to the Gentiles.

Gentiles

People who are not Jews. Much of Paul’s work was preaching to Gentiles in Greek and Roman cities.

Antioch

A great city in Syria where believers were first called Christians (Acts 11:26) and from which Paul’s journeys began.

Via Egnatia

A Roman road across Macedonia from the Adriatic Sea toward Byzantium. Paul walked part of it through Philippi and Thessalonica.

Melita

The King James name for Malta, the island where Paul was shipwrecked on the way to Rome (Acts 28:1).

CORE IDEAS

Jesus told His apostles they would be witnesses “unto the uttermost part of the earth” (Acts 1:8). The man who carried that message farthest was Saul of Tarsus, a Pharisee who had once hunted Christians until Christ met him on the road to Damascus. Better known by his Roman name, Paul, he made three long missionary journeys and then a final voyage to Rome, all recorded by his traveling companion Luke in **Acts 13–28**, between about A.D. 46 and 62.

First journey (Acts 13-14, about A.D. 46-48). The church at **Antioch** sent Paul and Barnabas, with young John Mark. They sailed to Cyprus, Barnabas's home island, and crossed it to Paphos, where the Roman governor Sergius Paulus believed. Then they sailed to the mainland of Asia Minor (today's Turkey). Mark went home, but Paul and Barnabas climbed into the highlands to Pisidian Antioch, Iconium, Lystra and Derbe. At Lystra Paul was stoned and left for dead, yet he got up and went on. Afterward they retraced their steps to strengthen the new churches.

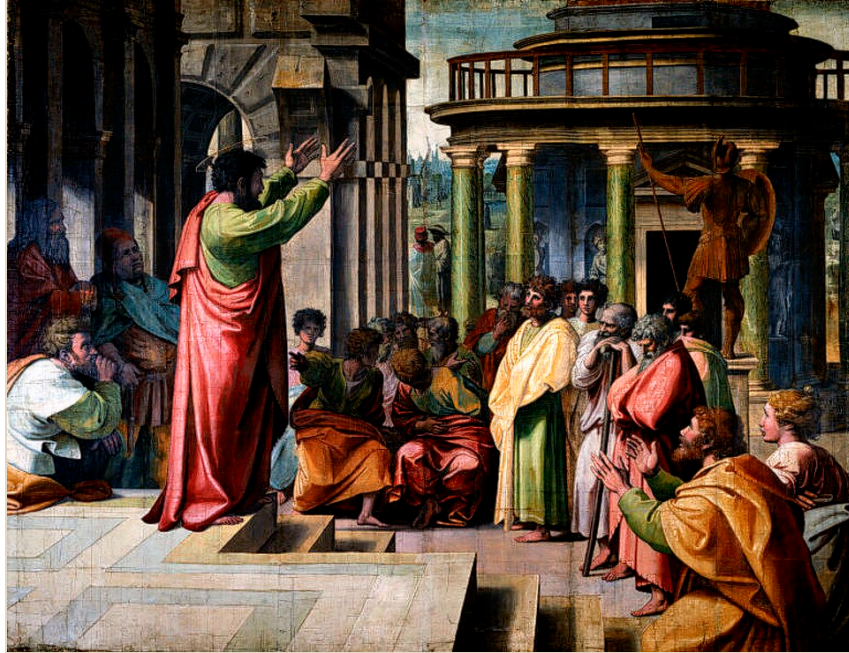
Second journey (Acts 15:36-18:22, about A.D. 49-52). Paul took Silas, and Timothy joined them at Lystra. At Troas Paul saw a vision of a man of Macedonia calling, "Come over into Macedonia, and help us" (16:9), so the gospel crossed into Europe. At Philippi a seller of purple cloth named Lydia believed, and Paul and Silas sang hymns in prison at midnight. They followed the **Via Egnatia** to Thessalonica, went on to Berea, and then Paul preached on Mars' Hill in Athens. He stayed eighteen months in Corinth, making tents to support himself.

Third journey (Acts 18:23-21:17, about A.D. 53-57). Paul spent about three years in Ephesus, a city famous for its temple of Diana. So many people turned from idols that the silversmiths who made little silver shrines started a riot in the theater. Paul then visited Macedonia and Greece, raised the young man Eutychus at Troas, and said a tearful farewell to the Ephesian elders at Miletus before going up to Jerusalem.

To Rome (Acts 21-28, about A.D. 57-62). In Jerusalem Paul was seized by a mob and arrested by Roman soldiers. He was held two years at Caesarea, then used his right as a Roman citizen to appeal to Caesar. On the voyage west, a storm drove the ship for fourteen days until it broke apart off **Melita**; all 276 people on board reached shore (27:37, 44). In Rome Paul lived two whole years under guard in his own rented house, "preaching the kingdom of God" to all who came (28:30-31).

Paul's travels were possible because of the world God had prepared: Roman roads paved with stone, sea lanes kept fairly free of pirates, the peace of the empire, and Greek spoken in nearly every port. Some scholars estimate he traveled more than 10,000 miles on foot and by ship. In 2 Corinthians 11 he lists what it cost: beatings, three shipwrecks, "in perils of waters, in perils of robbers," hunger and cold.

PICTURE STUDY



St. Paul Preaching in Athens, Raphael (Raffaello Sanzio), 1515–1516 · Bodycolor (glue-based paint) on paper, a full-size design for a tapestry · Victoria and Albert Museum, London (lent by the Royal Collection)
Wikimedia Commons · Public domain

Pope Leo X asked Raphael to design ten tapestries about Peter and Paul for the Sistine Chapel. Raphael painted full-size designs, called cartoons, which weavers in Brussels copied in wool and silk. Seven of the cartoons survive. This one shows Acts 17, when Paul spoke to the philosophers of Athens about “the unknown god.”

Look closely

- Find Paul. How do his pose and his place on the steps show that he is the speaker?
- Look at the faces in the crowd. Find one man who seems convinced and one who seems doubtful.
- Find the statue and the round temple. What do they tell you about the city Paul was in?

Talk about it

1. Acts 17:34 says some believed, including Dionysius and a woman named Damaris. Can you find anyone in the picture who might be one of them?
2. Why might Raphael have shown Paul standing above the crowd instead of among them?

HANDS-ON: HAND-DRAWN MAP OF PAUL’S JOURNEYS

This is one of the track’s main projects. You will draw the eastern Mediterranean and trace all four of Paul’s journeys in different colors.

You will need

- A large sheet of paper (11 by 17 inches is good) or two notebook pages taped together
- A Bible with maps or a Bible atlas
- Colored pencils: blue, red, green, orange and purple
- A ruler and a pencil

Steps

1. Draw the coastline of the eastern Mediterranean lightly in pencil: Italy, Greece, Asia Minor (Turkey), Syria and Israel. Add the islands of Sicily, Malta, Crete and Cyprus. Color the sea blue.
2. Mark and label these cities with dots: Jerusalem, Caesarea, Antioch, Tarsus, Paphos, Lystra, Derbe, Troas, Philippi, Thessalonica, Berea, Athens, Corinth, Ephesus, Miletus, Rome.
3. First journey in **red**: Antioch → Cyprus → Perga → Pisidian Antioch → Iconium → Lystra → Derbe, and back.
4. Second journey in **green**: Antioch → Derbe and Lystra → Troas → Philippi → Thessalonica → Berea → Athens → Corinth → Ephesus → Caesarea → Antioch.
5. Third journey in **orange**: Antioch → across Asia Minor → Ephesus → Macedonia and Greece → Troas → Miletus → Jerusalem.
6. Voyage to Rome in **purple**: Caesarea → past Crete → shipwreck on Malta (draw a tiny broken ship) → Rome.
7. Draw a dashed line for the Via Egnatia through Philippi and Thessalonica. Add a key for the four colors, a compass rose and a scale bar.

Check your work

- All four journeys are shown in different colors with arrows.
- At least twelve cities are labeled and spelled correctly.
- My map has a key, a compass rose, a scale bar and the Via Egnatia.

TRAVEL JOURNAL

1. **Travel journal, Stop C2.** Fold your large map into the journal, or draw a smaller copy on one page.
2. Write one paragraph as a log entry by a crewman on Paul's ship in Acts 27. Include the storm, the fourteen days, what Paul told the crew (27:22-25), and how everyone reached land. Use real details from the chapter.

Did you know? A stone inscription found at Delphi names Gallio as proconsul of Achaia, the same Gallio who threw Paul's case out of court in Corinth (Acts 18:12-17). It helps scholars date Paul's stay in Corinth to about A.D. 50-52. Paul wrote some of his letters while traveling: 1 and 2 Thessalonians from Corinth, and probably Romans from Corinth on his third journey.

Map or diagram. Make a small bar graph of how long Paul stayed in three places, using Acts: Corinth, 18 months (18:11); Ephesus, about 3 years, or 36 months (20:31); Rome, 2 years, or 24 months (28:30). Label each bar with its verse.

Goes deeper in. Geography, Grade 8, “The Mediterranean World,” and History, “The Early Church and the Roman Empire” (coming soon).

For families. Sources: Acts 13–28; 2 Corinthians 11:23–28; the Gallio inscription at Delphi. Dates are approximate; scholars differ by a year or two. The figure “more than 10,000 miles” is an estimate often given, not a measured total. Many believe Paul was released after the two years in Rome and later martyred under Nero, but Acts ends before that, so the stop does not tell it. Picture: Raphael’s cartoon, Royal Collection, on loan to the V&A.

PRACTICE

1. **EASY** From which city did Paul’s missionary journeys begin?
2. **EASY** On which island was Paul shipwrecked on the way to Rome?
3. **MEDIUM** What vision brought the gospel from Asia into Europe, and in which city did Paul first preach in Europe?
4. **MEDIUM** Name two things in the Roman world that made Paul’s travel easier.
5. **CHALLENGE** Add up the months Paul spent in Corinth (18), Ephesus (about 36) and Rome (24). How many years is that? What does it tell you about how he worked?

Make it a game · Which Journey?. Write city names on cards (Paphos, Lystra, Philippi, Athens, Corinth, Ephesus, Miletus, Malta, Rome). Lay four colored papers on the floor for the four journeys. Draw a card, say one thing that happened there, and lay it on the right color. Check with your map. Ephesus fits two journeys, so either answer counts if you can say why.

Scripture. “But ye shall receive power, after that the Holy Ghost is come upon you: and ye shall be witnesses unto me both in Jerusalem, and in all Judæa, and in Samaria, and unto the uttermost part of the earth.” (Acts 1:8, KJV)

This verse is almost an outline of the book of Acts. Paul’s journeys carried the witness outward from Jerusalem to the capital of the world, and the same command still sends the church outward today.

Practice: answers

1. Antioch in Syria.
2. Melita, which is Malta (Acts 28:1).
3. At Troas Paul saw a man of Macedonia saying, “Come over into Macedonia, and help us” (Acts 16:9). He preached first at Philippi.

4. Any two: paved Roman roads, sea routes, the Roman peace, Greek as a common language, his Roman citizenship.
5. 78 months, which is 6½ years. He did not only pass through; he stayed long in great cities to teach and build up churches, which could then spread the gospel to the regions around them.

3.3 MARCO POLO TO CHINA

OBJECTIVES

- Trace the Polos' route from Venice to the court of Kublai Khan and their return by sea.
- Name four things Marco Polo described in China that amazed Europeans.
- Explain how his book was written and why readers still test it carefully.

Warm-up. Look at a globe and put one finger on Venice, Italy, and another on Beijing, China. Before trains, planes or steamships, how do you think a traveler could get from one to the other? Guess how many years the round trip might take.

Video slot. Video coming. Marco Polo's journey on the Silk Road to Kublai Khan; the Mongol Empire and Venice in the 1200s. Search approved channels (Smithsonian, The British Library, National Geographic Kids, Simple History); preview first.

KEY TERMS

Silk Road

The network of overland trade routes linking China with Persia, the Middle East and the Mediterranean, named for the Chinese silk carried along it.

Kublai Khan

Grandson of Genghis Khan, ruler of the Mongol Empire from 1260 and emperor of China until his death in 1294.

caravan

A group of traders and travelers journeying together, often with camels, for safety across deserts and mountains.

Venice

A rich trading city in northern Italy built on islands in a lagoon; home of the Polo family.

Il Milione

The Italian name for Marco Polo's book, also called *The Description of the World* or *The Travels of Marco Polo*.

CORE IDEAS

In 1271 a seventeen-year-old from **Venice** named Marco Polo set out for the far side of the world with his father, Niccolò, and his uncle, Maffeo. The two older men had already been to China once and had met its ruler, **Kublai Khan**, whose Mongol Empire stretched from Korea to the edge of Europe. Kublai had sent them home with letters to the pope asking for a hundred learned Christian teachers and some oil from the lamp that burned at Christ's tomb in Jerusalem. The Polos brought the oil, but only two friars were sent, and they turned back early in fear of the dangers ahead.

The journey east took about three and a half years. From the port of Acre the Polos crossed into Persia and went down to Hormuz on the Persian Gulf, hoping to take a ship, but they decided the boats there were too flimsy. Instead they went overland along the **Silk Road**: across Persia, up into the high Pamir Mountains, which Marco called the “roof of the world,” and along the edge of the deserts of the Tarim Basin and the Gobi. Travelers crossed in **caravans**, carrying water for days, and told stories of voices in the desert night that lured stragglers away.

About 1275 they reached Kublai Khan’s summer palace at Shangdu, which English poets later called Xanadu. Marco learned languages and served the Khan for about seventeen years, sent on missions to distant provinces. He saw things almost no European had seen: paper money printed with the Khan’s seal, “black stones” (coal) burned for heat, a postal system with relay stations and fresh horses every twenty-five miles or so, the Grand Canal carrying grain barges, and the huge city of Hangzhou with its bridges and lakes.

In 1292 the Khan let the Polos leave on one condition: they were to escort a Mongol princess by sea to Persia. A fleet of fourteen ships sailed from the port of Quanzhou, past Sumatra, Ceylon and India. The voyage took about two years, and many of the passengers died on the way. The Polos reached Venice in 1295, twenty-four years after they had left. A family story says their relatives did not know them until they slit open the seams of their ragged coats and jewels poured out.

A few years later Marco was captured in a war between Venice and Genoa. In a Genoese prison he told his story to a fellow prisoner, Rustichello of Pisa, a writer of adventure tales, who wrote it down about 1298. The book, ***Il Milione***, was copied by hand across Europe. Some readers thought it exaggerated, and modern scholars note what it leaves out, such as tea and the Great Wall. Yet much of it has been confirmed by Chinese records. Two centuries later Christopher Columbus owned a copy and wrote notes in its margins. Marco died in Venice in 1324.

PICTURE STUDY

The Polos Set Out from Venice (in a manuscript of Li Livres du Graunt Caam), An English manuscript painter, sometimes called Johannes, and workshop, About 1400 · Tempera and gold on parchment (manuscript illumination) · Bodleian Library, Oxford (MS. Bodley 264, folio 218r)

This painting comes from a handmade book copied about a hundred years after Marco Polo’s death. The painter had probably never seen Venice, but he packed it with palaces, the bronze horses of St. Mark’s, gondolas and ships, to show a great trading city sending its travelers out to the world.

Look closely

- Find the boats leaving the city. How many people can you count in them?
- Find something that shows Venice is built on water.
- Look for the gold leaf. Where did the painter use it, and why would a costly book need it?

Talk about it

1. This picture was painted about a century after the journey. What might the painter get right, and what might he have to imagine?
2. Why would a merchant city like Venice produce great travelers?

HANDS-ON: SILK ROAD ROUTE MAP

Draw the Polos' round trip: overland going out and by sea coming home.

You will need

- A notebook page or sheet of paper
- A world atlas or online map of Europe and Asia
- Colored pencils (blue, brown, yellow, red and green)
- A ruler

Steps

1. Sketch the outlines of Europe, the Middle East, India and China. Draw the Mediterranean, the Black Sea, the Persian Gulf, the Indian Ocean and the China Sea in blue.
2. Draw the Pamir Mountains and the Himalayas as brown peaks. Shade the Taklamakan (Tarim) and Gobi deserts yellow and label them.
3. Mark these places with dots and labels: Venice, Acre, Hormuz, Kashgar, Shangdu (Xanadu), Khanbaliq (Beijing), Hangzhou, Quanzhou, Sumatra, Ceylon.
4. Draw the outward journey in red with arrows: Venice → Acre → across Persia → Hormuz → Pamirs → Kashgar → along the deserts → Shangdu. Write "1271-1275."
5. Draw the homeward voyage in green: Quanzhou → Sumatra → Ceylon → India → Hormuz → overland to the Black Sea → Venice. Write "1292-1295."
6. Add a key, a compass rose and four small pictures beside China: a banknote, a lump of coal, a relay horse and a canal barge.

Check your work

- Both routes are shown in different colors with arrows and dates.
- Mountains and deserts are drawn and labeled.
- I drew four things Marco described in China.

TRAVEL JOURNAL

1. **Travel journal, Stop C3.** Draw or glue in your Silk Road map.
2. Write one paragraph as Marco Polo reporting to the people of Venice about one wonder of China: paper money, coal, the relay post or the Grand Canal. Explain it so a Venetian who had never seen it could understand, and give one number.

Did you know? Kublai Khan's paper money was printed on paper made from mulberry bark. Marco was amazed that people accepted paper in place of gold and silver. Europe did not use government paper money widely until centuries later. A story recorded after his death says that when friends begged Marco to take back his "tall tales," he answered that he had not told half of what he saw.

Map or diagram. Make a timeline bar from 1250 to 1330. Mark: Marco born (1254), sets out (1271), reaches Shangdu (about 1275), leaves China (1292), home in Venice (1295), book written (about 1298), dies (1324). How old was he at each mark?

Goes deeper in. Geography, Grade 8, "China and East Asia," and History, "The Mongols and the Silk Road" (coming soon).

For families. Sources: *The Travels of Marco Polo* (Yule-Cordier translation, public domain); Britannica; Bodleian Library. The deathbed remark comes from the friar Jacopo d'Acqui, writing after Marco's death, so it is told as a story. The jewels-in-the-coats tale comes from Giovanni Battista Ramusio's 1559 edition and may be family legend. Where Marco was captured is uncertain; the often-named naval battle of Curzola (1298) is not proven. Some scholars doubt parts of the book because it does not mention tea, chopsticks or the Great Wall (most of the wall seen today was built later). The princess he escorted was Kōkōchin; the stop leaves out the court details. Columbus's annotated copy is in the Biblioteca Colombina, Seville.

PRACTICE

1. **EASY** Who was the ruler of the Mongol Empire whom Marco Polo served?
2. **EASY** In what year did the Polos set out, and in what year did they return to Venice?
3. **MEDIUM** Marco was born in 1254. How old was he when he left and when he came home? How many years was he gone?
4. **MEDIUM** Name four things Marco described in China that were new to Europeans.
5. **CHALLENGE** Marco did not write his book himself. Who did, and how should that affect the way we read it?

Make it a game • Relay Post. Set up "relay stations" every few yards across a yard or long hallway, with one player at each. A message on a slip of paper ("The Khan wants fresh horses at Hangzhou") starts at one end and is handed from runner to runner. Time it. Then have one player carry it the whole way alone and compare. Why did the Khan's fresh horses at every station make news travel so fast?

Scripture. "As cold waters to a thirsty soul, so is good news from a far country."
(Proverbs 25:25, KJV)

Before newspapers or telegraphs, news from far lands came only by travelers. Kublai Khan asked for Christian teachers, and few came. The best news from a far country is the gospel,

and it still needs faithful carriers.

Practice: answers

1. Kublai Khan.
2. They set out in 1271 and returned in 1295.
3. He was 17 when he left and about 41 when he came home; he was gone about 24 years.
4. Any four: paper money, coal ("black stones that burn"), the relay post with fresh horses, the Grand Canal, the great city of Hangzhou, the Khan's palaces.
5. Rustichello of Pisa wrote it down from Marco's telling in a Genoese prison. Because a writer of adventure stories shaped it, and it was later copied by hand with changes, careful readers compare it with Chinese and Persian records to see which parts are confirmed.

3.4 COLUMBUS CROSSES THE ATLANTIC, 1492

OBJECTIVES

- Tell the dates, ships and route of Columbus's first voyage.
- Explain why he went west and how far he thought Asia was.
- Describe both his courage as a navigator and the real wrongs done under his rule.

Warm-up. Educated Europeans in 1492 already knew the earth was round; ancient Greeks had even measured it. So the real argument was not about the shape of the earth. What do you think it was about? Write a guess in your notebook before you read.

Video slot. Video coming. Christopher Columbus's first voyage of 1492: the Niña, Pinta and Santa María, trade winds and dead reckoning. Search approved channels (Smithsonian, Mariners' Museum, Hillsdale College, Simple History); preview first.

KEY TERMS

caravel

A small, fast, light Spanish or Portuguese sailing ship; the Niña and the Pinta were caravels.

trade winds

Steady winds that blow from the east toward the west across the tropical Atlantic. Columbus rode them west.

dead reckoning

Finding a ship's position by its compass heading, speed and time sailed from a known starting point.

Taíno

The people Columbus met in the Bahamas and on the large islands of the Caribbean.

Hispaniola

The Caribbean island (today Haiti and the Dominican Republic) where Columbus founded Spain's first settlements in the Americas.

CORE IDEAS

Christopher Columbus was born in Genoa, Italy, in 1451 and went to sea as a young man. He became sure that a ship could reach the rich lands of Asia, which Marco Polo had described, by sailing west across the Atlantic. Everyone agreed the earth was round; the question was how big it was. Columbus used the smallest estimates he could find and figured Japan lay about 2,400 nautical miles west of the Canary Islands. The real distance is more than four times that. The experts who turned him down were right about the size of the earth; neither they nor he knew that two continents lay in the way.

For years Columbus asked the kings of Portugal, Spain, England and France for ships. At last, in 1492, after they had taken Granada from the Moors, King Ferdinand and Queen Isabella of Spain agreed. On August 3, 1492, three ships sailed from Palos: the *Santa María*, a heavier ship that Columbus commanded, and two **caravels**, the *Pinta* and the *Niña*, with about ninety men in all. They stopped in the Canary Islands for repairs and left from La Gomera on September 6, sailing due west on the **trade winds**.

Columbus navigated by **dead reckoning**, with a compass, an hourglass and his own judgment of speed. He kept two records of distance: a true one for himself and a smaller one for the crew, so they would not fear they were too far from home. As weeks passed with no land, the men grew frightened and angry. Columbus promised to turn back if land was not found within a few days. In the early hours of October 12, 1492, a sailor on the *Pinta*, Rodrigo de Triana, saw white sand shining in the moonlight and cried, "Tierra! Tierra!" ("Land! Land!").

That morning Columbus went ashore on an island in the Bahamas that its people, the **Taíno**, called Guanahaní. He knelt, gave thanks, and named it San Salvador, "Holy Savior." He sailed on to Cuba and **Hispaniola**. On Christmas Eve the *Santa María* ran aground and was lost; Columbus left 39 men in a fort built from her timbers and sailed home on the *Niña*, reaching Palos on March 15, 1493. He made three more voyages, and he died in 1506 still believing he had reached the edge of Asia.

Columbus was a brave and gifted sailor and a man of prayer who signed his name as "Christ-bearer." But as governor of Hispaniola he and his men forced many Taíno to work for gold and sent some to Spain as slaves, and his rule was so harsh, even toward Spanish settlers, that in 1500 the crown sent him home in chains. Christians of his own day, such as the friars Antonio de Montesinos and Bartolomé de las Casas, spoke out against the cruelty to the native people. The voyage of 1492 joined two halves of the world for good, for both blessing and great sorrow.

PICTURE STUDY



Columbus Before the Queen, Emanuel Leutze, 1843 · Oil on canvas · Brooklyn Museum, New York
Wikimedia Commons · Public domain

Emanuel Leutze, a German-born American painter best known for *Washington Crossing the Delaware*, painted several scenes from Columbus's life. This one imagines him pleading his case before Queen Isabella, years before she finally agreed to send him.

Look closely

- Find Columbus. What do his hands and face tell you about how he is speaking?
- Look at the people around the queen. Who seems to agree with him, and who seems doubtful?
- Where does the light fall brightest? Why do you think the painter chose that spot?

Talk about it

1. Leutze painted this 350 years after the event. Is it a record of what happened, or an artist's idea of it? How can you tell?
2. Why would a king or queen be slow to pay for a voyage like this one?

HANDS-ON: THE ATLANTIC WIND MAP

Draw the Atlantic Ocean to show why Columbus sailed south to the Canaries before turning west, and how he found a different way home.

You will need

- A notebook page or sheet of paper
- A world atlas

- Colored pencils (blue, red, green and gray)
- A ruler

Steps

1. Sketch the west coast of Europe and Africa on the right side and the east coast of North America and the Caribbean islands on the left. Color the ocean light blue.
2. Label Spain, Palos, the Canary Islands, the Azores, the Bahamas, Cuba and Hispaniola.
3. Draw three long gray arrows pointing from east to west across the ocean near the Canaries and the Caribbean. Label them **trade winds**.
4. Draw three gray arrows farther north pointing from west to east. Label them **westerlies**.
5. Draw the outward route in red: Palos → Canaries → west to San Salvador → Cuba → Hispaniola. Write “Aug. 3–Oct. 12, 1492.”
6. Draw the homeward route in green: Hispaniola → north into the westerlies → the Azores → Palos. Write “arrived March 15, 1493.”
7. In a corner, draw a dotted line from the Canaries to “Japan as Columbus imagined it,” about where North America is. Label it: “Columbus’s guess: about 2,400 nautical miles.”

Check your work

- My map shows both wind belts with labeled arrows.
- The outward and homeward routes are drawn in different colors with dates.
- I showed where Columbus thought Asia would be.

TRAVEL JOURNAL

1. **Travel journal, Stop C4.** Add your Atlantic wind map.
2. Write one paragraph as a ship’s boy on the *Niña* on October 10, 1492. You have been out of sight of land for over a month. Tell what you see, what the men are saying, and what you think of the captain.

Did you know? On September 13, 1492, Columbus noticed his compass needle no longer pointed exactly at the North Star. He had found magnetic variation, the difference between magnetic north and true north, which sailors still correct for today. Spanish sailors sang a hymn to Mary, the *Salve Regina*, each evening at sea, and a boy turned the half-hour glass and sang out the watch.

Map or diagram. Draw a simple diagram of a caravel from the side. Label the bow, the stern, the mainmast, the square sails and the triangular (lateen) sail, the rudder and the crow’s nest.

Goes deeper in. Geography, Grade 8, “The Atlantic World,” and History, “The Age of Exploration” (coming soon).

For families. Sources: Columbus's journal as abridged by Bartolomé de las Casas; Samuel Eliot Morison, *Admiral of the Ocean Sea* (1942); Smithsonian; Library of Congress. Which island was Guanahaní is still debated; the Bahamian island renamed San Salvador in 1925 is the most common choice. The number of men (about 90) and the Japan estimate are approximate. The stop names the wrongs of Columbus's governorship plainly and notes that his own contemporaries condemned them. Picture: Leutze, Brooklyn Museum.

PRACTICE

1. **EASY** Name Columbus's three ships.
2. **EASY** On what date did Columbus's men first sight land?
3. **MEDIUM** How many days was it from leaving Palos on August 3 to sighting land on October 12?
4. **MEDIUM** What was the real disagreement between Columbus and the experts who turned him down?
5. **CHALLENGE** Give one reason to admire Columbus and one wrong he did, and explain how people of his own time judged that wrong.

Make it a game • Dead Reckoning. Blindfold the "captain." A partner gives a heading and time ("north, 5 steps; east, 3 steps; north, 2 steps"), and the captain walks it. Before removing the blindfold, the captain points to where the starting point should be. How close was it? Swap places. Small errors grow over a long voyage, just as they did for Columbus.

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)

Columbus loved to read the prophets and Psalms and believed God had led him across the sea. Every sailor on that voyage saw the wonders of the deep. The Psalm also reminds us that the sea and all who cross it belong to the Lord, who sees what is done in far places.

Practice: answers

1. The Santa María, the Pinta and the Niña.
2. October 12, 1492.
3. 70 days (28 more in August, 30 in September and 12 in October).
4. Not the shape of the earth but its size. Columbus thought Asia was much closer than it is; the experts were right that it was too far to reach by sailing west.
5. Admire: his skill and courage in sailing into the unknown, his persistence over many years, his discovery of the wind routes. Wrong: as governor he forced the Taíno into labor and slavery and ruled harshly. People of his own time condemned it: the crown arrested him in 1500, and friars such as Montesinos and Las Casas preached against the cruelty.

3.5 LEWIS AND CLARK, WITH SACAGAWEA

OBJECTIVES

- Explain why President Jefferson sent the Corps of Discovery west in 1804.
- Trace the route up the Missouri, over the Rocky Mountains and down the Columbia to the Pacific.
- Tell how Sacagawea, York and the native nations helped the expedition succeed.

Warm-up. Find St. Louis, Missouri, and the mouth of the Columbia River in Oregon on a map of the United States. Measure the straight line between them. Now trace the rivers instead. How much longer is the river route?

Video slot. Video coming. The Lewis and Clark Expedition, 1804–1806: the Corps of Discovery, Sacagawea, the Missouri and Columbia rivers. Search approved channels (National Park Service, Smithsonian, Montana PBS, Hillsdale College); preview first.

KEY TERMS

Louisiana Purchase

The land west of the Mississippi that the United States bought from France in 1803 for \$15 million, doubling the size of the country.

Corps of Discovery

The army party led by Meriwether Lewis and William Clark that explored from the Missouri River to the Pacific, 1804–1806.

Continental Divide

The line of high ground in the Rockies that separates rivers flowing to the Atlantic side from rivers flowing to the Pacific.

portage

Carrying boats and supplies over land around falls or rapids, or between two rivers.

Shoshone

A native people of the Rocky Mountain region; Sacagawea was born among the Lemhi Shoshone.

CORE IDEAS

In 1803 the United States bought the vast **Louisiana Purchase** from France, about 828,000 square miles, though almost no American knew what was in it. President Thomas Jefferson chose his secretary, Captain Meriwether Lewis, to lead an expedition, and Lewis asked his friend William Clark to share command. Jefferson's orders were to follow the Missouri River to its source, find the best water route to the Pacific, map the land, record plants, animals and weather, and make peaceful contact with the native nations.

The **Corps of Discovery** left Camp Dubois, near St. Louis, on May 14, 1804, in a 55-foot keelboat and two smaller boats. They rowed, poled and hauled the boats against the Missouri's current, often making only ten or fifteen miles a day. In August Sergeant Charles Floyd died, probably of a burst appendix; he was the only member of the party to die on the whole journey. In the fall they built Fort Mandan in what is now North Dakota and spent the winter among the Mandan and Hidatsa people.

There they hired a French-Canadian trader, Toussaint Charbonneau, and his young Shoshone wife, **Sacagawea**, as interpreters. As a girl she had been taken from her people by a Hidatsa raiding party. In February 1805 she gave birth to a son, Jean Baptiste, and in April she set out carrying him on her back. When a boat nearly overturned, she calmly rescued papers, instruments and medicines from the water. Clark wrote that a woman with a party of men was "a token of peace," because no war party traveled with a mother and baby.

At the Great Falls of the Missouri the men spent about a month on an 18-mile **portage**, dragging canoes on rough wooden carts. In August 1805, near the **Continental Divide**, they met the Shoshone, and their chief, Cameahwait, turned out to be Sacagawea's own brother. He traded them the horses they needed to cross the mountains. On the Lolo Trail in the Bitterroot Mountains snow fell, game was scarce, and the men ate candles and some of their colts. The Nez Perce people fed them and helped them build canoes, and they floated down the Snake and Columbia rivers. On November 7, 1805, Clark wrote: "Ocian in view! O! the joy."

They spent a wet winter at Fort Clatsop near the Pacific. The party had voted on where to camp, and the vote included York, an enslaved man owned by Clark, and Sacagawea. In March 1806 they started home, and on September 23, 1806, they reached St. Louis, where people had given them up for dead. They had traveled about 8,000 miles in two years, four months and nine days, described about 178 plants and 122 animals new to science, and drawn maps that guided travelers for decades.

PICTURE STUDY



Lewis and Clark on the Lower Columbia, Charles M. Russell, 1905 · Opaque and transparent watercolor over graphite on paper · Amon Carter Museum of American Art, Fort Worth, Texas
Wikimedia Commons · Public domain

Charles Russell went west to Montana as a teenager, worked as a cowboy, and spent his life painting the old West and its native peoples. Here he imagines the Corps meeting Chinook people on the Columbia River, with Sacagawea standing in the bow to speak in sign language.

Look closely

- Find Sacagawea. What is she doing with her hands, and why does she stand at the front?
- Find Lewis and Clark. How can you tell which canoe belongs to the expedition?
- Compare the two kinds of canoe. Which looks better built for this big river?

Talk about it

1. Russell painted this a hundred years after the journey. What did he have to learn or imagine to paint it?
2. Why was it so important for the Corps to show peaceful intentions to every nation they met?

Safety first. If you trace part of the trail outdoors, stay with a grown-up near water and keep to marked paths.

HANDS-ON: MAP THE CORPS OF DISCOVERY

Draw the expedition's route on an outline of the western United States, the way Clark drew his maps: carefully, with rivers first.

You will need

- A printed outline map of the United States, or a notebook page
- An atlas or the National Park Service trail map
- Colored pencils (blue, brown, red and green)
- A ruler

Steps

1. Draw the Mississippi, the Missouri, the Yellowstone, the Snake and the Columbia rivers in blue. Label each.
2. Draw the Rocky Mountains in brown. Draw a dashed line along their crest and label it **Continental Divide**. Put a small arrow on each side showing which way the water flows.
3. Mark these places: Camp Dubois (St. Louis), Fort Mandan, Great Falls, Lemhi Pass, the Lolo Trail, Fort Clatsop. Beside each write its date (May 1804; winter 1804-05; June-July 1805; August 1805; September 1805; winter 1805-06).
4. Draw the westbound route in red with arrows and the eastbound route in green.
5. Add a compass rose and a scale bar. Using the scale, measure from St. Louis to Fort Clatsop along your red line and write the result.
6. Draw a small picture at three places: a keelboat on the Missouri, horses at Lemhi Pass and a canoe on the Columbia.

Check your work

- All five rivers and the Continental Divide are drawn and labeled.
- Six places are marked with dates.
- My map has two route colors, a compass rose and a measured distance.

TRAVEL JOURNAL

1. **Travel journal, Stop C5.** Glue in your route map.
2. Lewis and Clark wrote in journals almost every day. Write one paragraph as a journal entry for one day of the trip, such as the Great Falls portage, meeting Cameahwait, or the first sight of the Pacific. Give the date, the weather, the distance traveled and one plant or animal you saw.

Did you know? Lewis sent Jefferson a live prairie dog in 1805, along with skins, bones, seeds and a magpie. Clark later took Sacagawea's son, Jean Baptiste, whom he nicknamed "Pomp," to be educated in St. Louis. The Corps also carried a Newfoundland dog named Seaman, who went the whole way and back.

Map or diagram. Draw a cross-section, a side view of the land, from St. Louis to the Pacific. Start low at St. Louis (about 450 feet above sea level), rise slowly across the plains, climb steeply to Lemhi Pass (about 7,300 feet), then drop to sea level at the Pacific. Label the Missouri side and the Columbia side.

Goes deeper in. Geography, Grade 4, “Rivers and Mountains of the American West,” and History, “The Louisiana Purchase and the Westward Movement” (coming soon).

For families. Sources: *The Journals of the Lewis and Clark Expedition* (University of Nebraska online edition); National Park Service, Lewis and Clark National Historic Trail; Library of Congress. Sacagawea’s birth year (about 1788) and the spelling of her name are uncertain, and she was an interpreter more than a guide, though she recognized landmarks in her home country. Clark’s “token of peace” wording is from his journal for October 1805. York was enslaved by Clark and was not freed until some years after the expedition; the exact date is uncertain. Counts of new plants and animals vary by source. Picture: Russell, Amon Carter Museum.

PRACTICE

1. **EASY** Which president sent Lewis and Clark west?
2. **EASY** Who was Cameahwait?
3. **MEDIUM** What is the Continental Divide, and why did it matter to Jefferson’s plan?
4. **MEDIUM** The trip lasted about 860 days and covered about 8,000 miles. About how many miles a day is that on average?
5. **CHALLENGE** Name three times the expedition would likely have failed without help from native people.

Make it a game • Portage Race. Set a “river” at each end of the yard. Teams must carry a “canoe” (a laundry basket loaded with a few books or pillows) from one river to the other, then return for the “supplies” (several smaller items). Time each team. Then try with a wagon or a board on rollers. Which works better, and why did the Corps build carts?

Scripture. “The LORD shall preserve thy going out and thy coming in from this time forth, and even for evermore.” (Psalm 121:8, KJV)

More than thirty people went out with the Corps and nearly all came home after more than two years in unknown country. Only one died. Whether we cross a continent or a street, the Lord keeps our going out and our coming in.

Practice: answers

1. Thomas Jefferson.
2. A Shoshone chief, Sacagawea’s brother, who traded the expedition the horses it needed to cross the Rockies.

3. The high ridge that separates rivers flowing toward the Atlantic side from those flowing to the Pacific. Jefferson hoped there was a short, easy portage across it between the Missouri and a Pacific river; there was not.
4. About 9 miles a day ($8,000 \div 860 \approx 9.3$).
5. Any three: the Mandan and Hidatsa who traded food over the first winter; Sacagawea as interpreter and sign of peace; the Shoshone horses from Cameahwait; the Nez Perce who fed the starving men after the Lolo Trail and helped them build canoes; the Clatsop who traded food at Fort Clatsop.

3.6 ISABELLA BIRD IN THE ROCKIES, 1873

OBJECTIVES

- Tell who Isabella Bird was and how she came to ride through Colorado in 1873.
- Describe her climb of Longs Peak and draw its height in a diagram.
- Explain how her letters became one of the best-loved travel books of the 1800s.

Warm-up. Think of a time you wrote a letter or a long message to someone far away. What details did you put in so they could picture where you were? Isabella Bird wrote letters so vivid that they are still printed 150 years later.

Video slot. Video coming. Isabella Bird and A Lady's Life in the Rocky Mountains; Estes Park and Longs Peak in the 1870s. Search approved channels (Rocky Mountain National Park / National Park Service, Colorado Encyclopedia, Rocky Mountain PBS, History Colorado); preview first.

KEY TERMS

Colorado Territory

The land that became the state of Colorado in 1876; in 1873 it was still a U.S. territory with few towns.

Estes Park

A high mountain valley in northern Colorado, now the gateway to Rocky Mountain National Park, where Isabella Bird stayed in a log cabin.

Longs Peak

A 14,259-foot mountain in the Front Range of the Rockies, the highest point in Rocky Mountain National Park.

fourteener

A mountain more than 14,000 feet high. Colorado has more than fifty of them.

astride

Riding with one leg on each side of the horse, instead of sideways in a sidesaddle, as most ladies rode then.

CORE IDEAS

Isabella Bird was born in 1831 in Yorkshire, England, the daughter of a clergyman. As a girl she was often ill with a weak back, headaches and sleeplessness. Doctors advised a change of air, and she found that at home she felt like an invalid but on the road she grew strong. In 1872 she set out on a long journey that took her to Australia and the Sandwich Islands (Hawaii), where she learned to ride astride in a sturdy riding dress with full trousers beneath. In the late summer of 1873 she sailed to San Francisco and crossed the Sierra Nevada by train toward **Colorado Territory**.

She was forty-one and traveling alone, and when the bank panic of 1873 struck, she was often short of money. Colorado was still a frontier of mining camps, ranches and rough cabins. She rode a little bay pony she named Birdie, a tough, cheerful animal that could carry her and her pack over mountain trails. Between September and December 1873 the two of them covered more than 800 miles, often alone, sometimes in snowstorms, through valleys and over passes, sleeping in settlers' cabins and sometimes in barns.

Her favorite place was **Estes Park**, a high valley ringed by peaks. Over it towered **Longs Peak**, then rarely climbed. In October 1873 she set out to climb it with two young students and a guide, a rough mountain trapper known as "Rocky Mountain Jim" Nugent. They camped among the pines below the summit, and the next day they crossed fields of jagged boulders and climbed narrow ledges with long drops below. Near the top she was so tired and afraid that, as she later admitted, Jim had to drag her up some places "like a bale of goods." But she reached the summit, 14,259 feet high, a **fourteener**, and looked out over hundreds of miles of mountains and plains.

All along the way Isabella wrote long letters to her sister Henrietta in Scotland. She described sunsets, a cattle round-up, rides through snowstorms, bitter nights in drafty cabins, and the kindness and the coarseness of frontier people. In 1879 the letters were published as *A Lady's Life in the Rocky Mountains*. Readers loved it because it was honest, lively and exact; she gave heights, temperatures and distances along with her feelings.

Colorado was only the beginning. Isabella Bird later traveled in Japan, Malaya, Persia, Kurdistan, Tibet, Korea and China, often on horseback, and wrote more books. She used her book earnings to found mission hospitals in India and Kashmir in memory of her husband and her sister. In 1892 she became the first woman elected a Fellow of the Royal Geographical Society. She died in Edinburgh in 1904, while planning one more journey to China.

PICTURE STUDY



Among the Sierra Nevada, California, Albert Bierstadt, 1868 · Oil on canvas · Smithsonian American Art Museum, Washington, D.C.
Wikimedia Commons · Public domain

Albert Bierstadt was born in Germany and grew up in Massachusetts. He traveled west with survey parties, made sketches outdoors, and then painted enormous canvases in his studio, more than ten feet wide. Isabella Bird crossed these same Sierra Nevada mountains, and rode near Lake Tahoe, on her way to Colorado. Her first letter in her book was written from Lake Tahoe.

Look closely

- Find the brightest spot in the painting. Where does the light seem to come from?
- Find the animals at the water. How small are they compared with the mountains?
- Find the waterfall. Trace with your finger the path the water takes down to the lake.

Talk about it

1. Bierstadt sometimes made mountains taller and light more dramatic than in real life. Why might an artist do that? Is a travel writer allowed to do the same?
2. Isabella Bird used words where Bierstadt used paint. Choose one part of this painting and describe it in one sentence as she might have.

HANDS-ON: LONGS PEAK PROFILE DIAGRAM

Draw a side-view diagram showing how high Isabella Bird climbed compared with places you know.

You will need

- Graph paper or a notebook page
- A ruler and a pencil
- Colored pencils (green, gray, white and blue)

Steps

1. Along the left edge, draw a height scale from 0 to 15,000 feet. Let each square (or each half-inch) equal 1,000 feet.
2. Draw a dashed line at 0 and label it “sea level.” Draw another at about 5,280 feet and label it “Denver, the Mile-High City.”
3. Draw Estes Park as a flat valley at about 7,500 feet. Then draw Longs Peak rising from it to 14,259 feet, with a flat-topped summit.
4. Color the lower slopes green for forest. Draw a dashed line at about 11,000 feet and label it “tree line”; above it color the rock gray and add white snow patches.
5. Draw a dotted red line for the climb from the camp in the trees to the summit. Label the camp, the “Boulder Field,” the “Keyhole” (a notch in the ridge) and the summit.
6. Beside your mountain, draw bars for comparison: your house (about 30 feet), the tallest building you have visited, and Mount Everest’s height written in (29,032 feet; note that it would go off the page).

Check your work

- My diagram has a height scale with labels.
- Sea level, Denver, Estes Park, tree line and the summit are marked.
- I showed the climbing route and at least one comparison.

TRAVEL JOURNAL

1. **Travel journal, Stop C6.** Add your Longs Peak diagram.
2. Write one paragraph as a letter to a family member from a high place you have been, such as a hill, a tall building or a mountain road. Like Isabella Bird, include at least two exact facts (a height, a temperature, a distance or a time) and one thing you felt.

Did you know? Isabella Bird praised Birdie as a tireless, sure-footed little pony and was sad to part with her at the end of the trip. In her day, riding astride was unusual for an English lady, and when a London newspaper wrongly said she had worn men’s clothes, she was upset enough that later editions of her book added a note describing her modest riding dress. Longs Peak was first recorded climbed only five years before her, in 1868, by a survey party led by John Wesley Powell.

Map or diagram. On an outline map of Colorado, mark Denver, Colorado Springs, Estes Park and Longs Peak. Draw the Front Range of the Rockies as a line of peaks running north to south. Draw a loop for Isabella Bird’s ride and write “over 800 miles, September–December 1873.”

Goes deeper in. Earth Science, “Mountains and How They Form,” and Geography, Grade 4, “The Rocky Mountain States” (coming soon). Literature: Isabella Bird’s book is public domain and free online.

For families. Sources: Isabella L. Bird, *A Lady’s Life in the Rocky Mountains* (1879, public domain, Project Gutenberg); National Park Service, Rocky Mountain National Park; Royal Geographical Society. Longs Peak is 14,259 feet by the older survey datum (about 14,255 by the newer one). Her guide, Jim Nugent, was a colorful and troubled man who died the next year; the stop leaves out his later story and keeps to the climb. The “bale of goods” phrase is her own. Her book is suitable for reading aloud with some light skipping. Picture: Bierstadt, Smithsonian American Art Museum.

PRACTICE

1. **EASY** What was the name of Isabella Bird’s pony?
2. **EASY** What is the name of the book made from her letters, and when was it published?
3. **MEDIUM** Estes Park is about 7,500 feet high, and Longs Peak is 14,259 feet. How much higher is the summit than the valley?
4. **MEDIUM** If Isabella rode 800 miles in about 90 days, about how far did she average each day? Why might real days be very different?
5. **CHALLENGE** Why do you think a travel writer who gives exact facts (heights, temperatures, distances) is more trusted than one who gives only feelings? Give an example from this stop.

Make it a game • Higher or Lower?. One player calls out a place and the others guess “higher” or “lower” than the last one: sea level, Denver (5,280 feet), Estes Park (about 7,500), tree line (about 11,000), Pikes Peak (14,115), Longs Peak (14,259), Mount Whitney (14,505), Mount Everest (29,032). Stand on tiptoe for higher, crouch for lower. Finish by lining everyone up in order of height.

Scripture. “I will lift up mine eyes unto the hills, from whence cometh my help. My help cometh from the LORD, which made heaven and earth.” (Psalm 121:1-2, KJV)

Isabella Bird was raised in a minister’s home and knew these words. The mountains she climbed are great, but the psalm looks past them to the One who made them; our help comes from the Maker, not the hills.

Practice: answers

1. Birdie.
2. *A Lady’s Life in the Rocky Mountains*, 1879.
3. 6,759 feet (14,259 – 7,500).
4. About 9 miles a day ($800 \div 90 \approx 8.9$). Real days varied: some she rode 30 miles or more, others she stayed put because of snow, rest or visits.

5. Exact facts can be checked, so readers see that the writer is careful and honest; feelings then mean more. Example: she gives Longs Peak's height and tells the truth that she was dragged up parts of it, instead of pretending she climbed it easily.

3.7 NELLIE BLY AROUND THE WORLD IN 72 DAYS

OBJECTIVES

- Trace Nellie Bly's route around the world, 1889–1890, and name the steamships and trains she used.
- Explain how steam power, the Suez Canal and the telegraph made the trip possible.
- Use her times to figure how much faster she went than the fictional Phileas Fogg.

Warm-up. If you had to go all the way around the world and could take only one small bag, what would you put in it? Make a list of ten things, then cross out three.

Video slot. Video coming. Nellie Bly's trip around the world in 72 days, 1889–1890; steamships and the Suez Canal. Search approved channels (Smithsonian, Library of Congress, Simple History, PBS American Experience); preview first.

KEY TERMS

reporter

A writer who gathers news and tells it in a newspaper or magazine.

steamship

A ship driven by a steam engine turning paddle wheels or a propeller, so it does not depend on the wind.

Suez Canal

A canal across Egypt, opened in 1869, joining the Mediterranean Sea and the Red Sea, so ships no longer had to sail around Africa.

telegraph

A system that sent messages as electric pulses along wires and undersea cables, letting news cross oceans in hours.

International Date Line

An imaginary line, mostly along 180° longitude in the Pacific, where the calendar date changes by one day.

CORE IDEAS

In 1873 the French writer Jules Verne published *Around the World in Eighty Days*, a story about an English gentleman, Phileas Fogg, who wins a wager by circling the globe. Sixteen years later a young **reporter** for Joseph Pulitzer's *New York World* proposed to make the trip for real and beat Fogg's time. Her name was Elizabeth Cochrane, but readers knew her by her pen name, Nellie Bly. Born in Pennsylvania in 1864, she had already become famous for pretending to be insane so she could report from inside a women's asylum and expose its cruelty.

Her editors said the job needed a man, because a woman would need a protector and too many trunks. Nellie answered that she would do it in a single bag, and she did. On November 14, 1889, at 9:40 in the morning, she sailed from Hoboken, New Jersey, on the **steamship** *Augusta Victoria*, carrying one small leather gripsack, the dress she wore, a coat, and some money in a bag around her neck.

She crossed the Atlantic to England, took a train to London and the Channel, and made a side trip to Amiens, France, to meet Jules Verne himself, who wished her success. She rode a mail train across Europe to Brindisi, Italy, and boarded a ship through the **Suez Canal**, down the Red Sea, to Aden and Colombo, in Ceylon (today Sri Lanka). There she was stuck for five days waiting for a ship. She went on to Penang, Singapore, where she bought a monkey, and Hong Kong. In Hong Kong she learned that a rival, Elizabeth Bisland of *Cosmopolitan* magazine, had left New York the same day going west, and was racing her.

From Japan she crossed the Pacific on the *Oceanic*. Crossing the **International Date Line**, she lived one day twice. She landed in San Francisco, and the *World* hired a special train to rush her across the country while crowds waited at stations to cheer. Each step of the race was reported by **telegraph**, and readers followed her daily in the paper.

On January 25, 1890, Nellie Bly stepped off the train in Jersey City. Her time was 72 days, 6 hours, 11 minutes and 14 seconds, a world record. Bisland arrived about four and a half days later. Fifty years earlier such a trip would have taken many months by sailing ship. Nellie's race showed how steam engines, railroads, canals and telegraph cables had made the world smaller. She wrote the story as a book, *Around the World in Seventy-Two Days* (1890), and later ran a large manufacturing company. She died in New York in 1922.

PICTURE STUDY

Nellie Bly in her traveling clothes, H. J. Myers, photographer, About 1890 · Photograph · Library of Congress, Prints and Photographs Division, Washington, D.C.

This photograph shows Nellie Bly dressed as she traveled: a plain, sturdy dress, a long checked coat called an ulster, a small cap, and the one gripsack that held everything else. The picture was printed many times, and stores sold games and souvenirs with her image.

Look closely

- Find the bag. How big is it compared with her?
- Look at the coat. Why would a long, heavy coat be useful on ships and trains in winter?
- Look at her face and the way she stands. What kind of person does she seem to be?

Talk about it

1. Why do you think a reporter would want her photograph printed so widely before and after the trip?
2. What does the plain outfit tell you about how she planned the trip?

HANDS-ON: RACE AROUND THE WORLD MAP

Draw Nellie Bly's route on a world map and compare it with Elizabeth Bisland's.

You will need

- A printed outline world map or a notebook page
- A world atlas or globe
- Colored pencils (red, blue and black)
- A ruler

Steps

1. If you draw your own map, sketch the continents and label the Atlantic, Indian and Pacific Oceans.
2. Mark these stops with dots and labels: Hoboken/New York, Southampton, London, Amiens, Brindisi, Port Said and the Suez Canal, Aden, Colombo, Penang, Singapore, Hong Kong, Yokohama, San Francisco.
3. Draw Nellie Bly's route eastward in red, with arrows. Use a dashed line for trains and a solid line for ships. Write the date beside four of the stops (start November 14, 1889; Suez late November; Hong Kong late December; back January 25, 1890).
4. Draw Elizabeth Bisland's route in blue, going the other way: New York by train to San Francisco, ship to Japan and China, then west through the Suez Canal to Europe and home.
5. Draw the International Date Line in black down the middle of the Pacific. Write: "Eastbound: same date twice."
6. Add a key (ship, train, Bly, Bisland) and a compass rose.

Check your work

- At least twelve stops are labeled in order.
- Ships and trains are shown with different lines, and both racers' routes appear.
- The International Date Line is drawn and explained.

TRAVEL JOURNAL

1. **Travel journal, Stop C7.** Add your race map. On the facing page, draw Nellie Bly's gripsack open and list what you think she packed.
2. Write one paragraph as a telegraph report from one stop on her route. Begin with the place and date, as reporters did ("COLOMBO, CEYLON, Dec. 9."), and tell what happened there in a few lively sentences.

Did you know? Nellie Bly took no change of dress at all. Her gripsack held, among other things, a jar of cold cream, pens and pencils, writing paper, needles and thread, a dressing gown, a tennis blazer, a flask and a cup, and some underclothing. She also

carried 200 English pounds in a soft leather bag tied around her neck, plus some American money.

Map or diagram. Draw a simple time-zone diagram: a circle for the earth seen from the North Pole, cut into 24 slices like a pie. Mark New York, London and Hong Kong. Draw an arrow going east around the circle and explain why a traveler going east sets the clock ahead one hour about every 15° of longitude.

Goes deeper in. Geography, “Technology Overcoming Geography: Steamships, Canals and the Telegraph,” and Literature, Jules Verne, *Around the World in Eighty Days* (coming soon).

For families. Sources: Nellie Bly, *Around the World in Seventy-Two Days* (1890, public domain); Library of Congress; Matthew Goodman, *Eighty Days* (2013). Her packing list follows her own book. Dates at each stop are approximate except the start and finish. The *World* also ran a prize contest for guessing her time; the stop leaves it out. Her asylum exposé, *Ten Days in a Mad-House* (1887), describes cruelty to patients and is better for older readers. Picture: choose a Library of Congress photograph dated about 1890; it is public domain in the U.S.

PRACTICE

1. **EASY** What was Nellie Bly’s real name, and which newspaper did she work for?
2. **EASY** Which famous author did she meet in France?
3. **MEDIUM** Phileas Fogg took 80 days. Nellie took about 72. How many days faster was she? If Bisland took about 76½ days, by how much did Nellie win?
4. **MEDIUM** How did the Suez Canal shorten her trip?
5. **CHALLENGE** Going east around the world, Nellie set her watch ahead an hour about every 15° of longitude. How many hours did she set it ahead in all, and why didn’t she lose a whole day?

Make it a game • One-Bag Challenge. Give each player one small bag (a lunch bag or a small backpack) and five minutes to pack for a trip around the world from things in the house. Then each player unpacks and explains every item. The family votes for the most useful bag. Bonus: a player who can add an item Nellie Bly really carried (cold cream, needle and thread, pens, a cup) earns a point for each.

Scripture. “In all thy ways acknowledge him, and he shall direct thy paths.” (Proverbs 3:6, KJV)

Nellie Bly planned every connection she could, yet storms and missed ships still changed her path. We plan carefully too, but we acknowledge God in every road and every delay, and trust Him to direct our steps.

1. Elizabeth Cochrane; the *New York World*.
2. Jules Verne, at Amiens.
3. About 8 days faster than Fogg, and about $4\frac{1}{2}$ days ahead of Bisland.
4. It let ships go straight from the Mediterranean into the Red Sea and on to Asia, instead of sailing all the way around Africa.
5. 24 hours ($360^\circ \div 15^\circ = 24$), a full day. She got it back when she crossed the International Date Line going east and lived the same date twice, so her calendar matched New York's when she returned.

3.8 AMELIA EARHART OVER THE ATLANTIC, 1932

OBJECTIVES

- Tell the dates, route, airplane and time of Amelia Earhart’s solo Atlantic flight.
- Name the dangers she faced in the air and how she handled them.
- Compare how long the Atlantic crossing took by sail, steamship and airplane.

Warm-up. Columbus took about five weeks to cross the Atlantic. Nellie Bly’s steamship took about a week. Guess how long it took Amelia Earhart in 1932. Then guess how long a jet takes today.

Video slot. Video coming. Amelia Earhart’s 1932 solo transatlantic flight in the Lockheed Vega 5B; the Vega at the National Air and Space Museum. Search approved channels (Smithsonian National Air and Space Museum, Purdue University Archives, Library of Congress, Simple History); preview first.

KEY TERMS

solo

Alone. A solo flight has only one person aboard: the pilot.

transatlantic

Crossing the Atlantic Ocean.

altimeter

An instrument that tells a pilot how high the airplane is flying.

instrument flying

Flying by watching the dials (compass, altimeter, airspeed and turn indicators) when clouds or darkness hide the ground and sky.

Distinguished Flying Cross

A U.S. award for heroism or extraordinary achievement in flight. Earhart was the first woman to receive it.

CORE IDEAS

Amelia Earhart was born in 1897 in Atchison, Kansas. She took her first airplane ride in California in 1920 and wrote, “By the time I had got two or three hundred feet off the ground, I knew I had to fly.” She worked odd jobs to pay for lessons and bought a bright yellow biplane. In 1928 she became the first woman to cross the Atlantic by air, but only as a passenger; two men did the flying, and she said she had been carried along like “a sack of potatoes.” She resolved to do it herself someday.

Five years earlier, in May 1927, Charles Lindbergh had made the first **solo** nonstop **transatlantic** flight, from New York to Paris. No one had done it alone since. Amelia

prepared quietly. Her airplane was a single-engine Lockheed Vega 5B, painted red with gold stripes, with extra fuel tanks built into the cabin. On May 20, 1932, exactly five years to the day after Lindbergh's start, she took off from Harbour Grace, Newfoundland, at about 7:12 in the evening, heading for Paris.

Trouble came quickly. A few hours out her **altimeter** failed, so she could not be sure of her height above the dark sea. She flew into storms; when she climbed above them, ice formed on her wings and the Vega went into a spin. She recovered close to the waves, near enough to see whitecaps through the dark. She flew by her instruments for hours through cloud. Flames flickered from a cracked exhaust pipe, and fuel began dripping from a leaking gauge into the cockpit. She ate nothing but sipped tomato juice through a straw, and she kept flying.

At dawn she knew she could not safely reach Paris. When she saw a coastline, she searched for an airfield, found none, and landed in a pasture at Culmore, near Londonderry, Northern Ireland, frightening the cows. A farmhand ran up and asked, "Have you flown far?" She answered, "From America." The crossing of about 2,000 miles had taken just under 15 hours (14 hours and 56 minutes).

Amelia Earhart was the first woman, and only the second person, to fly the Atlantic alone. The U.S. Congress awarded her the **Distinguished Flying Cross**, and crowds welcomed her in London, Paris, Rome and New York. She later flew solo from Hawaii to California (1935). In 1937, trying to fly around the world near the equator, she and her navigator, Fred Noonan, disappeared over the Pacific Ocean near tiny Howland Island. Searches found no trace. Her red Vega survives and hangs today in the Smithsonian's National Air and Space Museum in Washington, D.C.

PICTURE STUDY



Amelia Earhart, aviator, Underwood & Underwood (press photographers), About 1928 · Photograph · Library of Congress, Prints and Photographs Division, Washington, D.C. · Wikimedia Commons · Public domain

Press photographers took many pictures of Amelia Earhart after her 1928 flight as a passenger made her famous. She liked practical flying clothes: leather jackets, trousers and boots. Look for one of the Library of Congress photographs from 1928 that shows her in flying gear.

Look closely

- Find the clues that tell you she is a pilot: clothing, goggles, the airplane.
- Look at her expression. What does it tell you about her?
- If an airplane appears, find the propeller, the engine and the wing.

Talk about it

1. Why would a pilot in an open or drafty cockpit in the 1920s need leather and wool?
2. This photograph was taken four years before her solo flight. What had she still not done when it was taken?

Safety first. If you fly paper airplanes or toy gliders for the game, throw them only in an open space and never toward someone's face.

HANDS-ON: THREE WAYS ACROSS THE ATLANTIC

Draw a map and a bar graph comparing three Atlantic crossings on this trail: Columbus's ships, a steamship like *Nellie Bly's*, and Amelia Earhart's airplane.

You will need

- Two notebook pages or one large sheet
- A world atlas
- Colored pencils (blue, red, green and brown)
- A ruler and graph paper

Steps

1. **Map.** Sketch the North Atlantic: North America on the left; Ireland, Britain, France and Spain on the right. Label Newfoundland, Harbour Grace, Northern Ireland (Culmore/Londonderry), Paris, New York and the Canary Islands.
2. Draw Earhart's flight in red: Harbour Grace → Culmore. Draw a dotted red line on to Paris and label it "planned." Write "May 20-21, 1932, 14 hrs 56 min."
3. Draw Lindbergh's 1927 route in green: New York → Paris. Draw Columbus's 1492 route in brown: Canaries → Bahamas.
4. **Bar graph.** On graph paper, draw three bars measured in hours. Columbus: about 36 days from the Canaries, which is 864 hours. A fast steamship of 1889: about 7 days, which is 168 hours. Earhart: about 15 hours. Choose a scale that fits (for example, 1 square = 24 hours) and label each bar.
5. Under the graph, write a one-sentence conclusion about how travel changed in 440 years.

Check your work

- My map shows Earhart's actual and planned routes, with Lindbergh's and Columbus's for comparison.
- My bar graph has a title, a labeled scale and three labeled bars.
- I wrote a conclusion sentence.

TRAVEL JOURNAL

1. **Travel journal, Stop C8.** Add your map and bar graph. This is the last stop on Trail C.
2. Write one paragraph as Amelia Earhart's logbook entry for the night of May 20-21, 1932: the failed altimeter, the ice, the flames from the exhaust, the dawn, and the landing among the cows. Use the times and distances from the stop.

Did you know? Amelia's husband, the publisher George Putnam, helped plan the flight and kept it secret until she was in the air. Her time of 14 hours and 56 minutes was a new record for an Atlantic crossing by airplane, an average of about 135 miles per hour. Today a memorial near Culmore marks the place where she landed.

Map or diagram. Draw a simple diagram of the Vega's cockpit panel with four round dials: compass, altimeter, airspeed indicator and turn-and-bank indicator. Under each, write one sentence about what it tells the pilot. Put a large X over the altimeter and write "failed, May 20, 1932."

Goes deeper in. Geography, “Technology Overcoming Geography: The Airplane,” and History, “America Between the World Wars” (coming soon). Smithsonian National Air and Space Museum online exhibit of the Vega 5B.

For families. Sources: Amelia Earhart, *The Fun of It* (1932); Smithsonian National Air and Space Museum; Purdue University Libraries (Earhart Papers). Fuel and speed figures are rounded; distance is often given as about 2,026 miles. The quotes about her first ride and the “sack of potatoes” are her own; the exchange with the farmhand appears in several forms. Her 1937 disappearance is still unsolved; the stop gives only the facts and none of the theories. Copyright on photographs from 1932 and later can be uncertain, so the picture study uses a press photograph from 1928 or earlier, which is public domain in the U.S.

PRACTICE

1. **EASY** From where did Amelia Earhart take off in 1932, and where did she land?
2. **EASY** What kind of airplane did she fly?
3. **MEDIUM** Name three dangers she faced during the flight.
4. **MEDIUM** Lindbergh flew the Atlantic alone in May 1927. Earhart did it in May 1932. How many years apart, and what was special about the date she chose?
5. **CHALLENGE** She flew about 2,026 miles in 14 hours 56 minutes. Round the time to 15 hours and find her average speed. How many times faster was that than a steamship averaging 20 miles per hour?

Make it a game • Instrument Flying. The “pilot” wears a blindfold and holds a paper plate as a steering wheel. A “co-pilot” acts as the instruments and calls only readings: “heading drifting left,” “altitude dropping,” “level.” The pilot must cross the room to a “landing field” (a towel) using only those calls. Then switch. Afterward, talk about why Amelia’s broken altimeter made the night so dangerous.

Scripture. “If I take the wings of the morning, and dwell in the uttermost parts of the sea; Even there shall thy hand lead me, and thy right hand shall hold me.” (Psalm 139:9–10, KJV)

Amelia Earhart flew all night over the open sea and saw the morning come up ahead of her. No one can travel so far, by sail or steam or wing, that God’s hand is not there to lead and hold.

Practice: answers

1. From Harbour Grace, Newfoundland; she landed in a pasture at Culmore, near Londonderry, Northern Ireland.
2. A red single-engine Lockheed Vega 5B.
3. Any three: the altimeter failed; storms; ice on the wings and a spin; flames from a cracked exhaust pipe; fuel leaking into the cockpit; flying blind in cloud and darkness; fatigue.

4. Five years apart. She took off on May 20, exactly five years to the day after Lindbergh began his flight.
5. About 135 miles per hour ($2,026 \div 15 \approx 135$). That is nearly 7 times faster than the steamship ($135 \div 20 \approx 6.8$).

TRAIL 3 BADGE QUIZ

The badge quiz is optional. The student answers in writing, in a sentence or two, and a parent checks with the answers given. Four right out of five earns the first badge; four right out of five earns the second. Badges and the certificate are earned by doing the stops, not by scores.

Badge quiz 1 (Stops 1-5)

1. Why did Abram's family travel from Ur by way of Haran instead of straight west to Canaan?
2. Name the city where Paul's journeys began and the island where he was shipwrecked on the way to Rome.
3. Whom did Marco Polo serve in China, and name two wonders he described.
4. What was the real disagreement between Columbus and the experts, and what did neither side know?
5. How did Sacagawea help the Corps of Discovery? Give two ways.

Badge quiz 2 (Stops 6-8)

6. What mountain did Isabella Bird climb in 1873, about how high is it, and how did the world learn of her journey?
7. Whose fictional record was Nellie Bly trying to beat, and what was her time?
8. Name two inventions or works of engineering that made Nellie Bly's fast trip possible.
9. Where did Amelia Earhart start and end her 1932 solo flight, and about how long did it take?
10. Put these in order from slowest to fastest Atlantic crossing: steamship, airplane, Columbus's caravels. About how long did each take?

TRAIL CERTIFICATE: MY GREAT JOURNEYS TRAVEL JOURNAL AND TRAIL C CERTIFICATE

Gather the eight Trail C pages of your travel journal: a route map or diagram and a journal paragraph for each journey, plus the large hand-drawn map of Paul's journeys. Add a title page, "Great Journeys," with your name and the dates you worked.

Make a timeline across two pages from about 2000 B.C. to A.D. 1932 and place all eight travelers on it, each with a small drawing of how they traveled (on foot, by sailing ship, on horseback, by steamship, by airplane).

Choose the journey you would most like to have joined and write a paragraph telling why, what you would have packed, and what you would have feared. When the journal is complete, a parent signs the Trail C certificate.

- **Maps and diagrams:** Each stop has a map or diagram with labeled places, a compass rose or scale where needed, and routes drawn with arrows.

- **Journal entries:** Each entry is a full paragraph that uses true dates, names and numbers from the stop.
- **Understanding:** The student can explain how geography and the means of travel shaped each journey, and can place all eight on the timeline.
- **Care:** Work is neat, spelled correctly and in order, and Scripture is copied exactly.

Answer key

1. Straight west lay the Syrian Desert with almost no water; the Fertile Crescent along the rivers had water and grass for people and flocks.
2. Antioch in Syria; Melita (Malta).
3. Kublai Khan. Any two: paper money, coal, the relay post, the Grand Canal, the city of Hangzhou.
4. The size of the earth: Columbus thought Asia was much closer. Neither side knew that the Americas lay in between.
5. Any two: she interpreted with the Shoshone; her brother Cameahwait traded them horses; she saved papers and instruments when a boat nearly overturned; a woman and baby with the party showed they came in peace; she recognized landmarks in her homeland.
6. Longs Peak, about 14,259 feet. Through her letters to her sister, published as *A Lady's Life in the Rocky Mountains* (1879).
7. Phileas Fogg's 80 days in Jules Verne's novel; she took 72 days (72 days, 6 hours, 11 minutes, 14 seconds).
8. Any two: steamships, railroads, the Suez Canal, the telegraph.
9. From Harbour Grace, Newfoundland, to a pasture near Londonderry, Northern Ireland; just under 15 hours (14 hours 56 minutes).
10. Columbus's caravels (about 5 weeks from the Canaries), steamship (about a week), airplane (about 15 hours).

TRAVEL AND FARAWAY PLACES TRAIL D: ARMCHAIR TOUR OF FARAWAY PLACES

The fourth trail of the Travel track is a tour of the world from your own chair. Eight stops visit the Holy Land (Jerusalem, Bethlehem and Galilee), Rome and the Colosseum, London and the Tower, Paris and the Eiffel Tower, the Swiss Alps, Egypt and the pyramids, Japan and Mount Fuji, and two of America's national parks, Yellowstone and the Grand Canyon. At each place you learn the geography, the history behind the famous sights, the numbers that make them remarkable and how the place connects to the story of the Bible and the Church.

This is the  **Ranger** level, for ages 10 to 13. The student reads each stop alone, in about 25 to 35 minutes, and a parent checks the answers and the notebook. Every stop stands by itself, so they can be done in any order. Each stop adds a hand-drawn map or diagram and a written **postcard** to a Trail D postcard set, and a one-paragraph page to the **travel journal** in the Field Notebook.

Five stops earn the **Ranger Traveler badge, part 1**; all eight stops earn part 2 and the **Trail D certificate**.

BEFORE YOU BEGIN

- Read a page of nonfiction alone and answer questions about it in full sentences.
- Find places on a world map or globe using the compass rose, and use a map's scale bar (Trail A helps).

MASTERY CHECKLIST

- ☐ I can find all eight places on a world map and name the country and nearest river, sea or mountain range for each.
- ☐ I can give one key date and one key measurement for each famous sight on this trail.
- ☐ I can draw a labeled map, plan, profile or cross-section with a scale or a compass rose.
- ☐ I can tell how at least four of these places connect to the Bible or the history of the Church.
- ☐ I have made eight postcards and written eight travel-journal paragraphs.

OPTIONAL BOOKS AND RESOURCES

- **National Park Service: Yellowstone and Grand Canyon** (<https://www.nps.gov>): Free maps, rock-layer charts, geyser predictions and webcams for Stop D8, including the Old Faithful live camera.
- **Historic Royal Palaces: Tower of London** (<https://www.hrp.org.uk/tower-of-london/>): Free history pages, a site plan and stories of the ravens, the Yeoman Warders and the Crown Jewels for Stop D3.

- **The Eiffel Tower (official site)** (<https://www.toureiffel.paris/en>): Facts and figures, construction photographs and the tower's history for Stop D4.
- **The Metropolitan Museum of Art: Heilbrunn Timeline of Art History** (<https://www.metmuseum.org/toah/>): Free essays and images on ancient Egypt, Rome and Japanese woodblock prints, including Hokusai's *Great Wave*.
- **Miroslav Šašek, *This Is Paris, This Is London and This Is Rome* (1959-1960)** (<https://www.worldcat.org>): Classic illustrated city tours, reissued by Universe. A little young for Rangers but full of details to sketch. Look for them at the library.

4.1 THE HOLY LAND: JERUSALEM, BETHLEHEM, GALILEE

OBJECTIVES

- Locate Jerusalem, Bethlehem, Nazareth, the Sea of Galilee, the Jordan River and the Dead Sea on a map.
- Explain why the Bible speaks of going “up” to Jerusalem, using elevations.
- Name three places a traveler visits today and the Bible events remembered there.

Warm-up. Open a Bible map of the land in the time of Jesus. Put one finger on Nazareth and one on Jerusalem. Guess how many miles apart they are, and how many days it would take to walk. Write your guesses down; you will check them in the practice.

Video slot. Video coming. A travel tour of Jerusalem’s Old City, the Church of the Nativity in Bethlehem, and the Sea of Galilee. Search approved channels (Associates for Biblical Research, Drive Thru History, Smithsonian Channel); preview first.

KEY TERMS

Holy Land

The land where the events of the Bible took place, between the Mediterranean Sea and the Jordan River, today mostly in Israel and the West Bank.

Old City

The walled heart of Jerusalem, less than half a square mile, with walls built by the Ottoman sultan Suleiman between 1537 and 1541.

Western Wall

Part of the great retaining wall King Herod built around the Temple Mount; the Temple itself was destroyed by the Romans in AD 70.

Church of the Nativity

The church in Bethlehem built over the cave remembered as the birthplace of Jesus; first built in the AD 320s–330s and rebuilt in the 500s.

elevation

How high a place is above (or below) the level of the sea.

CORE IDEAS

The **Holy Land** is small. From the Mediterranean coast to the Jordan River is only about 50 miles, and from Galilee in the north to Beersheba in the south is about 150. Yet more of the world’s best-known stories happened here than almost anywhere else. An armchair traveler needs a good map, because in this land the hills and valleys are part of every story.

Begin in **Jerusalem**, which sits on a ridge about 2,500 feet above sea level. King David captured it around 1000 BC and made it his capital (2 Samuel 5). His son Solomon built the

Temple there. The Babylonians destroyed that Temple in 586 BC; it was rebuilt, then greatly enlarged by King Herod about 20 BC, and destroyed again by the Romans in AD 70. The huge stones of the **Western Wall** are part of Herod's platform. Today visitors walk through the gates of the **Old City**, whose walls the Ottoman sultan Suleiman built between 1537 and 1541. Inside stands the Church of the Holy Sepulchre, first dedicated in AD 335, over the places long remembered as Calvary and the empty tomb.

Bethlehem lies only about 6 miles south of Jerusalem. Seven hundred years before Jesus was born, the prophet Micah named it as the town the ruler of Israel would come from. The **Church of the Nativity** was first built by the Emperor Constantine and his mother Helena in the 320s and 330s, and rebuilt by the Emperor Justinian in the 500s. It is one of the oldest churches in the world still used every day. Its main door was made very small centuries ago, perhaps to keep riders from entering on horseback, so every visitor must stoop to go in. It is called the Door of Humility.

Go north about 65 miles as the crow flies and you reach **Galilee**. Jesus grew up in Nazareth, in the Galilean hills, and did much of His teaching around the Sea of Galilee, a freshwater lake about 13 miles long and 8 miles wide. Its surface lies about 700 feet *below* sea level. Fishermen such as Peter, Andrew, James and John worked its waters, and Capernaum on its northern shore became Jesus' home base. Visitors can still see the stone foundations of Capernaum's synagogue and houses.

The **elevation** explains a phrase you will meet again and again in the Bible: people always go "up" to Jerusalem. A family walking from the Sea of Galilee climbed more than 3,000 feet. The Jordan River runs south from the Sea of Galilee to the Dead Sea, about 1,400 feet below sea level, the lowest land on earth. Jericho, near the Dead Sea, lies about 850 feet below sea level, so a traveler from Jericho climbs more than 3,000 feet in about 15 miles. That steep, lonely road is the one in the parable of the Good Samaritan.

PICTURE STUDY



Jerusalem from the Mount of Olives, David Roberts (drawing); lithograph by Louis Haghe, Drawn 1839; published 1842 · Hand-colored lithograph, from *The Holy Land, Syria, Idumea, Arabia, Egypt and Nubia* · Prints in many libraries, including the Library of Congress, Washington, D.C.

Wikimedia Commons · CC0

David Roberts, a Scottish painter, traveled through Egypt and the Holy Land in 1838 and 1839 and filled his sketchbooks with drawings. Back in London, the printmaker Louis Haghe turned them into lithographs, which were published in volumes from 1842 to 1849. For many families in Britain and America, these prints were their first true picture of the places in the Bible.

Look closely

- Find the walls of the Old City. Which large dome stands out inside them?
- Find the valley between the Mount of Olives and the city. Which way would you walk to reach the gates?
- Find the people in the foreground. What are they doing, and how does their size help you judge the distance?

Talk about it

1. Jesus wept over Jerusalem as He looked at it from the Mount of Olives (Luke 19:41). Why do you think this view was chosen so often by artists?
2. Roberts drew this view in 1839. What would be different if you stood in the same place today?

Safety first. An armchair tour is done from home. Look up maps and photographs with a parent, and use only the sites your family approves.

HANDS-ON: POSTCARD AND MAP: THE LAND FROM GALILEE TO BETHLEHEM

Begin your **postcard set** for Trail D. One side is a map you draw; the other is a short message as if you were writing home from the Holy Land.

You will need

- A 4-by-6-inch index card or cardstock
- A Bible atlas or a printed map of Israel
- Pencil, fine black pen, blue and brown colored pencils
- A ruler

Steps

1. On the blank side, draw the coastline of the Mediterranean on the left (west) and the Jordan River running north to south on the right (east).
2. Draw and label the **Sea of Galilee** at the top of the river and the **Dead Sea** at the bottom. Color the water blue.
3. Mark and label with dots: **Nazareth, Capernaum, Jericho, Jerusalem** and **Bethlehem**.
4. Shade the central hills light brown. Write the elevations beside three places: Jerusalem +2,500 ft, Sea of Galilee -700 ft, Dead Sea -1,400 ft.
5. Add a compass rose and a scale bar (find the scale on your atlas map).
6. On the lined side, write a 3-4 sentence postcard home telling one thing you “saw” and one Bible event that happened there. Address it to your family.

Check your work

- My map shows both seas, the Jordan River and five labeled towns.
- I wrote three elevations, a compass rose and a scale bar.
- My postcard message names a place and a true Bible event.

TRAVEL JOURNAL

1. **Travel journal, Holy Land page.** Write a paragraph (5-7 sentences) as if you had spent a day walking from Bethlehem to Jerusalem. Tell what the road was like, what you saw in the Old City, and which Bible event you thought about most.
2. Draw an elevation line: a side view from the Mediterranean (0 ft) up to Jerusalem (2,500 ft) and down to the Dead Sea (-1,400 ft). Label each point.

Did you know? The Dead Sea is about nine times saltier than the ocean, so swimmers float without trying. The Sea of Galilee has had several names in the Bible: the Sea of Chinnereth, the Lake of Gennesaret and the Sea of Tiberias. In 1986, during a drought, the remains of a wooden fishing boat from about the time of Jesus were found in its mud. It is now in a museum near the lake.

Map or diagram. The elevation line in your notebook is a *profile*. Mapmakers use profiles to show hills and valleys from the side, the way a hiker feels them.

Goes deeper in. Geography, Grade 4, “Southwest Asia and the Holy Land,” and History, “Israel and the Kings” (coming soon).

For families. Sources: Britannica (Jerusalem, Bethlehem, Sea of Galilee, Church of the Nativity, Church of the Holy Sepulchre); the Galilee boat is displayed at the Yigal Allon Centre, Ginosar. Elevations are rounded; the Sea of Galilee and Dead Sea levels change from year to year (the Dead Sea is now lower than 1,400 ft). The reason for the low door of the Church of the Nativity is traditional, not certain. The site of the Holy Sepulchre is the traditional one, held since at least the fourth century. Travel to the region depends on current conditions; check government travel advisories before any real trip. Picture: David Roberts, *The Holy Land* (London: F. G. Moon, 1842–1849).

PRACTICE

1. **EASY** Which town is about 6 miles south of Jerusalem and is remembered as the birthplace of Jesus?
2. **EASY** Which river flows from the Sea of Galilee to the Dead Sea?
3. **MEDIUM** The huge stones of the Western Wall belong to whose building project, and what happened to the Temple in AD 70?
4. **MEDIUM** Nazareth is about 65 miles from Jerusalem in a straight line, but the walking road was about 90 miles. At 20 miles a day, how many days did the walk take?
5. **CHALLENGE** Jerusalem is about 2,500 feet above sea level and the Sea of Galilee about 700 feet below. How many feet does a traveler climb going from the lake to Jerusalem? Why does the Bible say people go “up” to Jerusalem?

Make it a game • Up to Jerusalem. Make a “staircase” on the floor with five sheets of paper labeled Dead Sea, Jericho, Sea of Galilee, Bethlehem, Jerusalem. A caller names a place; players jump to the right sheet and say whether it is above or below sea level. Then sort the sheets from lowest to highest. The first player to put them in the right order without help becomes the next caller.

Scripture. “But thou, Beth-lehem Ephratah, though thou be little among the thousands of Judah, yet out of thee shall he come forth unto me that is to be ruler in Israel; whose goings forth have been from of old, from everlasting.” (Micah 5:2, KJV)

Micah wrote this about 700 years before Jesus was born. When the wise men came asking for the new King, the scribes in Jerusalem pointed to this verse and sent them to the little town 6 miles away (Matthew 2:5–6).

Practice: answers

1. Bethlehem.

2. The Jordan River.
3. King Herod's Temple Mount platform; the Romans destroyed the Temple in AD 70.
4. About $4\frac{1}{2}$ days ($90 \div 20 = 4.5$), so four to five days.
5. $2,500 + 700 = 3,200$ feet. Jerusalem is high in the hills, so from almost anywhere in the land, travelers climb to reach it.

4.2 ROME AND THE COLOSSEUM

OBJECTIVES

- Locate Rome, the Tiber River and Italy’s place in the Mediterranean on a map.
- Describe how the Colosseum was built and used, with its key dates and measurements.
- Explain what the Colosseum came to mean to Christians, and why Rome matters in the story of the early Church.

Warm-up. Find Italy on a map. It looks like a boot kicking a ball (Sicily). Find Rome about halfway down the western side. Why might a city near the middle of the boot, near the sea but not on it, become the center of an empire?

Video slot. Video coming. A tour of the Colosseum in Rome: how it was built, the arena floor and the underground hypogeum. Search approved channels (Smithsonian Channel, Khan Academy / Smarthistory, Drive Thru History); preview first.

KEY TERMS

amphitheater

An oval or round open-air arena with rising rows of seats all the way around (Greek “amphi,” on both sides).

Flavian Amphitheater

The Colosseum’s ancient name, after the Flavian family of emperors (Vespasian, Titus and Domitian) who built it.

travertine

A cream-colored limestone quarried near Tivoli, east of Rome; the Colosseum’s outer walls are made of it.

hypogeum

The two-level network of tunnels, cages and lifts under the arena floor (Greek for “underground”).

Tiber

The river that flows through Rome to the Mediterranean Sea.

CORE IDEAS

Roman tradition says the city was founded in 753 BC on hills beside the **Tiber** River, about 15 miles from the sea. Rome grew from a cluster of villages into the capital of an empire that, by AD 117, ringed the whole Mediterranean. Its roads, more than 50,000 miles of them paved with stone, all led back to the city. An armchair traveler today can still walk on the Via Sacra, the “Sacred Road,” through the ruins of the Roman Forum.

At the end of the Forum stands the **Colosseum**. Its builder, the Emperor Vespasian, began it around AD 72 on the site of a private lake in the Emperor Nero's palace gardens. His son Titus opened it in AD 80 with 100 days of games, and his younger son Domitian finished the top story. Romans called it the **Flavian Amphitheater**. The name Colosseum came later, probably from a colossal bronze statue of Nero that stood nearby.

The numbers are still impressive. The oval measures about 620 by 513 feet and rises about 157 feet, as tall as a 15-story building. Its outer wall is **travertine**, held together with iron clamps instead of mortar; the holes you see today are where people later dug the iron out. Eighty arched entrances let around 50,000 spectators find their seats quickly, by numbered gates, much as fans do at a stadium today. Sailors from the Roman fleet worked a huge canvas awning, the *velarium*, to shade the crowd. Under the floor, Domitian added the **hypogeum**, where animals and fighters waited and rope-and-pulley lifts raised them into the arena.

What happened inside was often cruel. Gladiators, most of them slaves or prisoners, fought one another, and wild animals from Africa and Asia were hunted for sport. Criminals were sometimes put to death there as public punishment. Rome was also the city where Christians first suffered persecution by an emperor: after the great fire of AD 64, Nero blamed them, and tradition holds that both Peter and Paul were put to death in Rome in those years. Gladiator fights ended in the early 400s, after the empire had become Christian, though animal hunts went on about a century more.

After Rome fell, earthquakes cracked the Colosseum, and builders carried off its stone for churches and palaces. In 1749 Pope Benedict XIV set it apart as a memorial to the Christian martyrs and stopped the quarrying. Each Good Friday a service called the Way of the Cross is still held there. Rome itself became a center of the Church; tiny Vatican City, the smallest country in the world at about 110 acres, lies inside it, across the Tiber.

PICTURE STUDY



A View through Three Arches of the Third Storey of the Colosseum, Christoffer Wilhelm Eckersberg, 1815 ·
Oil on canvas · Statens Museum for Kunst (National Gallery of Denmark), Copenhagen
Wikimedia Commons · Public domain

Eckersberg was a Danish painter who lived in Rome from 1813 to 1816 and painted outdoors, straight from life. Instead of painting the whole Colosseum from outside, he climbed to the third story and painted what he saw through three of its arches. Each arch frames its own small picture of the city.

Look closely

- Find the three arches. What different view does each one frame?
- Find the rough, weathered stone. How did the painter show that it is very old?
- Find the light. From which side is the sun shining?

Talk about it

1. Why do you think Eckersberg chose to look out from the Colosseum rather than paint it from outside?
2. If you made your own postcard of Rome, which single view would you choose, and why?

Safety first. An armchair tour is done from home. Look up maps and photographs with a parent, and use only the sites your family approves.

HANDS-ON: POSTCARD AND DIAGRAM: THE COLOSSEUM FROM ABOVE

Add the second card to your Trail D **postcard set**. This time the picture side is a labeled plan, a view from straight above.

You will need

- A 4-by-6-inch index card or cardstock
- Pencil, fine black pen, colored pencils
- A ruler
- Two pins or thumbtacks and a loop of string (optional, for drawing an oval)

Steps

1. Draw a large oval to fill the card. (Optional: push two pins into cardboard under the card, loop the string around them and a pencil, and draw with the string pulled tight.)
2. Draw a smaller oval in the middle. Label it **arena** (about 285 by 180 feet).
3. Between the ovals, draw four rings. Label them **seating, by rank**: senators nearest the arena, ordinary citizens farther up, and the poorest at the top.
4. Around the outer edge, mark a few of the **80 entrances** with short lines.
5. Draw a dotted grid inside the arena and label it **hypogeum (below the floor)**.
6. Write the outside measurements beside the oval: 620 ft long, 513 ft wide, 157 ft high. Add an arrow pointing north.
7. On the lined side, write a postcard home about your visit, naming one fact about how the Colosseum was built and one thing it reminds Christians of.

Check your work

- My plan has the arena, seating rings, entrances and hypogeum labeled.
- I wrote the three measurements and a north arrow.
- My postcard has one building fact and one fact about its meaning.

TRAVEL JOURNAL

1. **Travel journal, Rome page.** Write a paragraph comparing the Colosseum with a modern stadium you know or have seen pictures of. Give at least two ways they are alike and two ways they differ (size, how people got in, shade, what happened on the field).
2. Sketch one arch of the Colosseum and label the travertine stone and the holes where iron clamps were removed.

Did you know? The Colosseum's sloping walls and arches were so well designed that modern stadium builders still copy its plan of numbered gates and stairways. In the 500s, people lived and kept workshops inside its arches. Only about a third of the original building survives; the south side fell in an earthquake in 1349.

Goes deeper in. History, "The Roman Empire" and "The Early Church," and Geography, Grade 8, "Southern Europe" (coming soon).

For families. Sources: Parco archeologico del Colosseo; Britannica (Colosseum, Rome, Vatican City); Tacitus, *Annals* 15.44 (Nero and the Christians). Historians agree

Christians were martyred in Rome, but the evidence that martyrdoms took place in the Colosseum itself is uncertain; the stop says so carefully. Capacity estimates range from about 50,000 to 80,000. The ending of gladiator games is often credited to the monk Telemachus (Theodoret, *Church History* 5.26); it is a tradition and is left out of the story. The 50,000-mile road figure counts major paved highways; with lesser roads the total was much greater. Picture: Eckersberg, SMK, Copenhagen.

PRACTICE

1. **EASY** On what river does Rome stand?
2. **EASY** Which emperor opened the Colosseum, and in what year?
3. **MEDIUM** What was the hypogeum, and what was it used for?
4. **MEDIUM** Why are there so many holes in the Colosseum's outer stones?
5. **CHALLENGE** About 50,000 people entered through 80 entrances. If the crowd divided evenly, how many people used each entrance? If each gate let in 25 people a minute, how long did it take to fill the Colosseum?

Make it a game • Find Your Gate. Number pieces of paper 1 to 8 and tape them around the edge of a room as “gates.” Hand each player a “ticket” with a gate and a row (for example, Gate 5, Row 3). On “Go!” everyone finds their gate and stands in the right row, like spectators at the Colosseum. Time how long it takes, then shuffle the tickets and try to beat your time.

Scripture. “For I am not ashamed of the gospel of Christ: for it is the power of God unto salvation to every one that believeth; to the Jew first, and also to the Greek.” (Romans 1:16, KJV)

Paul wrote these words in a letter to the Christians in Rome, before he ever saw the city. The empire that built the Colosseum is gone, but the gospel Paul carried there is still preached in Rome and all over the world.

Practice: answers

1. The Tiber.
2. Titus, in AD 80.
3. The underground tunnels and rooms under the arena floor, where animals and fighters waited and lifts raised them into the arena.
4. Later builders dug out the iron clamps that held the stones together, to reuse the metal.
5. $50,000 \div 80 = 625$ people per entrance; $625 \div 25 = 25$ minutes.

4.3 LONDON AND THE TOWER

OBJECTIVES

- Locate London, the River Thames and the Tower of London on a map.
- Tell who built the White Tower, when and why.
- Name four jobs the Tower has done in its history, from fortress to home of the Crown Jewels.

Warm-up. Find Great Britain on a map, then the River Thames winding east across southern England to the North Sea. Why would a river that ships can sail up from the sea be a good place for a capital city? Why might a king want a strong castle on its bank?

Video slot. Video coming. A tour of the Tower of London: the White Tower, the Yeoman Warders, the ravens and the Crown Jewels. Search approved channels (Historic Royal Palaces, Smithsonian Channel, English Heritage); preview first.

KEY TERMS

Thames

The river that flows through London to the North Sea; it is tidal through the city, rising and falling twice a day.

White Tower

The great stone keep at the center of the Tower of London, begun by William the Conqueror around 1078.

keep

The strongest tower of a castle, the last place to hold out in an attack.

Yeoman Warders

The Tower's guards since Tudor times, nicknamed "Beefeaters"; today they also guide visitors.

Crown Jewels

The crowns, scepters and other regalia used to crown English and British kings and queens, kept in the Tower's Jewel House.

CORE IDEAS

London began as *Londinium*, a Roman trading town founded around AD 47–50 at the first place where the **Thames** could be bridged. Ships could sail up the river from the North Sea, so goods and people from all over the world came to its docks. In time it grew into the capital of England and, later, of the United Kingdom. Today about 9 million people live there.

In 1066 Duke William of Normandy crossed the English Channel, won the Battle of Hastings and was crowned king in Westminster Abbey on Christmas Day. He needed to hold London, a

large city that did not love him. So around 1078 he began a great stone **keep** in the southeast corner of the old Roman walls, right beside the river. It was finished by about 1100. The walls are up to 15 feet thick at the bottom and about 90 feet high, built partly with pale stone shipped from Caen in Normandy. It was later whitewashed, which is why it is called the **White Tower**. Inside is the Chapel of St John, one of the oldest church interiors in England.

Later kings added two rings of walls, a moat and more than twenty towers, so the Tower of London is really a whole castle. Over 900 years it has done many jobs. It was a fortress and a royal palace. It was an armory, storing weapons. For centuries it held the Royal Mint, where the country's coins were made, and a royal zoo, with lions and even a polar bear, until the animals moved to London Zoo in the 1830s.

The Tower is best known as a prison. Princess Elizabeth, later Queen Elizabeth I, was held there in 1554, fearing for her life. Sir Thomas More was imprisoned there for refusing to swear an oath against his conscience, and was beheaded on nearby Tower Hill in 1535. A few prisoners, including two queens, were executed on Tower Green inside the walls. Others, like Sir Walter Raleigh, lived there for years, writing books.

Since the 1600s the Tower has guarded the **Crown Jewels**. Most date from 1661, because the old regalia had been melted down after Charles I was executed in 1649; only a few pieces, such as a twelfth-century anointing spoon, survived. The **Yeoman Warders** still guard the Tower, and every night for centuries they have locked its gates in the Ceremony of the Keys. At least six ravens are kept on the grounds, because of an old legend that if the ravens ever leave, the kingdom will fall.

PICTURE STUDY



The Tower of London, from the Poems of Charles, Duke of Orléans, Unknown Flemish illuminator, About 1500 · Ink, paint and gold on parchment (Royal MS 16 F II, folio 73) · The British Library, London
Wikimedia Commons · CC0

Charles, Duke of Orléans, a French nobleman, was captured at the Battle of Agincourt in 1415 and kept as a prisoner in England for 25 years. He passed the time writing poems. About thirty-five years after his death in 1465, a copy of his poems was made for the English royal library, and the artist painted him inside the Tower. It is one of the oldest true-to-life pictures of London.

Look closely

- Find the White Tower with its four corner turrets. How many times can you find the duke in the picture? (The artist shows him more than once, doing different things.)
- Find London Bridge in the background. What is built on top of it?
- Find the river. What boats or people are on it?

Talk about it

1. Why would an artist show the same man several times in one picture? What story does it tell?
2. What does the picture tell you about how important the river was to London?

Safety first. An armchair tour is done from home. Look up maps and photographs with a parent, and use only the sites your family approves.

HANDS-ON: POSTCARD AND MAP: THE TOWER OF LONDON

Add the third card to your Trail D **postcard set**: a bird's-eye map of the Tower on the front and a message from London on the back.

You will need

- A 4-by-6-inch index card or cardstock
- Pencil, fine black pen, colored pencils (gray, green, blue)
- A ruler
- A plan of the Tower from the Historic Royal Palaces site or a library book

Steps

1. Draw the **River Thames** along the bottom (south) edge of the card and color it blue.
2. Draw two rings of walls, one inside the other, roughly square. Color the space outside them green and label it **moat (now dry)**.
3. In the middle, draw a square with four small round corners and label it **White Tower (c. 1078-1100)**.
4. Label **Tower Green** to the west of the White Tower and the **Jewel House** to the north.
5. Mark **Traitors' Gate** on the river wall, where prisoners were brought in by boat.
6. Add a compass rose and draw **Tower Bridge** (1894) just to the east, crossing the river.
7. On the lined side, write a postcard home naming two jobs the Tower has done and one thing you would most like to see there.

Check your work

- My map shows the river, two walls, the moat and the White Tower.
- I labeled Tower Green, the Jewel House, Traitors' Gate and Tower Bridge.
- My postcard names two of the Tower's jobs.

TRAVEL JOURNAL

1. **Travel journal, London page.** Write a paragraph telling the history of the Tower in order, from William the Conqueror to the Crown Jewels. Use at least three dates.
2. Make a quick timeline across the page: AD 50 Londinium, 1066 Hastings, c. 1078 White Tower begun, 1554 Princess Elizabeth held, 1661 new Crown Jewels, 1894 Tower Bridge.

Did you know? Many people mix up **Tower Bridge**, the one with two tall towers and a road that lifts for ships (opened 1894), with **London Bridge**, a plain bridge just upstream. The London Bridge of 1831 was sold in 1968 and rebuilt at Lake Havasu City, Arizona.

Goes deeper in. History, "The Norman Conquest" and "The Tudors," and Geography, Grade 8, "The British Isles" (coming soon).

For families. Sources: Historic Royal Palaces (hrp.org.uk) for the White Tower, menagerie, ravens, Ceremony of the Keys and Crown Jewels; Britannica (London, Tower of London, Thomas More). Sir Thomas More's execution took place on Tower Hill, just outside the walls; Anne Boleyn (1536) and Catherine Howard (1542) were among those executed on Tower Green. The stop names these events without detail. The raven legend's age is uncertain and may date only from the 1800s. Picture: British Library, Royal MS 16 F II, f. 73, usually dated c. 1500; the manuscript was made for Henry VII.

PRACTICE

1. **EASY** Which river flows past the Tower of London?
2. **EASY** Who began building the White Tower, and about when?
3. **MEDIUM** Name four jobs the Tower of London has done.
4. **MEDIUM** Why do most of the Crown Jewels date from 1661 and not earlier?
5. **CHALLENGE** The White Tower was finished about 1100. How many years old is it in 2026? Charles of Orléans was a prisoner from 1415 to 1440; how many years was that, and what fraction of a century?

Make it a game • Ceremony of the Keys. One player is the sentry and stands by a doorway. Another is the Chief Warder, carrying a ring of keys. The sentry calls, "Halt! Who comes there?" The Warder answers, "The keys." "Whose keys?" "King Charles's keys." (In the queen's reign they said "Queen Elizabeth's keys.") "Pass, King Charles's keys. All's well." Then the Warder "locks" the door. Take turns; anyone who forgets the words becomes the sentry.

Scripture. "The name of the LORD is a strong tower: the righteous runneth into it, and is safe." (Proverbs 18:10, KJV)

The White Tower was built to make a king feel safe, yet many who lived inside it were afraid. Solomon points to a stronger tower: the Lord Himself, a refuge no army can break.

Practice: answers

1. The Thames.
2. William the Conqueror, around 1078.
3. Any four: fortress, royal palace, prison, armory, Royal Mint, royal zoo, home of the Crown Jewels.
4. The older regalia were melted down after Charles I was executed in 1649, so new ones were made when the monarchy returned.
5. $2026 - 1100 = \text{about } 926 \text{ years}$. $1440 - 1415 = 25 \text{ years}$, one quarter of a century.

4.4 PARIS AND THE EIFFEL TOWER

OBJECTIVES

- Locate Paris, the Seine and the Île de la Cité on a map.
- Tell when, why and how the Eiffel Tower was built, using its key numbers.
- Draw and label a diagram of the tower's levels and heights.

Warm-up. Find France on a map, then Paris in the north, on the River Seine. Follow the Seine with your finger to the sea. Which body of water does it reach? Now guess: how tall is the Eiffel Tower in feet? Write your guess down.

Video slot. Video coming. How the Eiffel Tower was built for the 1889 World's Fair: iron pieces, rivets and engineering. Search approved channels (La Tour Eiffel official channel, Smithsonian Channel, Practical Engineering); preview first.

KEY TERMS

Seine

The river that flows through Paris and northwest to the English Channel.

Île de la Cité

The island in the Seine where Paris began; Notre-Dame Cathedral stands on it.

Exposition Universelle

A world's fair; the 1889 fair in Paris was the reason the Eiffel Tower was built.

wrought iron

A tough, workable iron, lighter and less brittle than cast iron; the tower is made of puddled wrought iron.

rivet

A metal pin heated red-hot and hammered flat at both ends to join two pieces of metal.

CORE IDEAS

Paris began on an island in the **Seine**. A tribe called the Parisii lived there when Julius Caesar's army conquered the region in 52 BC, and the Romans named the town Lutetia. The island, the **Île de la Cité**, is still the heart of the city. On it stands Notre-Dame Cathedral, begun in 1163. A fire destroyed its roof and spire in April 2019, and after five years of careful rebuilding by stonemasons and carpenters it reopened in December 2024. Downstream stands the Louvre, once a royal palace and since 1793 one of the world's great art museums.

In 1889 France held a world's fair, the **Exposition Universelle**, to mark 100 years since the French Revolution, and wanted a centerpiece that would amaze the world. Two engineers in Gustave Eiffel's company, Maurice Koechlin and Émile Nouguier, sketched a tall iron tower,

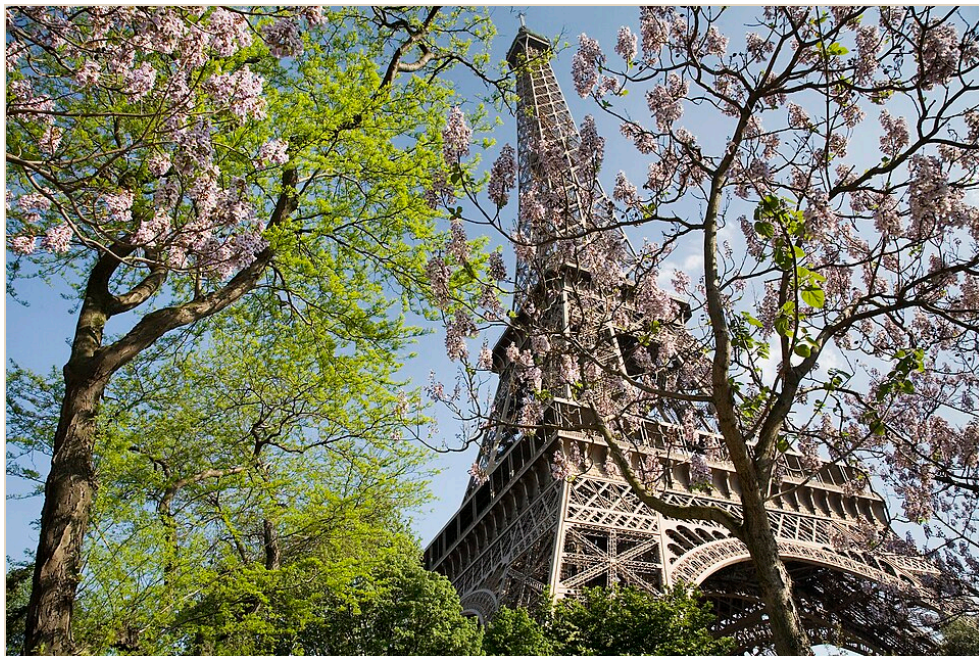
and the architect Stephen Sauvestre added the arches and decoration. Eiffel's firm already knew iron well: it had built railway bridges and the inner skeleton of the Statue of Liberty, finished in 1886.

Building began on January 28, 1887, and was finished on March 31, 1889, in two years, two months and five days. Every one of the 18,038 **wrought iron** pieces was drawn to a fraction of a millimeter in Eiffel's workshop outside Paris, then joined at the site with about 2.5 million **rivets**. A team of four men set each rivet: one heated it, one held it, one shaped the head and one hammered the end. The iron frame weighs about 7,300 tons, yet the tower is so well designed that its weight presses on the ground no harder than a person sitting in a chair.

At 312 meters (1,024 feet) with its flagpole, it was the tallest structure in the world until the Chrysler Building in New York passed it in 1930. With today's antennas it stands about 330 meters (1,083 feet). Visitors can climb 674 steps to the second floor or ride elevators to the top platform, 276 meters up. On a hot day the sun-warmed side of the iron expands, and the top leans a few inches away from the sun.

Not everyone liked it. In 1887 a group of artists and writers signed a protest calling it a useless and monstrous tower. Eiffel's permit allowed it to stand only 20 years. He saved it by proving it useful: he hosted experiments in weather, wind and especially radio, and from 1903 its height made it a valuable radio antenna for the French army. Today it is painted by hand about every seven years with some 60 tons of paint, and it has become the best-known picture of Paris.

PICTURE STUDY



Eiffel Tower, Georges Seurat, About 1889 · Oil on panel · Fine Arts Museums of San Francisco (Legion of Honor)

Wikimedia Commons · CC BY-SA 3.0

Georges Seurat was a French painter who built his pictures out of thousands of small dots of pure color, a method called pointillism. He painted this little picture, only about 9½ by 6 inches, around the time the tower was finished. Some people think the top looks unfinished because he painted it while the workmen were still at work.

Look closely

- Stand close, then step back. What happens to the dots?
- Find the colors Seurat used for the iron. Is the tower really painted red?
- Find the top of the tower. Does it look finished to you?

Talk about it

1. Many artists in 1889 thought the tower was ugly. Does Seurat's painting make it look ugly or beautiful? How?
2. How is building a picture out of dots like building a tower out of 18,038 iron pieces?

Safety first. An armchair tour is done from home. Look up maps and photographs with a parent, and use only the sites your family approves.

HANDS-ON: POSTCARD AND DIAGRAM: THE EIFFEL TOWER TO SCALE

Add the fourth card to your Trail D **postcard set**: a measured diagram of the tower on the front and a message from Paris on the back.

You will need

- A 4-by-6-inch index card or cardstock (turn it tall)
- A ruler marked in millimeters
- Pencil, fine black pen, brown or bronze colored pencil

Steps

1. Use a scale of **1 millimeter = 3 meters**. Draw a ground line 1 cm from the bottom of the card.
2. Mark heights up from the ground: **first floor 57 m** (19 mm), **second floor 115 m** (about 38 mm), **top platform 276 m** (92 mm), **tip with antennas 330 m** (110 mm).
3. Draw the four curved legs from the ground to the first floor, then the narrowing tower up to the top. The base is 125 m wide (about 42 mm).
4. Draw a short horizontal line at each floor and label it with its height.
5. Beside the tower, draw a 3-story house to the same scale (about 10 m tall, so 3 mm) to show how huge the tower is.
6. On the lined side, write a postcard home from Paris with two numbers about the tower and one sentence about the Seine or Notre-Dame.

Check your work

- My diagram uses the scale and shows four labeled heights.
- I drew a house to the same scale for comparison.
- My postcard includes two true numbers about the tower.

TRAVEL JOURNAL

1. **Travel journal, Paris page.** Write a paragraph imagining you are a newspaper reporter in March 1889. Describe the finished tower and give one argument the protesters made against it and one reason Eiffel gave for keeping it.
2. Sketch a rivet before and after it is hammered, with labels: *heated shank*, *head*, *hammered end*, *two iron plates*.

Did you know? Gustave Eiffel had the names of 72 French scientists and engineers engraved around the tower just below the first floor. He also kept a small apartment near the top, where he welcomed guests such as the inventor Thomas Edison in 1889.

Map or diagram. A *scale diagram* lets you compare things too large to measure with a ruler. If your tower is 110 mm tall at 1 mm = 3 m, multiply to check: $110 \times 3 = 330$ meters.

Goes deeper in. Arithmetic, “Scale and Ratio”; Art, “Seurat and the Impressionists”; and Geography, Grade 8, “Western Europe” (coming soon).

For families. Sources: the official Eiffel Tower site (toureiffel.paris) for dates, heights, the 18,038 pieces, 2.5 million rivets, 674 steps and painting; Britannica (Paris, Notre-Dame). The height was raised to about 330 m by a new antenna in 2022. The “weight of a person in a chair” comparison is the one the tower’s operators use for ground pressure (about 4 kg per square centimeter). The 1889 fair marked the centenary of the Revolution; the stop does not discuss the Revolution itself. Picture: Seurat, Fine Arts Museums of San Francisco, 1979.48.

PRACTICE

1. **EASY** On which river is Paris built?
2. **EASY** For what event was the Eiffel Tower built, and in what year?
3. **MEDIUM** How did Gustave Eiffel save the tower from being taken down after 20 years?
4. **MEDIUM** About 2.5 million rivets were used and four men set each one. Why do you think the work was split among four men?
5. **CHALLENGE** The tower was built in about 26 months. If the 18,038 pieces were set at an even pace, about how many pieces went up each month? The top platform is 276 m high; how many times taller is that than a 12 m church steeple?

Make it a game • Rivet Team. Players form teams of four: heater, holder, header and hammerer. Use a soft ball as the “rivet.” The heater tosses it to the holder, who passes it to the header, who hands it to the hammerer, who taps it down on a “plate” (a pillow) and

shouts “Set!” Count how many rivets each team sets in one minute. Switch jobs and play again.

Scripture. “For which of you, intending to build a tower, sitteth not down first, and counteth the cost, whether he have sufficient to finish it?” (Luke 14:28, KJV)

Eiffel’s engineers drew every one of the tower’s pieces before a single one was lifted, and so they finished on time. Jesus used a builder counting the cost to teach that following Him is something to consider seriously and carry through to the end.

Practice: answers

1. The Seine.
2. The Exposition Universelle (world’s fair) of 1889.
3. He made it useful for science, especially as a radio antenna for the army.
4. Each job (heating, holding, shaping the head, hammering the end) had to be done fast while the rivet was still red-hot; one man could not do them all at once.
5. $18,038 \div 26 \approx 694$ pieces a month (about 700). $276 \div 12 = 23$ times taller.

4.5 THE SWISS ALPS

OBJECTIVES

- Locate the Alps, Switzerland and three famous Swiss peaks on a map.
- Explain how climate and living things change as you climb a mountain, and draw a labeled diagram of the zones.
- Describe how the Swiss have lived with the mountains: summer pastures, rescue dogs, mountain railways and tunnels.

Warm-up. Find the Alps on a map of Europe: a curved band of mountains from southern France, through Switzerland and northern Italy, into Austria. Which countries does the band touch? Now find two great rivers that begin in the Swiss Alps and flow to different seas.

Video slot. Video coming. The Swiss Alps: the Matterhorn, the Jungfrauoch railway, the Aletsch Glacier and cows going up to summer pastures. Search approved channels (Smithsonian Channel, Rick Steves' Europe, Swiss Travel System); preview first.

KEY TERMS

alp

A high mountain pasture where cattle graze in summer; the mountains are named after these meadows.

glacier

A huge, slowly moving river of ice, formed from snow packed down over many years.

treeline

The height above which trees cannot grow because it is too cold and windy; about 6,500 to 7,200 feet in the Swiss Alps.

pass

A low gap between mountains where a road or path can cross.

cog railway

A mountain railway with a toothed rail in the middle that a gear on the train grips, so it can climb steep slopes.

CORE IDEAS

The Alps stretch about 750 miles across eight countries, but Switzerland is the country most people think of first, because about 60 percent of it is mountains. Its highest peak, the Dufourspitze on Monte Rosa, reaches 15,203 feet. Two of Europe's great rivers begin in Swiss **glaciers**: the Rhine, which flows north to the North Sea, and the Rhône, which flows south to the Mediterranean. The longest glacier in the Alps, the Aletsch, is about 12 miles of ice, in places more than half a mile thick.

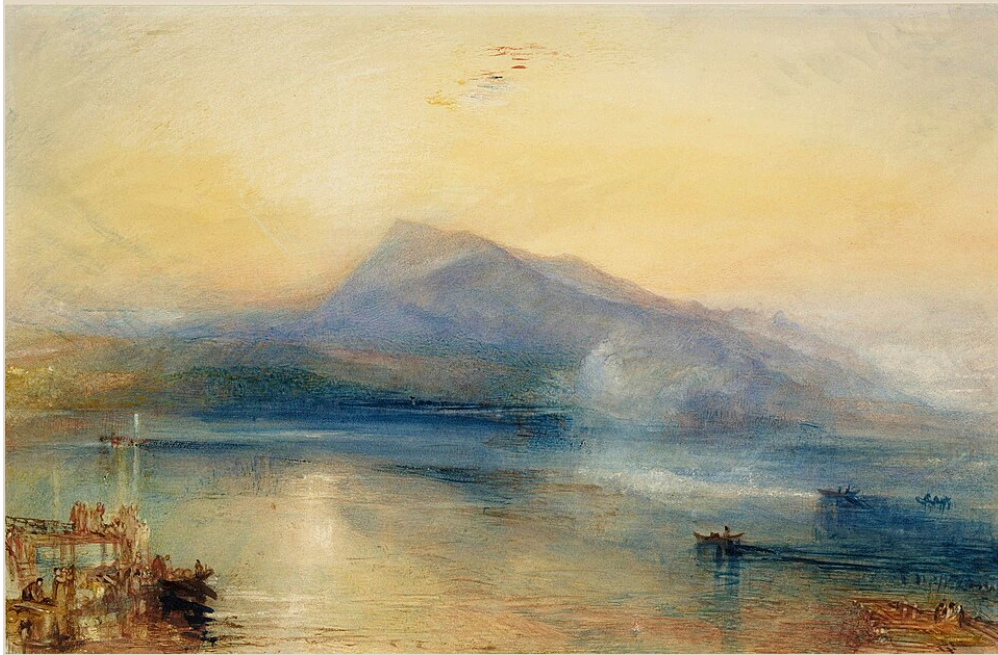
Climbing a mountain is like traveling toward the North Pole. The air cools about 3½°F for every 1,000 feet you rise. Valley floors have orchards, vineyards and villages. Above them grow forests of beech, then fir, spruce and larch. At the **treeline**, about 7,000 feet, the trees give out and the **alps**, the high summer meadows, begin, bright with gentians and edelweiss. Higher still are bare rock, snow and ice that never melt.

For centuries Swiss farmers have moved with the seasons. In early summer families drive their cows, bells clanging, up to the alps, where herdsmen spend the summer making cheese in stone huts. In September the cows come down again, sometimes crowned with flowers. Johanna Spyri's novel *Heidi* (1880-1881) made this life famous around the world.

Crossing the mountains was always dangerous. Around 1050 a churchman, Bernard of Menthon, founded a hospice, a shelter for travelers, at the top of a **pass** 8,100 feet high, now called the Great St Bernard Pass. From about 1700 its monks kept big dogs to find travelers lost in snow. The most famous, Barry, is said to have saved more than 40 people between 1800 and 1814. Peaks were dangerous too. The Matterhorn, 14,692 feet, was first climbed on July 14, 1865, by Edward Whymper and six companions; on the way down a rope broke and four of the seven fell and died.

The Swiss answered the mountains with engineering. **Cog railways** climb grades too steep for ordinary trains. The Jungfrau Railway, opened in 1912, tunnels through the Eiger to Jungfraujoch station, 11,332 feet up, the highest railway station in Europe. In 2016 Switzerland opened the Gotthard Base Tunnel, about 35 miles long, the longest railway tunnel in the world, so trains can pass under the Alps instead of over them. A small country with four national languages (German, French, Italian and Romansh) has been held together partly by its trains and tunnels.

PICTURE STUDY



The Blue Rigi, Sunrise, Joseph Mallord William Turner, 1842 · Watercolor on paper · Tate Britain, London
Wikimedia Commons · Public domain

J. M. W. Turner, an English painter, visited Lake Lucerne in Switzerland every summer from 1841 to 1844 and painted the mountain called the Rigi from his hotel window at all times of day. This one shows it at dawn, still blue in shadow. In 2007, after a public appeal to keep it in Britain, the Tate gallery bought it for the nation.

Look closely

- Find the mountain. How did Turner show it is far away?
- Find the line where water meets sky. Can you see it clearly? Why not?
- Find the tiny figures and animals near the shore.

Talk about it

1. Turner painted the same mountain again and again. Why might the same view look so different at sunrise, noon and sunset?
2. How is this picture of the Alps different from a photograph of the Matterhorn?

Safety first. An armchair tour is done from home. Look up maps and photographs with a parent. On real mountain trips, stay on marked trails, carry warm clothes even in summer, and never go onto a glacier without a trained guide.

HANDS-ON: POSTCARD AND DIAGRAM: CLIMBING A SWISS MOUNTAIN

Add the fifth card to your Trail D **postcard set**: a side-view diagram of the life zones of an Alpine mountain.

You will need

- A 4-by-6-inch index card or cardstock (turn it tall)
- A ruler
- Pencil, fine black pen, colored pencils (green, dark green, yellow-green, gray, white or blue)

Steps

1. Draw a tall mountain from the bottom to near the top of the card. Down the left edge, make a height scale: 0 at the bottom, then marks for 3,000, 7,000, 10,000 and 15,000 feet.
2. Shade the zones from bottom to top and label each: **valley farms and villages** (to about 3,000 ft), **forest** (to about 7,000 ft), **treeline** (draw a dashed line), **alp: summer meadows, rock, snow and glacier**.
3. Draw a small cow and hut in the alp zone and a village with a church in the valley.
4. Mark **Jungfrauoch station, 11,332 ft** with a dot and a tiny train.
5. On the right edge, write the temperatures for a 70°F day in the valley: about 56°F at 4,000 ft higher and about 42°F at 8,000 ft higher.
6. On the lined side, write a postcard home from the Alps describing what you “saw” on the way up.

Check your work

- My diagram has a height scale and six labeled zones.
- I marked the treeline and Jungfrauoch station.
- I showed how temperature falls as you climb.

TRAVEL JOURNAL

1. **Travel journal, Alps page.** Write a paragraph as a herdsman’s child spending the summer on an alp: the climb up with the cows, the hut, the work, the weather, and the day you come down.
2. Draw a cog railway wheel gripping a toothed rail. Label *gear*, *rack (toothed rail)* and *ordinary rails*.

Did you know? Barry the St Bernard is preserved at the Natural History Museum in Bern. The dogs no longer do rescue work, which is now done by helicopters and trained avalanche dogs, but St Bernards still live at the pass in summer to greet visitors.

Map or diagram. A side view of a mountain is called a *cross-section*. Scientists use cross-sections to show how plants and animals change with height, just as they change from the equator to the poles.

Goes deeper in. Earth Science, “Mountains and Glaciers” and “Weather and Climate,” and Geography, Grade 8, “Central Europe” (coming soon).

For families. Sources: Britannica (Alps, Switzerland, Matterhorn, Great St Bernard Pass); Jungfrau Railway; SBB and AlpTransit Gotthard (tunnel length 57.1 km); Natural History Museum Bern (Barry). The temperature drop (about 6.5°C per 1,000 m, roughly 3.5°F per 1,000 ft) is an average; actual weather varies. The Aletsch Glacier is about 20 km long and has been shrinking; glaciers have grown and shrunk throughout history. The Matterhorn accident is told plainly without detail. Bernard of Menthon's dates are uncertain (often given as c. 1020–1081). Picture: Turner, *The Blue Rigi, Sunrise*, Tate, bought in 2007 with help from the Art Fund and public donations.

PRACTICE

1. **EASY** What is an alp?
2. **EASY** Name two rivers that begin in the Swiss Alps.
3. **MEDIUM** Why do no trees grow above the treeline?
4. **MEDIUM** Why did the Swiss build the Gotthard Base Tunnel deep under the mountains instead of a railway over the pass?
5. **CHALLENGE** The air cools about 3½°F for every 1,000 feet you climb. It is 65°F in a village at 3,000 feet. What is the temperature at Jungfraujoch, about 11,000 feet?

Make it a game • Up the Mountain. Line up six cards on the stairs or across the room: Valley, Forest, Treeline, Alp, Rock, Snow. A caller names a thing (cow, vineyard, edelweiss, glacier, fir tree, cheese hut, lost traveler). Players race to stand at the zone where it belongs. The first one right becomes the caller.

Scripture. “I will lift up mine eyes unto the hills, from whence cometh my help. My help cometh from the LORD, which made heaven and earth.” (Psalm 121:1–2, KJV)

Mountains are beautiful and strong, but the psalmist looks past them to the One who made them. The monks of the St Bernard Pass lived out this trust, helping travelers in the name of the Lord who made the snow and the heights.

Practice: answers

1. A high mountain meadow where cattle graze in summer.
2. The Rhine and the Rhône.
3. It is too cold and windy, with too short a growing season, for trees to survive.
4. A low, flat tunnel lets heavy trains run fast and in all weather without climbing steep slopes or facing snow on the pass.
5. The climb is 8,000 feet; $8 \times 3\frac{1}{2} = 28^\circ\text{F}$ colder; $65 - 28 =$ about 37°F .

4.6 EGYPT AND THE PYRAMIDS

OBJECTIVES

- Locate the Nile, Cairo, Giza, Luxor and the Nile Delta on a map, and explain why “Upper” Egypt is in the south.
- Describe the Great Pyramid with its builder, date and key measurements.
- Connect Egypt to at least three events in the Bible.

Warm-up. Look at a satellite picture or relief map of Egypt. Most of it is tan desert, but a thin green line runs from south to north and opens into a green fan at the sea. What is the green line? Where do you think most Egyptians live?

Video slot. Video coming. The pyramids of Giza and the Great Sphinx: how the Great Pyramid was built and the workers’ village. Search approved channels (Smithsonian Channel, Khan Academy / Smarthistory, Associates for Biblical Research); preview first.

KEY TERMS

Nile

The river that flows north through Egypt to the Mediterranean; at about 4,130 miles it is usually counted the longest river in the world.

delta

The fan-shaped land at a river’s mouth, built from mud the river drops as it splits into branches and slows.

pharaoh

The title of the kings of ancient Egypt.

pyramid

A huge tomb with a square base and four sloping, triangular sides meeting at a point.

hieroglyphs

The picture-writing of ancient Egypt, first read in modern times by Jean-François Champollion in 1822 with help from the Rosetta Stone.

CORE IDEAS

The Greek historian Herodotus called Egypt “the gift of the river.” Almost no rain falls in most of the country, but the **Nile** flows north through the desert for hundreds of miles, and until the Aswan High Dam was finished in 1970 it flooded every summer, leaving a layer of rich black mud on the fields. Even today almost all Egyptians live on the thin green strip beside the river or in the **delta**, on only about 5 percent of the land. Because the Nile flows north, the south is “Upper Egypt” (upriver) and the north is “Lower Egypt.”

On a rocky plateau at Giza, at the edge of modern Cairo, stand three great **pyramids**. The largest, the Great Pyramid, was built for the **pharaoh** Khufu about 2560 BC. Its base covers about 13 acres, each side about 756 feet long, and it first rose 481 feet high. It was the tallest building made by man for about 3,800 years, until a cathedral spire in England passed it in the 1300s. Its sides face north, south, east and west almost exactly. It is the only one of the Seven Wonders of the Ancient World still standing.

About 2.3 million blocks of limestone and granite went into it, averaging about 2½ tons each; the heaviest granite beams, over the king's burial chamber, weigh 25 to 80 tons and were floated on the Nile from Aswan, about 500 miles south. No one knows for certain how the blocks were raised, though most scholars think the builders used ramps of mud brick and rubble. Archaeologists have found the builders' town just south of the pyramids, with bakeries, breweries and the bones of thousands of cattle, sheep and goats. The builders were organized crews of skilled craftsmen and laborers, many serving in rotation, and they were fed and buried with honor near the king's tomb.

Beside the second pyramid, built for Khufu's son Khafre, crouches the Great Sphinx, about 240 feet long and 66 feet high, carved from the bedrock as a lion with a king's head. The pyramids were once covered in smooth, shining white limestone. After an earthquake in 1303 much of that casing was carried off to rebuild Cairo, leaving the stepped surface we see today. The Great Pyramid now stands about 455 feet.

Egypt runs all through the Bible. Abraham went down into Egypt during a famine (Genesis 12:10). Joseph was sold there as a slave and rose to rule over the land, and Jacob's family settled in Goshen, in the delta. Moses led Israel out of Egypt in the Exodus. Centuries later, Joseph and Mary fled to Egypt with the young child Jesus. When Abraham saw Egypt, the pyramids at Giza were already some 500 years old by the usual reckoning, and they were ancient by the time of Moses.

PICTURE STUDY



The Great Pyramid and the Great Sphinx, Francis Frith, 1858 · Albumen silver print from a glass negative (photograph) · The Metropolitan Museum of Art, New York; other prints at the Getty Museum, the Nelson-Atkins Museum and the Victoria and Albert Museum
Wikimedia Commons · Public domain

Francis Frith, an English photographer, traveled up the Nile three times between 1856 and 1860 carrying huge glass-plate cameras. He had to coat each glass plate with chemicals in a dark tent, take the picture and develop it before it dried, in desert heat. His prints were among the first photographs of Egypt most people in Europe and America ever saw.

Look closely

- Find the Sphinx's face. What has happened to it over the centuries?
- Find the sand. How deep is the Sphinx buried in this 1858 picture?
- Find the Great Pyramid. Can you see its steps? Is any smooth casing left?

Talk about it

1. How is a photograph different from a painting as a record of a place? Which would you trust more for facts, and why?
2. Frith worked in great heat with fragile glass. What does that tell you about how much people wanted to see faraway places?

Safety first. An armchair tour is done from home. Look up maps and photographs with a parent, and use only the sites your family approves.

HANDS-ON: POSTCARD AND MAP: DOWN THE NILE

Add the sixth card to your Trail D **postcard set**: a map of Egypt's river valley with the pyramids marked.

You will need

- A 4-by-6-inch index card or cardstock (turn it tall)
- An atlas map of Egypt
- Pencil, fine black pen, colored pencils (blue, green, tan, yellow)
- A ruler

Steps

1. Color the whole card tan for desert. Draw the **Mediterranean Sea** across the top and the **Red Sea** slanting down the right side.
2. Draw the **Nile** from the bottom (south) to the top (north). Near the top, split it into a fan and color it green: label **Nile Delta (Lower Egypt)**.
3. Color a thin green strip along both banks of the river.
4. Mark and label: **Cairo** at the bottom point of the delta; **Giza** just west of Cairo (draw three tiny triangles); **Luxor (ancient Thebes)** about halfway down; **Aswan** near the bottom.
5. Write **Upper Egypt** in the south and draw an arrow pointing north labeled **the Nile flows this way**.
6. Add the **Sinai Peninsula** between the Mediterranean and the Red Sea, a compass rose and a scale bar.
7. On the lined side, write a postcard home from Giza with two numbers about the Great Pyramid.

Check your work

- My map shows the Nile flowing north, the delta and the green strip.
- I labeled Cairo, Giza, Luxor, Aswan, Sinai and Upper and Lower Egypt.
- My postcard has two true numbers about the Great Pyramid.

TRAVEL JOURNAL

1. **Travel journal, Egypt page.** Write a paragraph explaining why Egypt has been called "the gift of the Nile." Use the words *flood*, *delta* and *desert*.
2. Draw a side view of the Great Pyramid with a person to scale beside it (a person is about 1/80 of the pyramid's first height). Label the height, 481 ft, and the base, 756 ft.

Did you know? The Rosetta Stone, found in 1799, has the same decree written three ways: in hieroglyphs, in a later Egyptian script called demotic, and in Greek. Because scholars could read the Greek, Champollion was able to work out the hieroglyphs in 1822. The stone is now in the British Museum.

Map or diagram. Most maps put north at the top, so the Nile on a map looks as if it flows “up.” Rivers flow downhill, not south; the Nile simply runs downhill toward the north.

Goes deeper in. History, “Ancient Egypt,” and Geography, Grade 8, “North Africa and the Middle East” (coming soon).

For families. Sources: Britannica (Nile, Pyramids of Giza, Great Sphinx); Mark Lehner and Zahi Hawass, *Giza and the Pyramids* (2017), on the workers’ town. Dates for the Old Kingdom vary by a few decades among scholars; Khufu’s pyramid is usually dated c. 2580–2560 BC. How the blocks were lifted is still debated; ramps are the leading view. Biblical dates also vary; on the traditional chronology Abraham lived about 2000 BC, so “some 500 years” is approximate. The Nile/Amazon length contest depends on how sources are measured. Travel to Egypt depends on current conditions; check government advisories before any real trip. Picture: Frith, Met 2005.100.555.

PRACTICE

1. **EASY** Which way does the Nile flow?
2. **EASY** For which pharaoh was the Great Pyramid built?
3. **MEDIUM** Why is southern Egypt called “Upper Egypt”?
4. **MEDIUM** Name three Bible people who went to Egypt, and why.
5. **CHALLENGE** The Great Pyramid was first 481 feet tall and is now about 455 feet. How many feet were lost? If it was finished in 2560 BC, how many years old was it in AD 2026? (Remember there is no year 0.)

Make it a game • Pyramid Builders. Use 21 paper cups or blocks. Teams race to build a pyramid with 6 on the bottom, then 5, 4, 3, 2 and 1. Only one block may be carried at a time, from a “quarry” across the room. Time each team. Then ask: if 21 blocks took this long, how long would 2.3 million take?

Scripture. “When he arose, he took the young child and his mother by night, and departed into Egypt: And was there until the death of Herod: that it might be fulfilled which was spoken of the Lord by the prophet, saying, Out of Egypt have I called my son.” (Matthew 2:14–15, KJV)

Egypt, where Israel was once enslaved, became a place of safety for the child Jesus. Matthew shows that God kept His word through the prophet Hosea (Hosea 11:1), even in a land of ancient tombs and pharaohs.

Practice: answers

1. North, to the Mediterranean Sea.
2. Khufu.
3. Because it is upriver; the Nile flows from the south down to the north.

4. Any three: Abraham (famine), Joseph (sold as a slave), Jacob and his family (famine; Joseph sent for them), Moses (born there; led Israel out), Joseph and Mary with Jesus (fleeing Herod).
5. $481 - 455 = 26$ feet. $2560 + 2026 - 1 = 4,585$ years old.

4.7 JAPAN AND MOUNT FUJI

OBJECTIVES

- Locate Japan's four main islands, Tokyo, Kyoto, Nagasaki and Mount Fuji on a map.
- Explain why Japan has so many volcanoes and earthquakes, and describe Mount Fuji with its height and last eruption.
- Tell the true story of Japan's hidden Christians.

Warm-up. Find Japan on a globe, east of China and Korea across the Sea of Japan. In Japanese the country's name, Nihon, means "origin of the sun." Look at where it sits on the globe. Why might people in China, long ago, have thought of it as the land where the sun rises?

Video slot. Video coming. Mount Fuji and Japan: the volcano, the climbing season, the bullet train and Hokusai's prints. Search approved channels (Smithsonian Channel, NHK World-Japan, The Metropolitan Museum of Art); preview first.

KEY TERMS

archipelago

A chain or group of islands; Japan is an archipelago of four large islands and about 14,000 smaller ones.

stratovolcano

A tall, cone-shaped volcano built up from many layers of lava and ash; Mount Fuji is one.

Ring of Fire

The horseshoe of volcanoes and earthquake zones around the edges of the Pacific Ocean.

woodblock print

A picture printed from carved wooden blocks, one block for each color.

Shinkansen

Japan's high-speed "bullet train," first opened between Tokyo and Osaka in 1964.

CORE IDEAS

Japan is an **archipelago** stretching about 1,900 miles from the cold north to the warm south. Four large islands, Hokkaido, Honshu, Shikoku and Kyushu, hold most of its roughly 124 million people, and Honshu is by far the largest. About three-quarters of the land is mountains, so the people crowd onto the coastal plains. Tokyo, the capital, is the center of the largest city region on earth. Kyoto, the old imperial capital for more than 1,000 years, is full of wooden temples and gardens.

Japan sits on the **Ring of Fire**, where great plates of the earth's crust push against each other. It has about 110 active volcanoes and feels more than a thousand earthquakes a year,

most of them too small to notice. Japanese engineers build for this: skyscrapers in Tokyo stand on rubber and steel bearings that let them sway without breaking, and the **Shinkansen** bullet trains, running since 1964 at up to about 200 miles an hour, stop automatically when sensors feel an earthquake coming.

The highest mountain is Mount Fuji, 12,388 feet, about 60 miles west of Tokyo. It is a **stratovolcano**, its almost perfect cone built up layer by layer. It last erupted in 1707, when ash fell on the city of Edo (now Tokyo) like gray snow. Today it is quiet but still counted active. Each summer, from about July to early September, more than 200,000 people climb it, many starting at night to watch the sunrise from the summit.

Japan was for long periods closed to foreigners. Christianity first came in 1549, when the missionary Francis Xavier landed at Kagoshima, and within fifty years there were perhaps 300,000 Japanese Christians. Then the rulers turned against them. In 1597, twenty-six Christians, Japanese and European, were crucified on a hill in Nagasaki, and from 1614 the faith was banned. From the 1630s Japan shut itself off from almost all foreigners for more than two hundred years.

Yet some Christians held on in secret. For about 250 years these “hidden Christians” of the Nagasaki region passed down prayers by memory, baptized their children and waited, without priests or Bibles. In 1865, a few years after Japan reopened to the world, a group of them came to a new church in Nagasaki and quietly told the French priest, “Our hearts are the same as yours.” It is one of the most remarkable stories of faith kept alive anywhere.

PICTURE STUDY



Under the Wave off Kanagawa (The Great Wave), from Thirty-six Views of Mount Fuji, Katsushika Hokusai, About 1831 · Woodblock print, ink and color on paper · The Metropolitan Museum of Art, New York, and many other collections

Wikimedia Commons · Public domain

Hokusai was about seventy when he made his series *Thirty-six Views of Mount Fuji*; it was so popular that ten more prints were added, making forty-six. Thousands of copies were printed from carved woodblocks and sold for about the price of a bowl of noodles. The deep blue came from Prussian blue, a pigment newly imported from Europe.

Look closely

- Find Mount Fuji. How big is it compared with the wave?
- Find the three boats and the rowers. What are they doing?
- Find the foam at the top of the wave. What does it look like?

Talk about it

1. Why do you think Hokusai made the mountain so small in a series about Mount Fuji?
2. The wave is about to fall, but the mountain does not move. What might the artist be saying about the two?

Safety first. An armchair tour is done from home. Look up maps and photographs with a parent, and use only the sites your family approves.

HANDS-ON: POSTCARD AND MAP: JAPAN FROM NORTH TO SOUTH

Add the seventh card to your Trail D **postcard set**: a map of Japan's islands with Mount Fuji and the bullet-train line.

You will need

- A 4-by-6-inch index card or cardstock
- An atlas map of Japan
- Pencil, fine black pen, colored pencils (blue, green, brown, red)
- A ruler

Steps

1. Color the edges of the card blue. Label the **Sea of Japan** on the west and the **Pacific Ocean** on the east.
2. Draw the four main islands curving from upper right to lower left: **Hokkaido**, **Honshu**, **Shikoku** and **Kyushu**. Label each.
3. Mark with dots and label: **Tokyo**, **Kyoto**, **Osaka** and **Nagasaki**.
4. Draw a small brown triangle with a white top west of Tokyo and label it **Mount Fuji, 12,388 ft.**
5. Draw a red line from Tokyo through Kyoto to Osaka and label it **Shinkansen, 1964**.
6. Add a compass rose and a scale bar.
7. On the lined side, write a postcard home as if you had just climbed Fuji to see the sunrise.

Check your work

- My map shows and labels the four main islands and both seas.
- I marked four cities, Mount Fuji and the first Shinkansen line.
- My postcard describes the climb or the view.

TRAVEL JOURNAL

1. **Travel journal, Japan page.** Write a paragraph about the hidden Christians of Nagasaki. What did they do to keep their faith alive for 250 years without priests or Bibles? What can you learn from them?
2. Draw a cross-section of Mount Fuji with labels: *layers of lava and ash, magma chamber, crater, summit 12,388 ft.*

Did you know? Mount Fuji's summit crater is about 1,600 feet across. There are post offices and huts near the top in summer, so climbers can mail a postcard from the summit. In 2013 the mountain was named a World Heritage Site for its place in Japanese art and culture.

Goes deeper in. Earth Science, "Volcanoes and Earthquakes"; Art, "Hokusai and the Woodblock Print"; and Geography, Grade 8, "East Asia" (coming soon).

For families. Sources: Britannica (Japan, Mount Fuji, Hokusai, Kakure Kirishitan); Japan Meteorological Agency (111 active volcanoes); Metropolitan Museum of Art (*Great Wave*, JP1847). The 1597 martyrdom is told without detail; the Twenty-Six Martyrs were canonized in 1862. The 1865 "Discovery of the Hidden Christians" took place at Ōura Church with Father Bernard Petitjean; the quoted words are as he recorded them, in translation. Estimates of the number of Christians around 1600 range from about 200,000 to 300,000. Japan's island count was revised to 14,125 in 2023. Climber numbers vary by year.

PRACTICE

1. **EASY** Name Japan's four main islands.
2. **EASY** When did Mount Fuji last erupt?
3. **MEDIUM** Why does Japan have so many volcanoes and earthquakes?
4. **MEDIUM** Who brought Christianity to Japan, and what happened to Japan's Christians after 1614?
5. **CHALLENGE** A bullet train covers the 320 miles from Tokyo to Osaka in about 2 hours 20 minutes. What is its average speed? If Fuji is 12,388 ft and you climb from the fifth station at about 7,500 ft, how many feet do you climb?

Make it a game • Earthquake Drill, Bullet-Train Style. Players are "trains" moving around the room. A caller rings a bell for the earthquake sensor. Every train must stop at once and crouch low (drop, cover and hold on). The last one to stop becomes the caller. Then talk about why stopping fast keeps passengers safe.

Scripture. “If I take the wings of the morning, and dwell in the uttermost parts of the sea; Even there shall thy hand lead me, and thy right hand shall hold me.” (Psalm 139:9–10, KJV)

Japan, far across the sea in the land of the morning sun, was the “uttermost part” for the first missionaries. God’s hand held the hidden Christians there for 250 years with no church to go to.

Practice: answers

1. Hokkaido, Honshu, Shikoku and Kyushu.
2. In 1707.
3. It lies on the Ring of Fire, where plates of the earth’s crust push against each other.
4. Francis Xavier, in 1549. The faith was banned; many were persecuted, and some kept it in secret for about 250 years.
5. $320 \div 2\frac{1}{3} \approx 137$ miles per hour. $12,388 - 7,500 = 4,888$ feet.

4.8 AMERICA'S NATIONAL PARKS: YELLOWSTONE AND THE GRAND CANYON

OBJECTIVES

- Locate Yellowstone and the Grand Canyon on a map of the United States, with the states and rivers around them.
- Tell how Yellowstone became the world's first national park in 1872, and the part a painter and a photographer played.
- Describe the Grand Canyon with its key measurements and draw a labeled diagram of its rock layers.

Warm-up. Find Wyoming on a map of the United States, then its northwest corner, where Yellowstone lies. Now find Arizona and the Colorado River crossing its northwest corner. Draw a line between the two. About how many miles apart are they? (Use the map's scale.)

Video slot. Video coming. Yellowstone's geysers and Old Faithful, and a tour of the Grand Canyon's rock layers. Search approved channels (National Park Service, Smithsonian Channel, Associates for Biblical Research or Answers in Genesis for a creation view of the canyon); preview first.

KEY TERMS

national park

Land set aside by the national government to be protected and kept open for people to enjoy; the United States now has 63.

geyser

A hot spring that now and then shoots water and steam into the air, heated by hot rock far below.

caldera

A huge bowl-shaped hollow left when the ground collapses after a volcano empties its magma; much of Yellowstone sits in one.

canyon

A deep, narrow valley with steep sides, usually cut by a river.

strata

Layers of rock laid one on top of another (one layer is a stratum).

CORE IDEAS

In 1870 and 1871, explorers came back from the high country of northwestern Wyoming with stories few people believed: boiling pools, mud pots, a canyon of yellow rock and

fountains of hot water shooting into the sky. In 1871 the government sent Ferdinand Hayden with a team of scientists to find out. With him went the painter Thomas Moran and the photographer William Henry Jackson. Their pictures proved the stories true. On March 1, 1872, President Ulysses S. Grant signed a law making **Yellowstone** the first **national park** in the world, “for the benefit and enjoyment of the people.”

Yellowstone covers about 3,500 square miles, mostly in Wyoming, with edges in Montana and Idaho. Much of it lies inside a great volcanic **caldera** about 30 by 45 miles. Hot rock still lies a few miles down, and it heats more than 10,000 hot springs, mud pots, steam vents and **geysers**, more than 500 of them geysers, about half of all the geysers in the world. The most famous, Old Faithful, erupts roughly every hour and a half, shooting water 100 to 180 feet high. Bison, elk, grizzly bears and wolves roam the park, and the Lower Falls of the Yellowstone River drop 308 feet, nearly twice the height of Niagara.

About 600 miles to the southwest, in Arizona, the Colorado River runs through the **Grand Canyon**. It is 277 river miles long, up to 18 miles wide and about a mile deep. In 1869 John Wesley Powell, a geology teacher who had lost his right arm in the Civil War, led ten men in four wooden boats down the river into the unknown canyon; after three months, six men in two boats came out at the other end. President Theodore Roosevelt, who visited in 1903, urged Americans to “leave it as it is,” made it a national monument in 1908, and in 1919 it became a national park.

The canyon walls are a giant layer cake of **strata**: sandstone, limestone and shale, stacked in bands of red, tan, gray and white, with dark, crystal-filled schist at the bottom. Many layers hold fossils of sea creatures, even near the rim, more than a mile above sea level. Geologists of all views study these layers. Most say they were laid down over very long ages; many Christian geologists see much of the work done quickly in the great Flood of Noah’s day. All agree the layers lie in order, the lowest put down first, and that water did the building and the carving.

In 1916 Congress created the National Park Service to care for the parks. Today there are 63 national parks, and Yellowstone and the Grand Canyon each welcome four to five million visitors a year. Rangers, many of them living in the parks, teach visitors, fight fires and rescue lost hikers. The idea first tried at Yellowstone, to set aside wild places for everyone, has since been copied by countries around the world.

PICTURE STUDY



The Grand Canyon of the Yellowstone, Thomas Moran, 1872 · Oil on canvas (about 7 by 12 feet) · Smithsonian American Art Museum, Washington, D.C. (lent by the U.S. Department of the Interior Museum)
Wikimedia Commons · Public domain

Thomas Moran sketched this view on the 1871 Hayden expedition and painted it the next year in his studio. Congress bought it in 1872 for \$10,000, a very large sum, and hung it in the Capitol. Moran was so tied to the park that he began signing his paintings “TYM,” Thomas “Yellowstone” Moran.

Look closely

- Find the Lower Falls. How far away do they look?
- Find the tiny figures on the rock at the front. Some think one of them stands for Hayden, the expedition leader. How do they show the size of the canyon?
- Find the colors of the canyon walls. Why do you think the river is called Yellowstone?

Talk about it

1. Moran’s painting and Jackson’s photographs helped persuade Congress to protect Yellowstone. Why might a painting persuade people when words could not?
2. If you could protect one wild place you love, which would it be, and how would you show others why it matters?

Safety first. In real parks: stay on boardwalks and trails in Yellowstone’s thermal areas, where the ground can be a thin crust over scalding water; stay at least 25 yards from bison and elk and 100 yards from bears and wolves; keep well back from the Grand Canyon’s rim, which often has no railing; and carry water in the heat. At home, look up maps and photographs with a parent.

HANDS-ON: POSTCARD AND DIAGRAM: GRAND CANYON LAYERS

Finish your Trail D **postcard set** with the eighth card: a cross-section of the Grand Canyon on the front and a message from a national park on the back.

You will need

- A 4-by-6-inch index card or cardstock
- Pencil, fine black pen, colored pencils (cream, red, tan, gray, dark purple, blue)
- A ruler
- A rock-layer chart from the National Park Service's Grand Canyon site or a library book

Steps

1. Draw a wide V-shaped canyon with stepped sides across the card. Draw the **Colorado River** in blue at the bottom.
2. Divide the walls into bands. From top to bottom, color and label: **Kaibab Limestone** (cream, at the rim), **Coconino Sandstone** (pale tan), **Hermit Shale and Supai Group** (red), **Redwall Limestone** (gray, stained red), **Tapeats Sandstone** (brown), **Vishnu Schist** (dark purple, at the bottom).
3. Draw a tiny shell fossil in the Kaibab Limestone and label it **sea fossils near the rim**.
4. On the side, write: **about 1 mile deep, up to 18 miles wide, 277 miles long**.
5. Add a small arrow labeled **oldest layer: bottom**.
6. On the lined side, write a postcard home from Yellowstone or the Grand Canyon. Name one thing you saw and one safety rule you kept.

Check your work

- My cross-section shows the river and six labeled layers in the right order.
- I wrote the canyon's three measurements.
- My postcard names a sight and a safety rule.

TRAVEL JOURNAL

1. **Travel journal, national parks page.** Write a paragraph comparing Yellowstone and the Grand Canyon: where each is, what makes it famous, and when it was protected. End with which you would rather visit first and why.
2. Draw a diagram of a geyser: *hot rock, underground water channel, water heated under pressure, steam and water bursting out.*

Did you know? Yellowstone's bison are the only herd in the United States that has lived in the same place since prehistoric times. Wolves had disappeared from the park by the 1920s and were brought back from Canada in 1995. At the Grand Canyon, the temperature at the river can be 20°F or more hotter than at the rim.

Map or diagram. Your canyon drawing is a *cross-section*, as if a giant knife sliced through the land and you looked at the cut edge. Geologists use the principle of superposition: in undisturbed layers, the bottom one was laid down first.

Goes deeper in. Earth Science, “Rocks and Fossils” and “Volcanoes and Hot Springs”; Art, “Painters of the American West”; and Geography, Grade 4, “The American West” (coming soon).

For families. Sources: National Park Service (nps.gov/yell and nps.gov/grca) for areas, geyser counts, Old Faithful intervals, the Lower Falls, wildlife distances and canyon measurements; Smithsonian American Art Museum (Moran, 1872); Powell, *The Exploration of the Colorado River and Its Canyons* (1875). Three of Powell’s men left the expedition near the end and were never seen again; one had already left early on. The age of the Grand Canyon’s rocks is a subject on which Christians differ; the stop presents both the conventional long-age view and the Flood view without settling it, so families can teach from their own convictions. National park count (63) and visitor numbers are as of 2025–2026.

PRACTICE

1. **EASY** Which was the first national park in the world, and in what year?
2. **EASY** Which river flows through the Grand Canyon?
3. **MEDIUM** What is a geyser, and what heats the water in Yellowstone’s geysers?
4. **MEDIUM** How did Thomas Moran and William Henry Jackson help Yellowstone become a park?
5. **CHALLENGE** Old Faithful erupts about every 90 minutes. About how many times does it erupt in one day? The Lower Falls are 308 feet and Niagara’s Horseshoe Falls about 170 feet; how many feet taller are the Lower Falls?

Make it a game • Ranger Says. One player is the park ranger. The ranger calls out situations: “A bison is 10 yards away!” “There’s a pretty pool beside the boardwalk!” “The canyon rim has no railing!” Players act out the safe choice (back away slowly, stay on the boardwalk, step back from the edge). Anyone who makes an unsafe move becomes the next ranger.

Scripture. “Hearken unto this, O Job: stand still, and consider the wondrous works of God.” (Job 37:14, KJV)

Standing at the rim of a canyon a mile deep, or watching a geyser roar into the sky, it is natural to stand still and wonder. National parks are places to do just what this verse says: consider the works of God.

Practice: answers

1. Yellowstone, in 1872.

2. The Colorado River.
3. A hot spring that shoots water and steam into the air from time to time; the water is heated by hot volcanic rock deep below the park.
4. Their paintings and photographs from the 1871 Hayden expedition showed Congress that the wonders were real and worth protecting.
5. $24 \text{ hours} \times 60 = 1,440 \text{ minutes}$; $1,440 \div 90 = 16 \text{ eruptions}$. $308 - 170 = 138 \text{ feet taller}$.

TRAIL 4 BADGE QUIZ

The badge quiz is optional. The student answers in writing, in full sentences where possible, and a parent checks the answers. Four right out of five earns the first badge; four right out of five on the second part earns the second. Badges and the certificate are earned by doing the stops, not by scores.

Badge quiz 1 (Stops 1-5)

1. Why does the Bible say people go “up” to Jerusalem? Use an elevation in your answer.
2. Who opened the Colosseum, in what year, and what was the hypogeum?
3. Who began the White Tower, and why did he build it beside the Thames?
4. Why was the Eiffel Tower built, and what saved it from being torn down?
5. List four zones you pass through climbing a Swiss mountain, from bottom to top.

Badge quiz 2 (Stops 6-8)

6. Why is southern Egypt called “Upper Egypt”?
7. For which pharaoh was the Great Pyramid built, and about when?
8. Why does Japan have so many volcanoes and earthquakes? When did Mount Fuji last erupt?
9. Who were the hidden Christians of Japan?
10. Which was the world’s first national park, when was it made, and which river carved the Grand Canyon?

TRAIL CERTIFICATE: MY TRAIL D POSTCARD SET AND TRAVEL JOURNAL

Gather your eight postcards into an envelope page or punch them and tie them with string: “Postcards from Faraway Places,” with your name and dates. Each card has a hand-drawn map or diagram on the front and a message home on the back.

Put your eight travel-journal paragraphs in the Field Notebook, one page per place. Add a world map at the front with all eight places marked and numbered in the order you visited them.

Choose the one place you would most like to visit in person. Write a final paragraph explaining why, and read it aloud to your family. When the set is done, a parent signs the Trail D certificate.

- **Maps and diagrams:** Each postcard has a neat map, plan, profile or cross-section with clear labels and a compass rose or scale where needed.
- **Facts:** Postcards and journal entries give correct dates, places and measurements from the stops.
- **Writing:** Each journal entry is a full paragraph with a clear opening sentence, details and a closing thought.
- **Connections:** The student can explain how several places connect to the Bible, the Church or history, and tell one story from the trail in their own words.

Answer key

1. Jerusalem sits high in the hills, about 2,500 feet above sea level, so travelers climb to reach it from almost anywhere (for example, 3,200 feet from the Sea of Galilee).
2. The Emperor Titus, in AD 80. The hypogeum was the network of tunnels and rooms under the arena floor.
3. William the Conqueror, about 1078, to hold London and guard the river approach to the city.
4. It was built for the 1889 world's fair (Exposition Universelle). It was saved because it proved useful for science, especially as a radio antenna.
5. Valley farms and villages, forest, alp (high summer meadows above the treeline), rock, and snow and glacier (any four in order).
6. Because the Nile flows north, so the south is upriver.
7. Khufu, about 2560 BC.
8. Japan lies on the Ring of Fire, where plates of the earth's crust push together. Fuji last erupted in 1707.
9. Christians near Nagasaki who kept their faith in secret for about 250 years after it was banned, and made themselves known to a priest in 1865.
10. Yellowstone, on March 1, 1872. The Colorado River.