

SCIENCE
FOR
Little Hearts
AND
Hands

BONES and STONES

PARENT GUIDE


The Good and the Beautiful
CURRICULUM

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About This Course

Little children's hearts and minds are most impressionable during the preschool and early elementary years, so it's an important time for molding the way they view learning. Your enthusiasm while teaching in a positive and uplifting manner can help foster a love of learning and a desire for all things good and beautiful. This course strives to assist you in creating a solid educational foundation through fun, interactive, hands-on lessons that require minimal preparation.

What Does the Course Set Include?

- **Full-color *Parent Guide***

- ***The Big Book of Science Stories***

The Big Book of Science Stories contains beautifully illustrated stories that will inspire interest and wonder in a variety of science topics.

- **Lesson Audio Narrations**

Lesson audio narrations are included and will be accessed every few lessons. These audio narrations share interesting facts about the topics studied in a fun and engaging manner.

How to Get Started with This Course

Note: We recommend that the lessons in this unit be completed in order. Several of the concepts that are introduced in the first few lessons are essential for the child to understand in later lessons.

No preparation time is required for this course. Some activities will need additional supplies, which are listed on pages 7–9.

Belief Statement

The *Science for Little Hearts and Hands: Bones and Stones* unit has been written with a focus on basic Bible principles, allowing all families to use this unit and add in their specific beliefs. This unit works well for those who hold either Young Earth or Old Earth beliefs.



Lesson Overview

The *Science for Little Hearts and Hands: Bones and Stones* course consists of 30 lessons. Each lesson is parent directed and provides detailed teaching for young learners. The lessons are taught in story, audio narration, or activity format, with directions for the parent included in the lesson.

Lesson Text

To complete the lessons, simply follow the instructions on each page. Instructions in orange text are for you; text in black is what you read to the child.

Each lesson has a brief introduction and then instructs you to read one story from *The Big Book of Science Stories: Bones and Stones*, listen to an audio narration, or complete an activity. Finally, you will return to this *Parent Guide* for discussion questions and optional activities.

The Big Book of Science Stories

If instructed to do so in the lesson, read the suggested story to the child, and take time to enjoy the detailed illustrations. Every few lessons include a story from this resource.



Audio Narrations

Audio narration lessons can be found on the Good and Beautiful Homeschool app, which can be downloaded by scanning the QR code to the right or by visiting [goodandbeautiful.com/apps](https://www.goodandbeautiful.com/apps). Alternatively, the audio narration lessons can still be found by going to [goodandbeautiful.com/hearts-and-hands](https://www.goodandbeautiful.com/hearts-and-hands) (password is “littles”). There are seven lessons throughout the unit that have audio narrations. In each of these lessons, you will be directed to remove and assemble the pawn from the perforated pages at the end of the unit. The child will use the pawn to follow along with illustrations that accompany the audio narration. The pawns do not need to be saved for future lessons.



Activities

Opening activities are listed at the beginning of each lesson, and optional activities are listed at the end of most lessons. Any supplies needed are listed on pages 7–9 and at the beginning of each lesson. Optional activities are not required but are offered as enhanced learning opportunities for you to complete with your child.

Important Safety Notice

Adult supervision is recommended for all activities as some require sharp objects, heat sources, or small objects that could be a choking hazard for young children.

Frequently Asked Questions

How long will a lesson take?

Lesson length will vary greatly among children. Have the child do as much work each day as the child's attention span will allow. You do not need to complete one lesson a day. You might do more or less than that. Look for cues of frustration or fatigue to help you know when to finish. The child will learn much from you as you display love, patience, and enthusiasm for learning. At this age it's important that the learning feels more like fun to the child than something forced or unpleasant.

Do you include any specific doctrine?

No, the goal of our curriculum is not to teach doctrines specific to any particular Christian denomination but to teach general principles such as honesty, hard work, and kindness.

Is there anything I need to do to prepare for a lesson?

This course is written as an open-and-go course. Activity supplies are listed on pages 7–9, and access to the Good and Beautiful Homeschool app is needed for some of the lessons.



Activity Supplies

Opening activities are listed at the beginning of each lesson, and optional activities are listed at the end of each lesson. Optional activities are not required but are offered as enhanced learning opportunities for you to complete with your child.

Lesson 1: What Is a Paleontologist?

- none

Lesson 2: Fossils

Optional Activity

- rock, toy dinosaur, small dog bone, or other similar-sized item

Lesson 3: Dinosaurs in Museums

- several pipe cleaners

Optional Activity

- play dough or modeling clay
- small object

Lesson 4: What Did Dinosaurs Eat?

- 3 foods the child likes, such as sliced banana, warmed green peas, or sliced strawberry (keep foods hidden)
- handheld mirror
- piece of lettuce per child
- piece of jerky per child
- plate
- quarter
- 5 dimes
- 5 nickels

Lesson 5: Reptiles in the Air

Optional Activity

- large bowl
- water
- 10 small pieces of fruit
- slotted spoon or small strainer

Lesson 6: Dinosaurs on the Land

Optional Activity

- different shapes of dried pasta
- paper
- glue

Lesson 7: Ancient Sea Creatures

Optional Activity

- 1 c flour
- ½ c salt
- ½ c warm water
- parchment paper
- small shells or similar sea objects
- oven (optional)

Lesson 8: Ancient Mammals

Optional Activity

- sidewalk chalk

Lesson 9: Extinct Animals

- none

Lesson 10: What Is a Geologist?

- magnifying glass
- measuring tape
- sandpaper
- cup of water
- pencils, colored pencils, or crayons
- paper
- outdoor area with rocks or a handful of rocks if indoors
- something to take photos with (optional)

Lesson 11: Layers of the Earth

- bed

Optional Activity

- cutting board
- apple
- knife (for adult use only)



Activity Supplies. cont.

Lesson 12: Landforms

Optional Activity

- damp play sand
- large casserole dish

Lesson 13: Glaciers

- paper or plastic cup
- small rocks
- water
- blue food dye (optional)
- access to a freezer
- baking sheet with raised edges or cake pan
- wax paper
- flour
- book (2.5-5 cm, or 1-2 in, thick)

Lesson 14: Earthquakes

Optional Activity

- blocks or craft sticks
- straws
- tape
- tabletop



Lesson 15: Volcanoes

- blankets and pillows

Optional Activity

- play dough or modeling clay
- small cup
- large baking sheet
- $\frac{1}{4}$ c baking soda
- red food dye (optional)
- utensil to mix
- $\frac{3}{4}$ c vinegar



Lesson 16: Caves

- a blanket
- 2 chairs
- flashlight

Optional Activity

- cardstock or construction paper
- paint
- crayons or markers

Lesson 17: Rocks

- clean rock

Optional Activity

- 1-2 rocks
- paints
- paintbrushes

Lesson 18: Igneous Rocks

Optional Activity

- handful of mini marshmallows
- 2 Tbsp chocolate chips
- handful of dry cereal (such as corn flakes)
- microwave-safe bowl
- heat-safe spoon
- microwave

Lesson 19: Sedimentary Rocks

- wax or parchment paper
- play dough
- heavy item (such as a cast-iron pan)

Optional Activity

- 1-qt clear container with tight-fitting lid
- 1 c uncooked rice
- funnel (optional)
- 1 c dark-colored dried beans
- 1 c flour
- water
- duct tape (optional)



Activity Supplies. cont.

Lesson 20: Metamorphic Rocks

- play dough or modeling clay (2–4 colors)
- plastic sandwich bag

Optional Activity

- candy bar (with peanuts, nougat, or caramel), OR avocado, cream cheese, and salt & pepper
- plastic sandwich bag
- heavy item

Lesson 21: Mining

- prepared cupcake
- 2 plates
- plastic knife
- soda can (rinsed and filled with drinking water)
- pencil (regular or mechanical)
- plastic spoon
- toothpick
- 1 c hard-packed brown sugar
- pebbles
- 2 colors of play dough or modeling clay
- sprinkles
- frosting

Lesson 22: Gemstones

- treat or snack

Optional Activity

- paper
- drawing utensils
- something to hide

Lesson 23: Geodes

- sticky note or piece of paper
- cardboard egg carton
- scissors
- plastic wrap
- blue paint
- paintbrush
- small sandwich bag
- 2 Tbsp Epsom salt
- blue food coloring
- glue

Optional Activity

- geode
- safety goggles
- tube sock
- chisel
- rock hammer or sledgehammer

Lesson 24: Diamonds

- play dough or modeling clay
- scrap paper
- plastic object
- metal spoon
- glass object

Optional Activity

- diamond (real or in a picture)



Lesson 25: Metals

- 3–5 metallic items, such as a ring, paper clip, safety pin, coin, or key

Lesson 26: Extracting Metals

- paper clips
- play dough or modeling clay

Optional Activity

- paper clips
- shallow baking dish
- soil
- magnet

Lesson 27: What Is Geography?

- map of your town, city, or country

Optional Activity

- modeling clay or play dough

Lesson 28: Maps

- small toy or book
- hand-drawn map (see lesson for details)

Lesson 29: The Continents

- world map or globe (optional)

Lesson 30: Zones of the World

Optional Activity

- map of where you live



WHAT IS A PALEONTOLOGIST?



OPENING



Read to the child: Look at the animal tracks below. Based on the shape, can you guess what stepped in the mud before it dried? These are dog prints!



What do you think landed in the sand on the side of a river to make the shapes below? Maybe you have seen this type of plant. It is called a fern!



When God created the world, He made many different types of animals and plants—so many that we are still learning about them! While some of these animals and plants no longer exist today, they did leave behind prints such as these. Scientists study these prints, along with bones and other things they find in the ground, to learn what the world was like a long time ago.

Read to the child: The scientists who study plants and animals from long ago are called *paleontologists*. Today we are going to learn about how they discover amazing things from the past. Let's visit the Bones and Stones Museum and hear what our tour guide, Ashley, has to say about all of these old bones and stones!



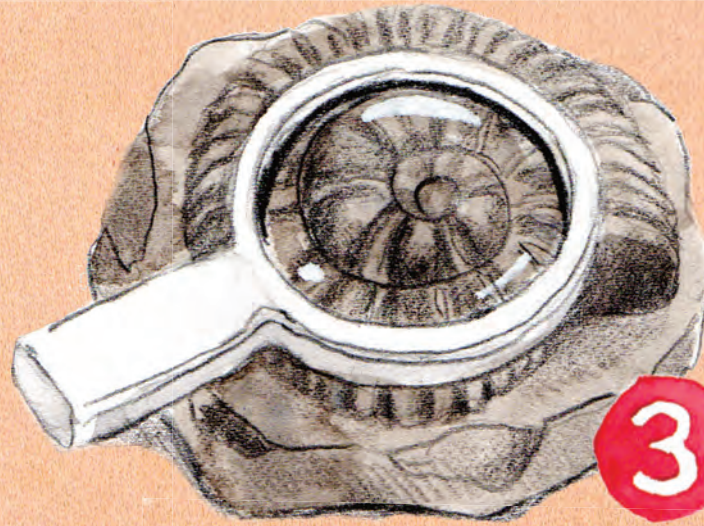
Audio Narration

Remove the Lesson I pawn from the perforated pages at the end of the unit. Have the child put the pawn on illustration I on the next page. Begin the audio narration "What Is a Paleontologist?" When you hear a chime, have the child move the pawn to the next number by following the arrow. Turn the page when you hear the third chime to continue the narration. Afterward, have the child answer the discussion questions.

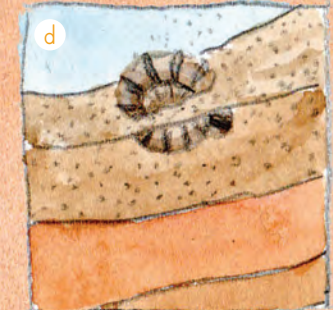
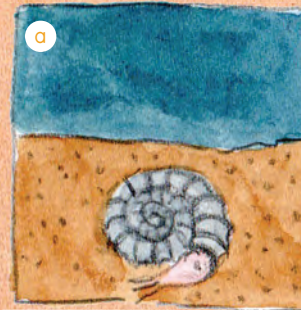




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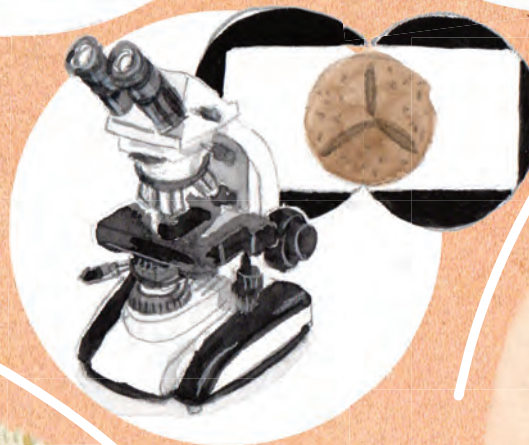
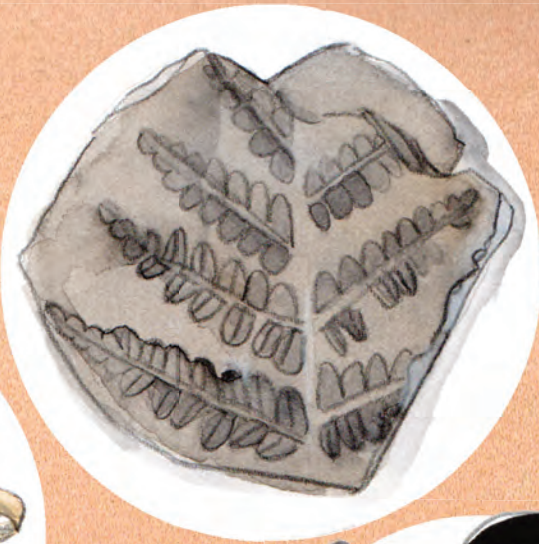


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4



6



5



7

8

Discussion

- * Q: What do paleontologists study?
- * A: Fossils
-
- * Q: Name three kinds of fossils that paleontologists study.
- * A: Answers may include bones from vertebrates (e.g., dinosaurs and mammals); fossils from plants, shells and other parts from invertebrates (e.g., snails and crabs); and tiny fossils (e.g., pollen).
-
- * Q: If you could be a paleontologist, would you like to study animals, plants, or tiny fossils? Why would you choose that?
- * A: Answers will vary.

Optional Activity

Take a nature walk and look for items that might one day turn into fossils, such as leaves on the ground, bugs that may be covered by mud or sand after they die, or animals that might leave bones behind. Discuss what future paleontologists might learn from those fossils and bones.

LESSON 4

WHAT DID DINOSAURS EAT?

Supplies Needed

- * three foods the child likes, such as sliced banana, warmed green peas, or sliced strawberry (keep foods hidden)
- * handheld mirror
- * piece of lettuce per child
- * piece of jerky per child
- * plate
- * quarter
- * 5 dimes
- * 5 nickels

OPENING



Gather three foods that the child likes. Keep the foods hidden. Read to the child: Close your eyes and open your mouth. I'm going to give you a taste of something, and you're going to tell me what it is without looking.

Put a small piece of the first food in the child's mouth. After the child has swallowed the food, read to the child: What is that? Yes, it is! Now, close your eyes and open your mouth again.

Put a small piece of the second food in the child's mouth. After the child has swallowed the food, read to the child: What kind of food is that? Great job! Close your eyes and open your mouth one more time.

Put a small piece of the third food in the child's mouth. Read to the child: Can you tell what that is? You're exactly right.

Read to the child: You just tasted some different foods that humans can eat. Do we have to eat in order to stay alive? That's right, we do! Did you know that the same was true for dinosaurs? They had to eat, too, and scientists have been studying dinosaurs long enough to learn which foods they ate. Let's dive in and discover a bit more about dinosaur foods.



Activity Time

Read to the child: If you could go buy groceries all by yourself, what foods would you buy? **Allow the child to answer.** Those are all great ideas! I like some of those foods too. As humans, we are able to eat plants, such as fruits and vegetables, grains, and meat, such as beef, fish, and chicken. This makes us *omnivores*, which are creatures that eat both plants and meat from animals.



Some dinosaurs were omnivores and ate both plants and animals, just like us! The dinosaurs in this picture were omnivores.



Many dinosaurs were *herbivores*, meaning they ate only plants. This next picture shows dinosaurs that were herbivores.



And still other dinosaurs ate only meat, so they were called *carnivores*. These dinosaurs below were carnivores.



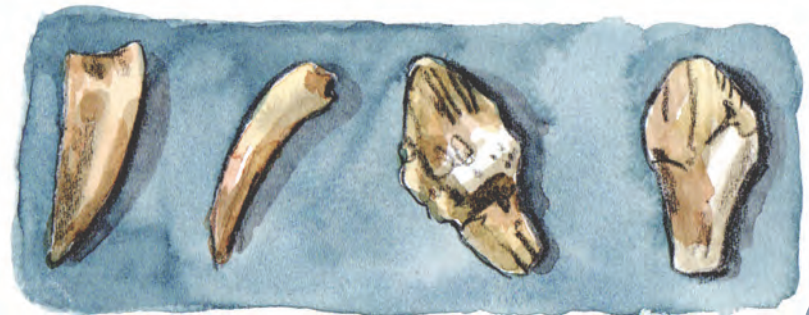
Read to the child: How do you think scientists know what different dinosaurs ate? Looking at the bones that make up the dinosaur's head, called the skull, can give a scientist a pretty good clue.



Hand the child a mirror. Read to the child: Open your mouth wide and look at your teeth in the mirror. How are your back teeth different from your front teeth? Your wide, flat back teeth are good for chewing and grinding food into small enough pieces that you can swallow and break down, or *digest*. Your front teeth are longer, which makes them really good at taking bites of fruit and vegetables, and your sharp, pointy teeth to the side are good at tearing meat. Do you think you could chew up a carrot without strong back teeth? And how would you take a bite from a piece of chicken without your pointy teeth? Isn't it wonderful that our wise and loving God gave us the tools we need to eat the food that keeps us healthy?



God also knew that dinosaurs needed the right kind of teeth to eat their food! Scientists also think some dinosaurs' stomachs were shaped differently to let them digest only meat or only vegetables.



* Spinosaurus
[SPY-no-SORE-us]



* Stegosaurus
[STEG-oh-SORE-us]



* Fruitadens
[FROOT-a-dens]



* Velociraptor
[vel-AH-ser-AP-tor]



* Triceratops
[tri-SAIR-uh-tops]

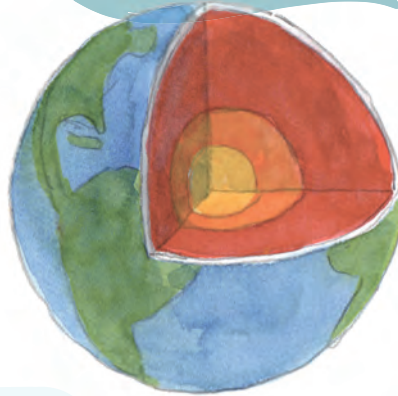


* Edmontosaurus
[ed-MON-toh-SORE-us]



LESSON II

LAYERS OF THE EARTH



Supplies Needed

- * bed
- Optional Activity
- * cutting board
- * apple
- * knife (for adult use only)

OPENING



Take the child into one of your home's bedrooms with a fully made bed and point it out to the child. Read to the child: This bed has several layers. First is the top blanket or comforter. Let's pull that back and see what's underneath. There is a sheet. Let's pull that back too. What's under the sheet? The mattress (or a mattress pad, depending on your bed)! Look under the mattress—what's the next layer? It's the box spring (or bed frame). We looked at four layers of the bed. The earth also has four layers!

Read to the child: Have you ever wondered what's under your feet when you're outside playing? You can see dirt or sand, of course. But what's under that? People have wondered this for a very long time, and they have been digging holes into the earth to try to answer this question! Our story today is going to tell us about the earth under our feet and one of these holes.

Story Time

Read to the child "A Brownie Sundae Borehole" on page 88 of *The Big Book of Science Stories*, and then return to the *Parent Guide* for discussion questions.





Discussion

- * Q: What is the outer layer of the earth called?
- * A: The crust
-
- * Q: Are the inner and outer core of the earth hot or cold?
- * A: Very hot
-
- * Q: What do you think we could learn from drilling deeper into the earth?
- * A: Answers will vary.

Optional Activity

Place an apple on a cutting board. Tell the child that the apple represents the earth. Then cut the apple in half. Discuss with the child which parts of the apple represent which parts of the earth: the peel is the crust; the flesh is the mantle; the core is the outer core; and the area where the seeds are is the inner core. Cut both halves of the apple into slices and enjoy a snack together. (Be sure to put the knife out of the child's reach.)

Note: The activities for Lesson 13 require preparation at least one day in advance. See instructions on page 45.

LESSON 15

VOLCANOES

Supplies Needed

- * blankets and pillows
- * ¼ c baking soda
- Optional Activity
- * red food dye (optional)
- * play dough or modeling clay
- * utensil to mix
- * small cup
- * ¾ c vinegar
- * large baking sheet

Direct the child to look at the image of a volcano on the next page. Read to the child: A *volcano* is an opening in the surface of the earth—usually on a mountain—where gases, ash, and hot lava come up from deep inside the earth. Point out the ash and lava in the image of the volcano. When this happens, it is called a volcanic eruption. Let's listen to learn more about volcanoes.



Audio Narration

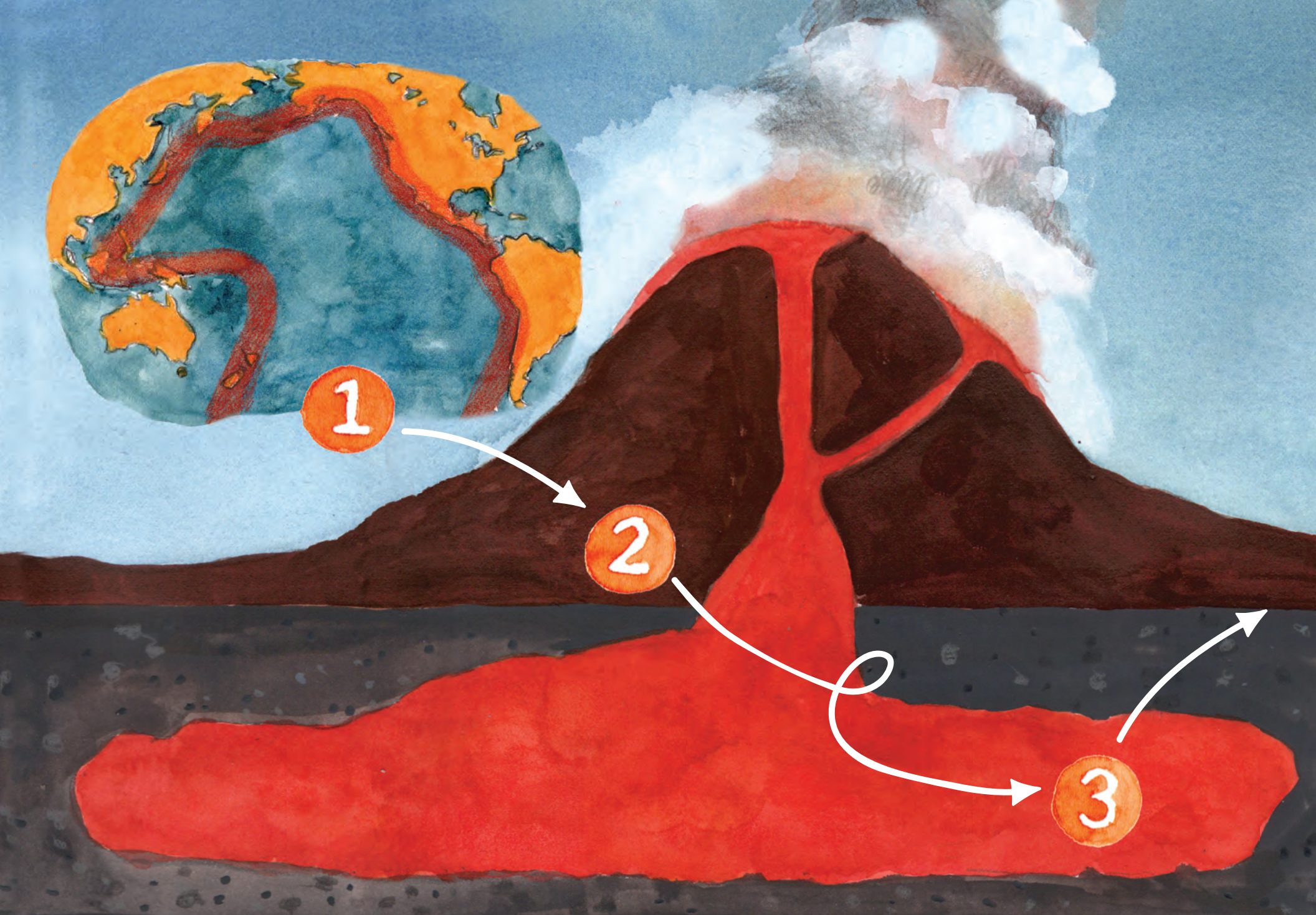
Remove the Lesson 15 pawn from the perforated pages at the end of the unit. Have the child put the pawn on illustration I on the next page. Begin the audio narration "Volcanoes." When you hear a chime, have the child move the pawn to the next number by following the arrow. Turn the page when you hear the third chime to continue the narration. Afterward, have the child answer the discussion questions.

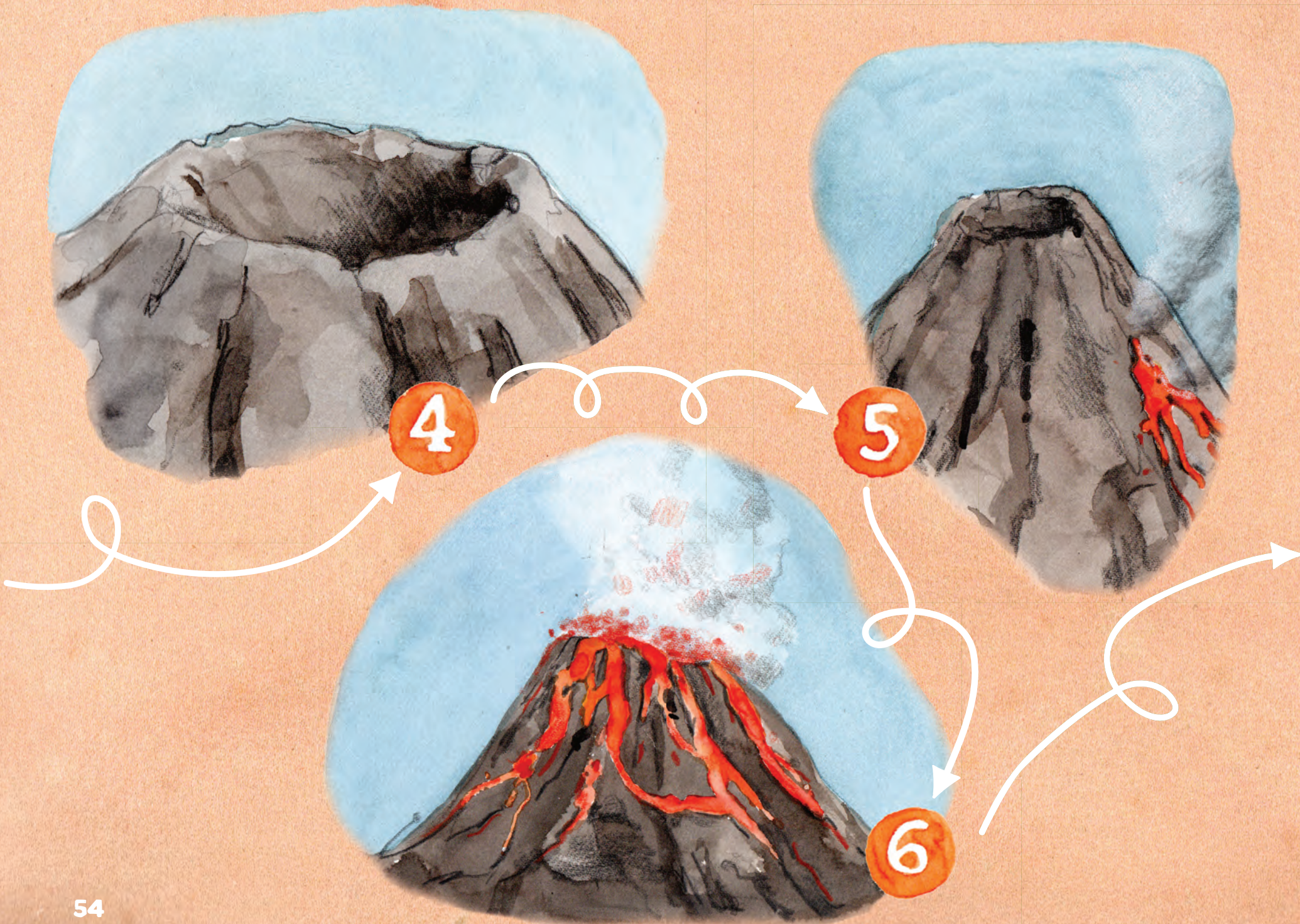
OPENING



Play a game of "Lava" by placing a few pillows or blankets on the floor. Travel around the room by jumping on the blankets and pillows while trying to avoid touching the floor. Read to the child: Let's play a game of "Lava." We're going to pretend the floor is hot lava, and we can't step anywhere on the floor.

What is actual lava? *Lava* is rock that is so hot that it has melted into a liquid! Lava erupts from deep inside volcanoes. When it is underground, it is called *magma*. As soon as it comes out of Earth's crust, it is called lava.





7

Discussion

- * Q: What is melted rock called when it's inside the earth? What is it called when it comes out of the volcano?
- * A: Magma; lava
-
- * Q: What are some of the parts of a volcano that you heard about?
- * A: Magma chamber, side vents, crater
-
- * Q: Would you like to watch a volcano erupt? Why or why not?
- * A: Answers will vary.

Optional Activity

Have the child make a volcano by putting play dough around a small cup. Be sure to place the cup and play dough on a large baking sheet to catch the mess. After the child has built his or her volcano, leaving an opening where the top of the cup is, fill the cup with $\frac{1}{4}$ c baking soda and a few drops of red food dye (optional) and mix it together. Put a few drops of red food dye into $\frac{3}{4}$ c vinegar. Pour the vinegar into the cup mixture and watch it erupt!



LESSON 27



WHAT IS GEOGRAPHY?



Supplies Needed

- map of your town, city, or country

Optional Activity

- modeling clay or play dough

OPENING



With the child, look at a map of your town, city, or country.

Read to the child: This map shows the area around where we live.

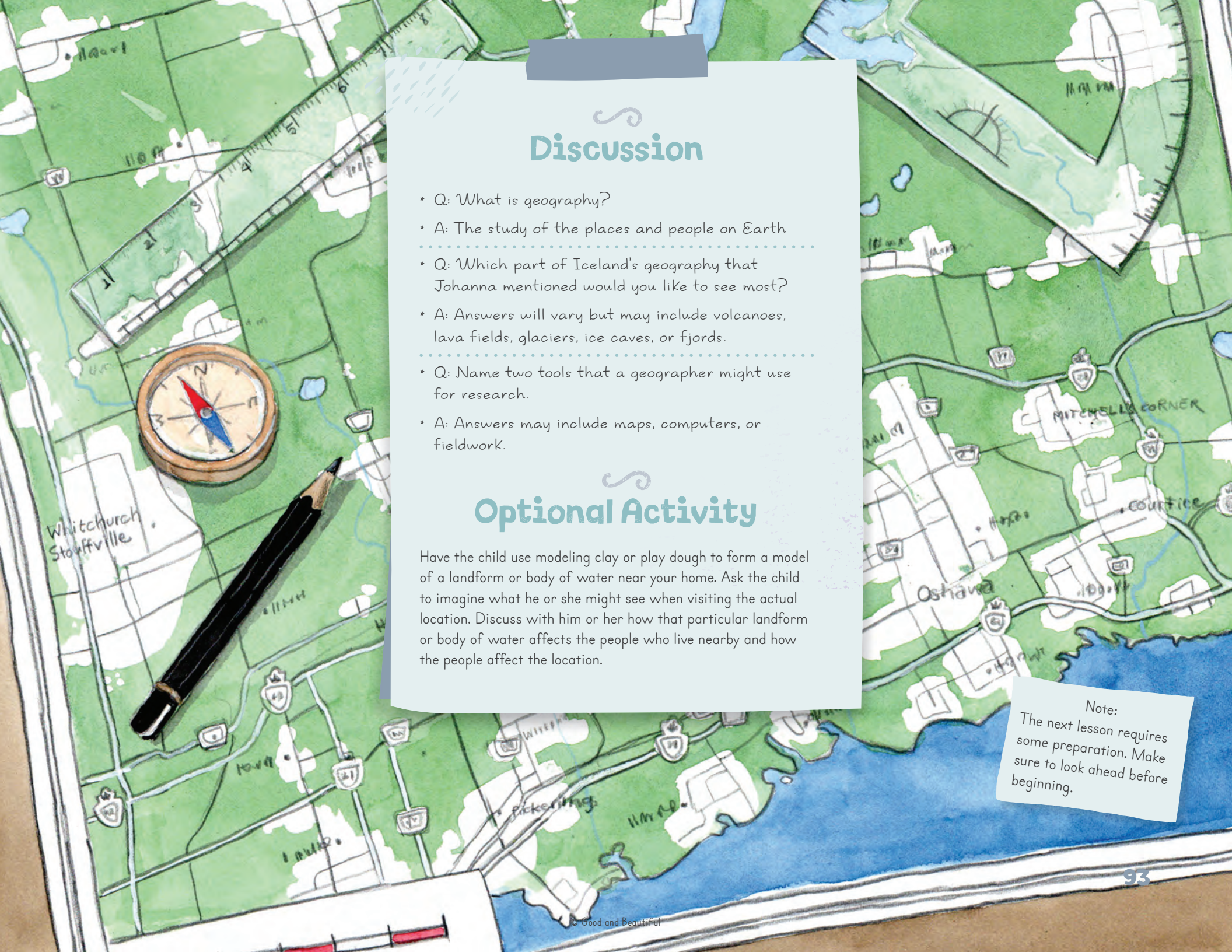
Show the child 2–3 natural landmarks on the map, such as mountains, lakes, or rivers. Read to the child: These places are landmarks. They can help us know where we are in our town (or city or country). Scientists have been exploring and studying the earth for many years in order to learn about beautiful landmarks, such as these, as well as other areas around the world. This type of study even has its own special name!

Read to the child: *Geography* is the study of places on the earth. A person who studies geography is called a *geographer*. Geographers study and learn things such as why the earth's surface is shaped a particular way. Geographers also learn about how being in a certain place affects the way people live, including the kinds of food they eat and the types of houses they build. Let's listen as Johanna tells us about the geography of her home country.

Story Time

Read to the child "Geography with Johanna" on page 200 of *The Big Book of Science Stories*, and then return to the *Parent Guide* for discussion questions.





Discussion

- * Q: What is geography?
- * A: The study of the places and people on Earth
- * Q: Which part of Iceland's geography that Johanna mentioned would you like to see most?
- * A: Answers will vary but may include volcanoes, lava fields, glaciers, ice caves, or fjords.
- * Q: Name two tools that a geographer might use for research.
- * A: Answers may include maps, computers, or fieldwork.

Optional Activity

Have the child use modeling clay or play dough to form a model of a landform or body of water near your home. Ask the child to imagine what he or she might see when visiting the actual location. Discuss with him or her how that particular landform or body of water affects the people who live nearby and how the people affect the location.

Note:
The next lesson requires some preparation. Make sure to look ahead before beginning.



MAPS



Supplies Needed

- * small toy or book
- * hand-drawn map (prepared ahead of time; see details in "Opening" section)

OPENING



Hide something small, such as an action figure or a book, somewhere in your home. Draw a basic map of your house and mark where the hidden object is. For younger children, draw a map of the room the item is hidden in.

Read to the child: This map shows you where I've hidden a small object. Use the map to help you find it!



SCALE

 ½ in = 500 ft

Read to the child: We just followed a simple map to find something. This map only showed a little bit of where we live, but there are maps that can show us our state, our country, and even the world. There are many different kinds of maps, and each shows different types of things, such as states, weather, the kinds of crops grown somewhere, or roads and highways. Let's explore maps!

Take a look at the map on this page. Can you reach out and tap the star? The star shows where the park is! There are also areas that are green for land or blue for water. Trace your finger along a line that shows a road. There are little green triangles for trees and little red triangles for houses as well.

All of these—the colors, shapes, and lines—are called *symbols*. Symbols make it easier for us to spot things on the map.

Does this map look like it is the same size as a real-life place? No, it's a much smaller picture, isn't it? Every map lets us see a big place on a smaller picture. You can tell how big things are on the map compared to real life by looking at the scale. This scale will tell you how big something is compared to the measurement on the map. Can you measure how big the park is with your fingers? Now put your fingers on the scale. On this map, ½ inch equals 500 feet—longer than a football field. The park is ½ inch wide on the map, so this means in real life the park is 500 feet wide! Let's look at the different kinds of maps that we can use to help us learn about our world.

Activity Time

Read to the child: Imagine you could hold the whole world in your hands. When you look down at the planet, you see the big pieces of land called continents and the vast stretches of water called oceans. Look at the map below. This kind of map is called a *political map*. Can you use two fingers and walk them along the lines in the picture below? These lines show the edges between countries. Now quickly poke a few of the dots on the map. These little dots here show us the capitals of some of the countries.

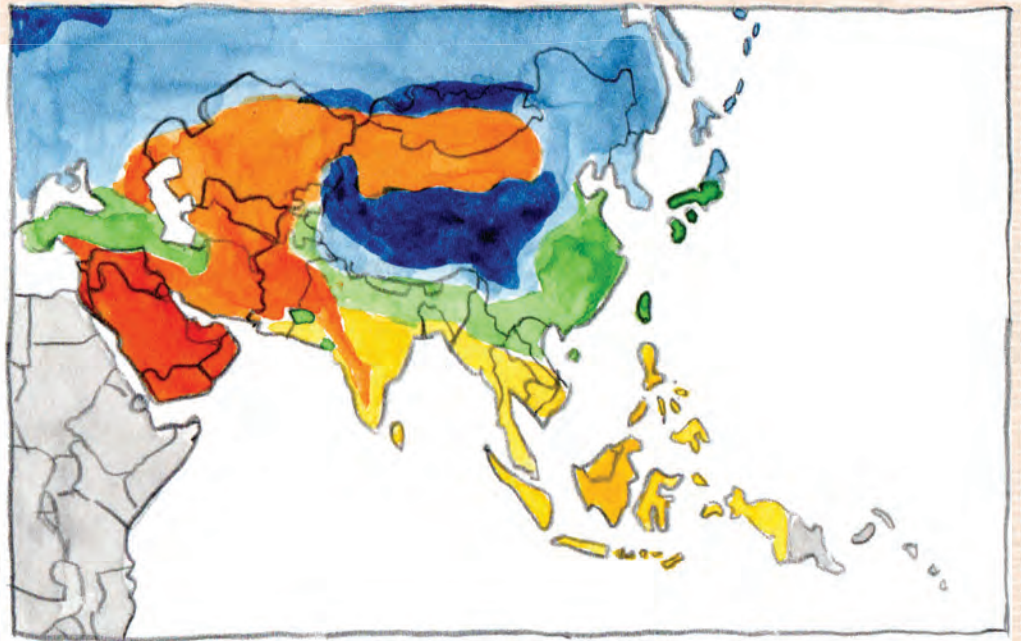


The map below looks a bit different, doesn't it? This map shows us where we can find winding rivers, large lakes, tall mountains, and forests full of animals. In this type of map, called a *physical map*, rivers and lakes are often colored blue. Can you gently flick a place on the map where there is water? That's right! The land is shown in different shades of green and brown, depending on how high up the land is. Low land is shown in dark green; land higher up is in lighter colors. Mountains are shown in brown. Use two fingers to climb up a mountain!



Activity Cont.

Do you know what kind of weather is normal in different parts of the world? You can see this on a *climate map*! The map to the right shows us the *climate*, or the usual kind of weather, for different places. Some places are hot; some are cold. Some have a lot of rain or snow, and other places are very dry. Climate maps show this information using different colors for different climates. Use your thumb to rub a blue place on the map. The blue means this place has a colder climate.



Take a look at the map to the left. Do you see the little pictures on it? This is a *resource map*, a type of map that shows which products different countries produce, or make, and sell to other countries.

You may notice the box that has the symbols listed next to words. This is a *map key*. It tells us what the symbols stand for. Pet the cow on the key. The picture of the cow tells us that at least one country in South America sells cows for beef to make money.

A map key may have symbols for factories, farms, oil, or minerals. On this map the brown pods are a symbol for soybeans, and the reddish bars are a symbol for a metal called copper. Can you spot the tiny sugar cube? This country sells sugar! Which country do you think sells planes? Let's pretend to fly to that country!



Activity Cont.

This last map is one that you may have seen your parents use on their phones or in the car. It is called a *road map*. This map shows the different roads, highways, or railways in an area and helps us find our way from one place to another. These maps can also show street names, parks, buildings, and locations as small as a city or as big as a whole country!

Maps are like special pictures that help us explore places and know where to go. In the same way, did you know that following and trusting Christ acts as a map for our lives, showing us how to act and allowing us to experience God's goodness? Proverbs 3:5-6 says, "Trust in the LORD with all thine heart; and lean not unto thine own understanding. In all thy ways acknowledge him, and he shall direct thy paths." Now that you are a map expert, you can make maps of your own to show someone all about where you live!

Discussion

- * Q: What information is on a road map?
- * A: Answers will vary but may include street names, specific buildings, or parks.
-
- * Q: Name one way maps are useful.
- * A: Answers will vary but may include showing where countries and their capitals are, the usual kind of weather in an area, what products different places make and sell, and the right roads to get from one place to another.
-
- * Q: What other kinds of maps can you think of?
- * A: Answers will vary but may include maps of stars, constellations, and space; maps of parks, playgrounds, and theme parks; maps of stores and shopping malls; treasure maps; or weather maps.

Supplies Needed

* world map or globe (optional)



THE CONTINENTS

OPENING



Show the child a world map (on paper or online) or globe.

Read to the child: Do you notice the really big areas of land on this map? These are called *continents*. **Point out the seven continents to the child, and let him or her tell you anything he or she notices about their size or shape.** On globes and maps, we divide the earth into north, south, east, and west. Everything above the center, or the equator, is north, while everything below is south. An imaginary line called the Prime Meridian divides east from west. **Point out the equator and Prime Meridian.**

Read to the child: Continents are what we call the big areas of land on our planet. God created each continent with different types of plants and animals, weather, mountains and lakes, and people. Our country is (*say your country's name*), and it is on the continent of (*say your continent*). Let's get ready to meet Olivia; she is going to tell us more about each of the continents.



Audio Narration

Remove the Lesson 29 pawn from the perforated pages at the end of the unit. Have the child put the pawn on illustration I on the next page. Begin the audio narration "The Continents." When you hear a chime, have the child move the pawn to the next number by following the arrow. Turn the page when you hear the fourth chime to continue the narration. Afterward, have the child answer the discussion questions.









9

Discussion

- * Q: Which continent has the most people and the most land?
- * A: Asia
-
- * Q: What is one continent on which penguins can be found?
- * A: Antarctica
-
- * Q: Which continent would you most like to visit? Why?
- * A: Answers will vary.

Optional Activity

Memorize the names of the continents!

(Sing to the tune of "Row, Row, Row Your Boat")

Say, say, say the names

Of the Continents.

Let's begin with Aus-tral-ia;

Then we'll say the rest.

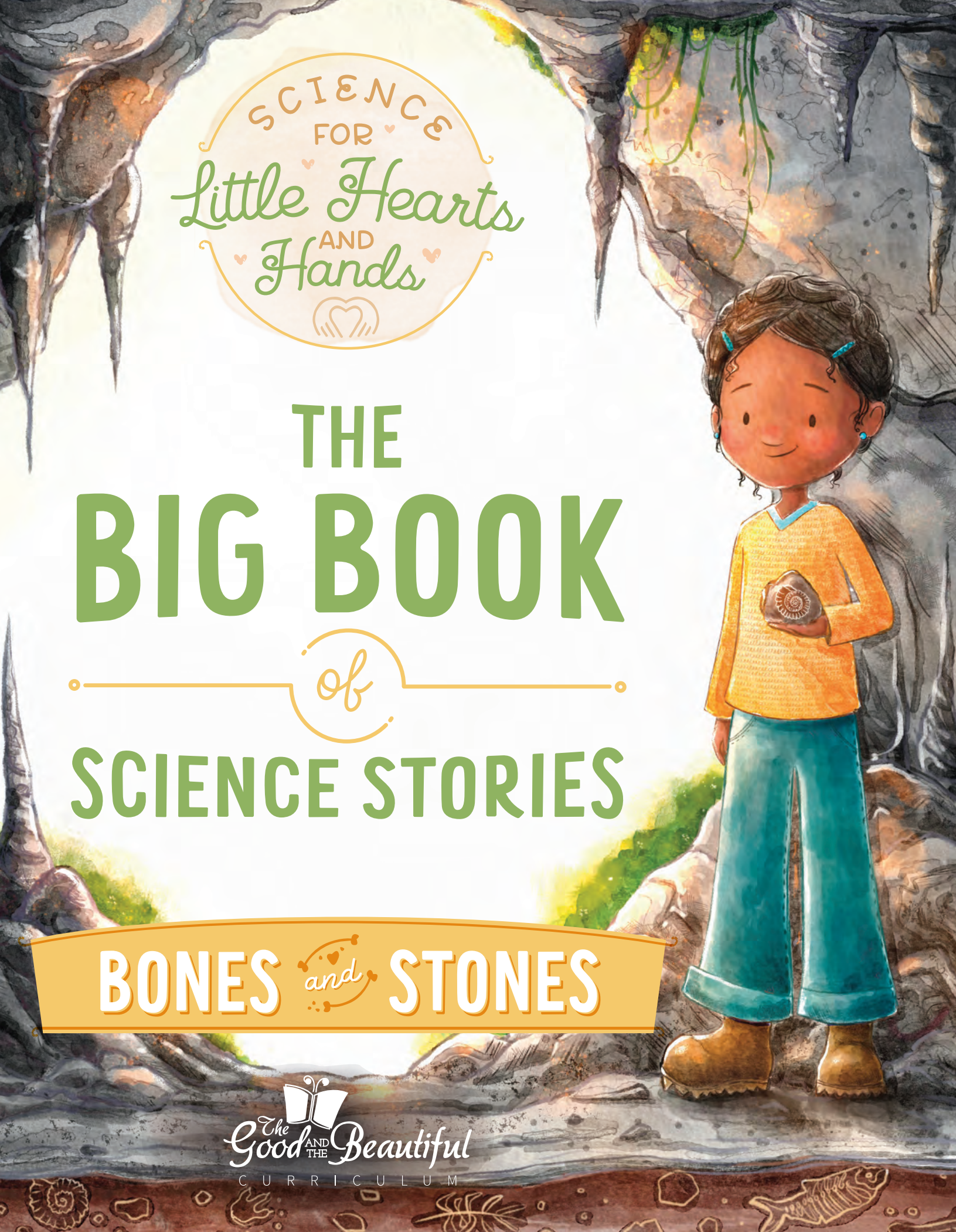
North A-mer-i-ca,

South A-mer-i-ca,

Asia, Europe, Af-ri-ca,

Then Ant-arc-ti-ca!

SCIENCE
FOR
Little Hearts
AND
Hands

A watercolor illustration of a young girl with brown hair and blue hair ties, wearing an orange sweater and teal pants, standing in a cave. She is holding a fossil in her right hand. The cave has stalactites and a bright opening in the background. The ground is covered with various fossils like shells and fish bones.

THE BIG BOOK of SCIENCE STORIES

BONES *and* STONES



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The Missing Piece

Illustrated by Vanessa Toye





Waves lapped at the sandy beach as the hot summer sun beat down. Trina and her younger sisters, Tabby and Veda, sat in shallow water, scooping up handfuls of sand and letting the water wash the tiny grains away again.

“Girls!” Grandpa called. “Come get some melon!” Trina’s mouth watered. She was so hungry. The girls jumped up and ran to the picnic table, where their grandpa handed them each a slice of juicy watermelon. They ate the sweet fruit, wiping juice from their mouths after every bite.



When Trina was finished, she jumped from the table, ready to head back to the water. As she landed, one of her feet bumped into something poking out of the sand. Trina brushed the sand away with her fingers.

“Grandpa!” she cried. “Tabby! Veda! Come look at this!”



“Well, I never . . .” Grandpa’s voice trailed off.

“What?” the girls asked together.

“That looks like a fossil!” he exclaimed.

“Wait—a *real* fossil?” Trina asked, amazed.



A few weeks later, Trina, Tabby, and Veda sat on Grandpa's back porch, sipping lemonade. Grandpa's footsteps sounded at the back door.

"Girls," he said, grabbing their attention. "I have a surprise for you."

"What is it?" Trina asked, jumping up.

"What are we doing?" Veda and Tabby inquired at the same time.

"Grab your shoes and get in the jeep. We've got somewhere to go!" Grandpa instructed. The girls squealed and ran to the jeep.

Fifteen minutes later, Grandpa pulled the jeep into the parking lot of the local museum. “This way,” Grandpa directed them, leading them into the building and down a long hallway. They soon entered a room with a large mammoth statue. Paintings of ancient animals covered the walls.



Also on display in the center of the room was a large skeleton of what looked like some kind of horse. Mr. Dom was waiting in the room, and he waved and motioned for them to come over to the display.

“Thanks for coming!” he told the group. “I wanted to show you this.” He pointed to the display. “These are the fossils of a horse that lived many years ago. We’ve been putting together this display for a long time, and we were missing a few of the fossils. Can you guess what you found?”



“One of the missing pieces?” Trina guessed excitedly.

“Correct!” Mr. Dom answered. “You found the missing fossil, and we wanted to thank you.”



Reaching into his pocket, he pulled out a string of deep yellow-orange beads. “This is an amber necklace,” he said, handing the necklace to Trina. She took it in her hands and felt the smooth beads. “Amber is actually a type of fossil,” he explained. “Some trees keep out germs and bugs by making gooey stuff called resin. When resin hardens over time, it turns into amber.” He went on, “When people discovered amber, some thought it was so beautiful they decided to make jewelry with it.”



Trina pulled the necklace around her neck and clasped it safely on. Tabby and Veda leaned over to look at Trina’s special gift. “You’re wearing a fossil!” Veda exclaimed, and the girls giggled.

“Thank you, Mr. Dom,” Trina told him.

“Thank you,” he replied.

FUN FACTS ABOUT



FOSSILS



If you ever find what might be a fossil, leave it there, record the exact location, and report it to a local organization that deals with fossils. They will let you know whether or not you can keep it!

The process by which a bone or other material becomes a fossil is called fossilization.

Some fossils are so tiny that we can't even see them! They can only be seen through a scientific tool called a microscope.



MICROSCOPE

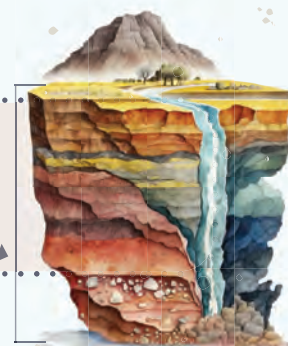
Fossils have been found on every continent on Earth!



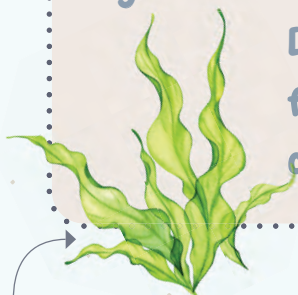
Many of the earth's fossils have been formed underwater. Moving water can quickly cover dead plants or creatures with mud, which turns them into fossils over time.

Most fossils are found in a "soft" type of rock called sedimentary rock.

SEDIMENTARY ROCK



One type of fossil can help keep bugs from eating your garden! A powdery substance called diatomaceous [die-uh-tuh-MQ-shus] earth is made up of fossilized algae and, when sprinkled on plants, can help keep bugs under control.



ALGAE

Ancient Aquarium

Illustrated by Olga Baumert





It was a rainy Friday afternoon. Nia sat in a big chair by the large window in the family room, watching the rain fall from the dull gray sky. She turned to her older brother, who was sitting on the couch looking at the fish swim round and round in their tank. With a sigh, she said, "I wish it wasn't raining. I really wanted to play catch with you today, Riku."

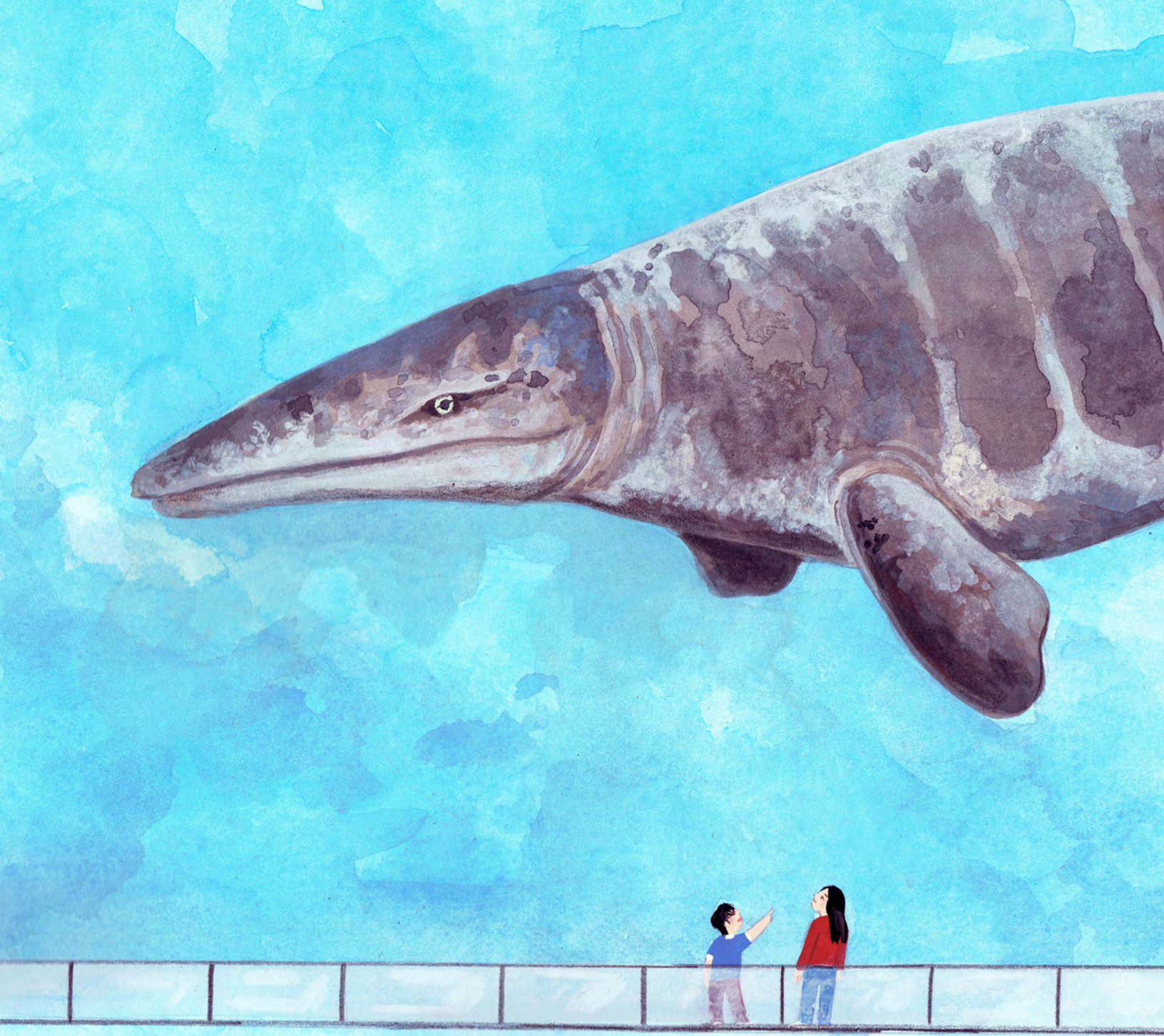


Riku replied, “Me too, but I’m sure we can think of something fun to do inside.”

“I won!” Sora squealed from her place on the soft rug, where she and her twin brother had just finished a board game. “Good game, Koda,” she said to him.

Suddenly, Koda looked up and shared an idea with his three siblings. “I know! Let’s imagine we’re at an aquarium.”





Koda suggested they move on to the next exhibit, where they saw a fierce *Tylosaurus* [tie-luh-SOR-us] paddling his four flippers through the water with his long tail waving out behind him.

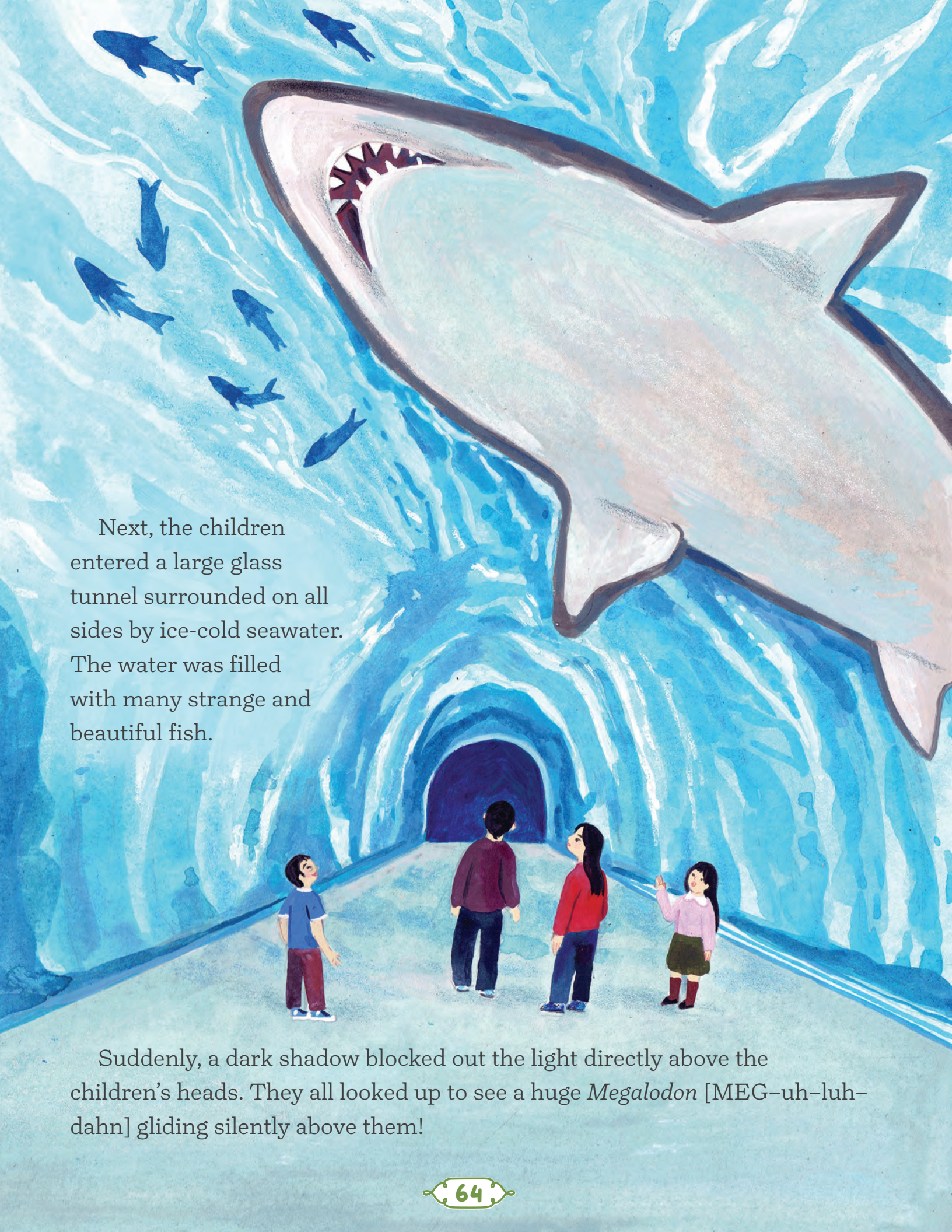
“That’s a big scary mouth,” Koda said, backing away.

Riku nodded. “The *Tylosaurus* is just about the deadliest hunter in the ancient ocean. He can swallow birds, sharks, and dinosaurs without chewing!”



With a splash, followed by oodles of bubbles that rose to the surface, a giant sloth dove deep down to eat the green plants at the bottom.

“Long ago, the place where the giant sloth lived would have been a desert. He would’ve spent a lot of time in the cool water,” Riku recalled.

A vibrant illustration of a glass-bottomed shark tunnel. The tunnel is arched, with blue and white water visible through the glass walls. Several small blue fish are swimming in the water. A large, pinkish-grey shark with a wide, open mouth showing sharp teeth is positioned above the children. Four children are standing on a light blue floor inside the tunnel, looking up at the shark. The child on the far left is a boy in a blue shirt and red pants. The child next to him is a boy in a dark red shirt and dark pants. The child next to him is a girl in a red shirt and dark pants. The child on the far right is a girl in a pink shirt and dark skirt, pointing upwards.

Next, the children entered a large glass tunnel surrounded on all sides by ice-cold seawater. The water was filled with many strange and beautiful fish.

Suddenly, a dark shadow blocked out the light directly above the children's heads. They all looked up to see a huge *Megalodon* [MEG-uh-luh-dahn] gliding silently above them!

“The *Megalodon* is the largest shark ever known to live,” Riku said with awe in his voice. “It was far bigger than the whale shark, which is the largest shark that lives today.”

Sora piped up, “And this one looks hungry! What does it eat?”

“With those giant teeth, Meg can eat anything she wants,” said Nia, staring at teeth that were about the length of a new pencil.

“I agree, Nia!” Riku said with a chuckle. “But the *Megalodon* actually ate other large animals, such as dolphins, sea lions, and sea turtles.”

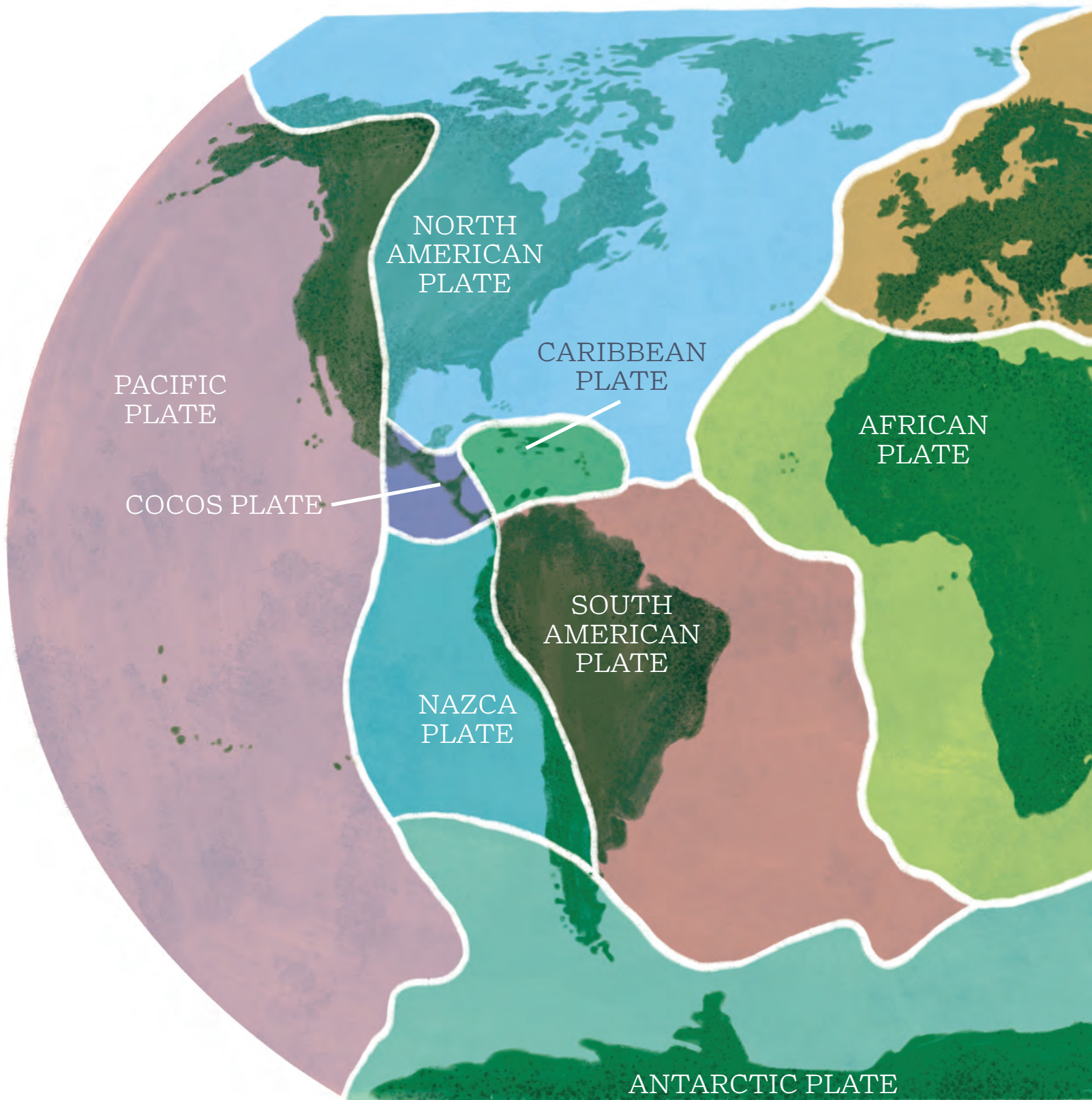


When
the Earth
"SHAKES"

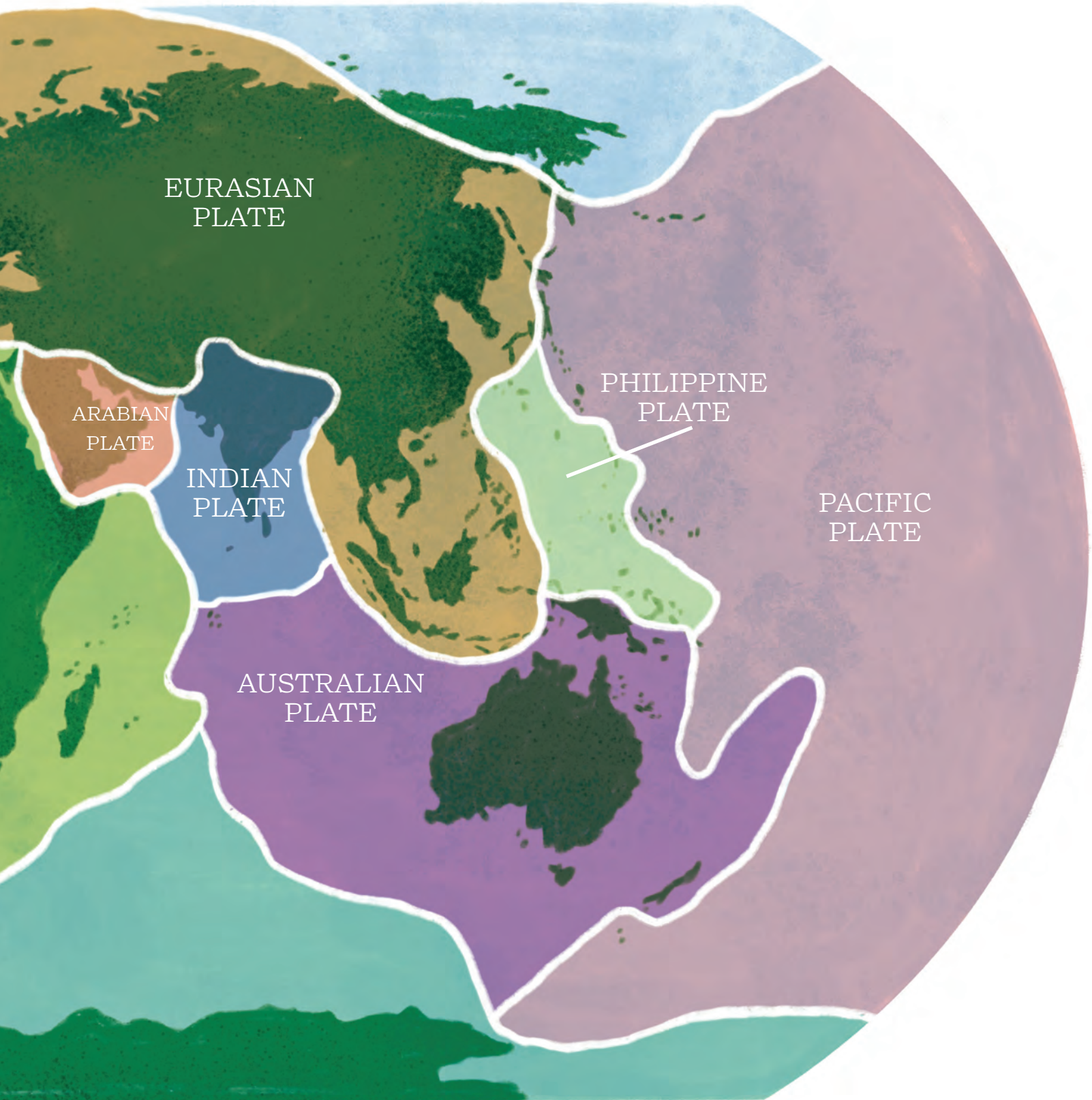
Illustrated by Natalia Grebtsova



Deep down in the earth, there are many big chunks of rock—chunks bigger than a whole country! These big chunks are called *tectonic plates*, but they aren't like your dinner plates.



These plates are very thick and carry all of our cities, rivers, mountains, and countries on top of them. They make up the outer layer of the earth, also known as the *crust*, and fit together like puzzle pieces.



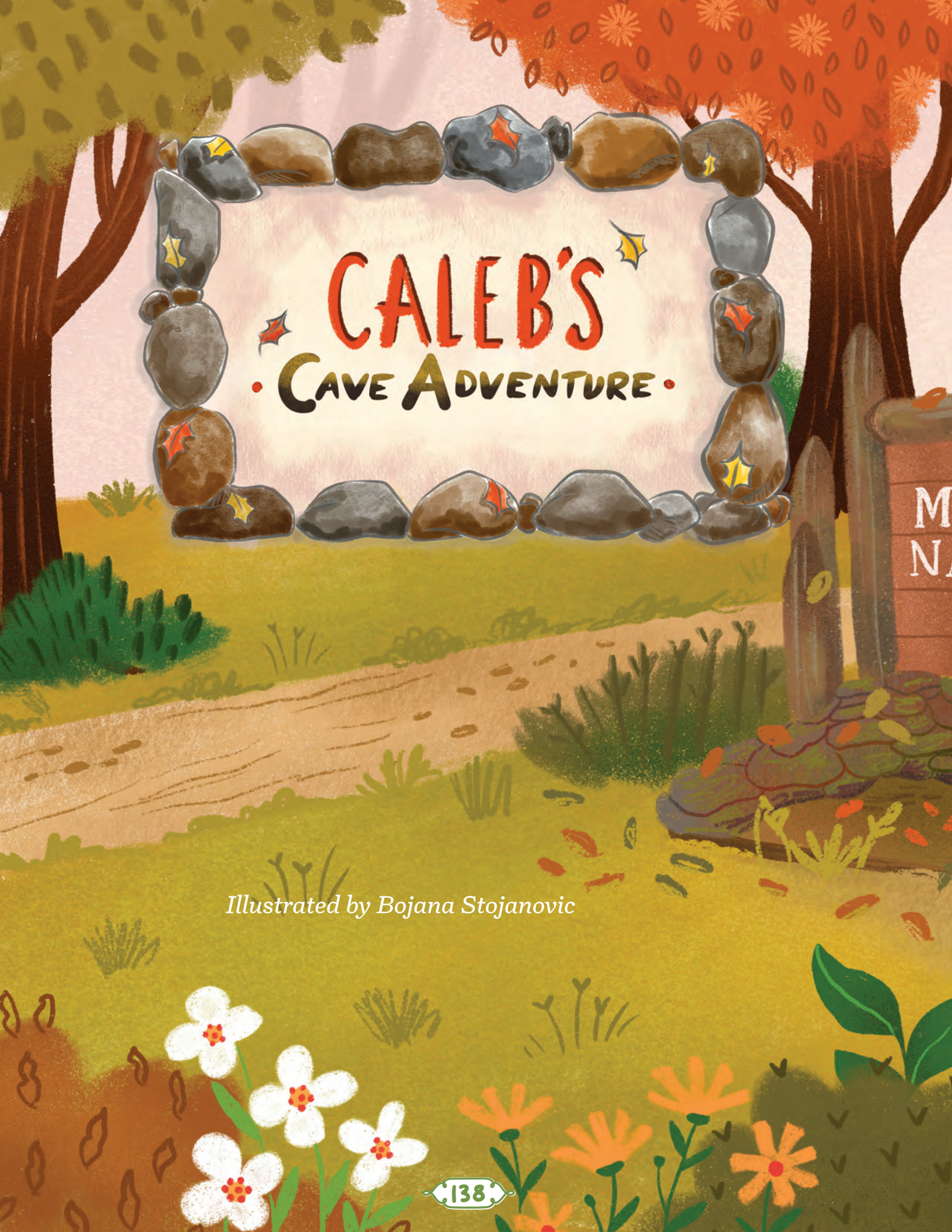
If you were to look beneath the earth's crust, you would see a layer much thicker than the crust, called the *mantle*. This layer is made up of hot, partly melted rock. The crust floats on top of the mantle, giving tectonic plates the ability to move.



Imagine a boat sitting on the water. Since there is liquid beneath the boat, it can't hold totally still—even when the wind or a motor isn't taking it anywhere.



Just like a boat on the water, tectonic plates are moving all the time, but the movement is small and slow enough that we usually don't even feel it.



CALEB'S

CAVE ADVENTURE.

Illustrated by Bojana Stojanovic



AMMOTH CAVE
ATIONAL PARK

A World Heritage
and International Biosphere



The leaves were turning red and orange as Caleb walked with his family down the path that led to Mammoth Cave. Glancing ahead, Caleb could see the entrance to the cave. “Water!” shouted Caleb’s little sister, Bella.

Trickling from the top of the cave down into the entrance was a waterfall surrounded by dark green ferns. The gentle breeze carried misty beads of water toward Caleb, who sighed with delight. The weather was warm and muggy, so he wasn’t quite sure why he needed to bring a jacket.



As they went through the cave opening made of gray limestone rock, Caleb felt the temperature drop—it was no longer warm like it had been when he had walked down the colorful autumn path just a few minutes ago. With a 40-degree drop in temperature and a windy breeze blowing through the entrance of the cave, Caleb was suddenly grateful he had brought his jacket. Caleb and his sister held on to the railing as they took the 68 stairs down into the cave.

At the bottom of the stairs, a tour guide was waiting for them. Everyone introduced themselves, and then he said, “Welcome to Mammoth Cave! I am Ranger Dave, and I am excited to have you join me today to experience the wonders that can only be found in the dark depths of our rocky earth. We are blessed to have the gift of electricity as we enjoy our tour today. When Native Americans and early settlers found this cave, they didn’t have light switches or strong flashlights.”



The lights went out, and Bella gave a surprised squeal. Caleb tried to adjust his eyes to the darkness, but everything around him was completely black. “Without light from a fire or electricity, this is what your tour would feel like today,” continued Ranger Dave.



“Down here, the light from the sun cannot reach us, so no plants and only a few animals can survive in this darkness. Luckily, with the help of some light . . .” continued Ranger Dave as the lights suddenly switched back on, “you will be able to discover ‘deep’ beauty today. Be sure to pay attention to any sounds you hear.”

Caleb’s family walked along the railed pathway until they came to the end of a narrow corridor.



Pete's ROCK Collection

Illustrated by Shannon Vogus



Pete picked up a dark rock covered in holes. As he turned it in the palm of his hand, he noticed how rough it felt against his skin.



“Pete, are you about ready to go?” he heard his dad call.

“Yes, Dad,” responded Pete as he carefully put the dark rock into his shirt pocket, closed the lid of his rock box, grabbed his notebook, and hurried to meet his father.

Today, Pete had the special opportunity to join Dad on a work assignment. Pete's dad was a geologist; he studied the rocks that formed the Hawaiian Islands.



After buckling his seatbelt, Pete pulled the rock back out of his pocket. “Dad, are these the rocks we are trying to find today?” he asked.

“No, today we will be looking for something a little different,” responded Dad. “I’ll tell you about it when we get to the beach.”

“While we drive, could you tell me the story of this rock again? It’s my favorite story!”

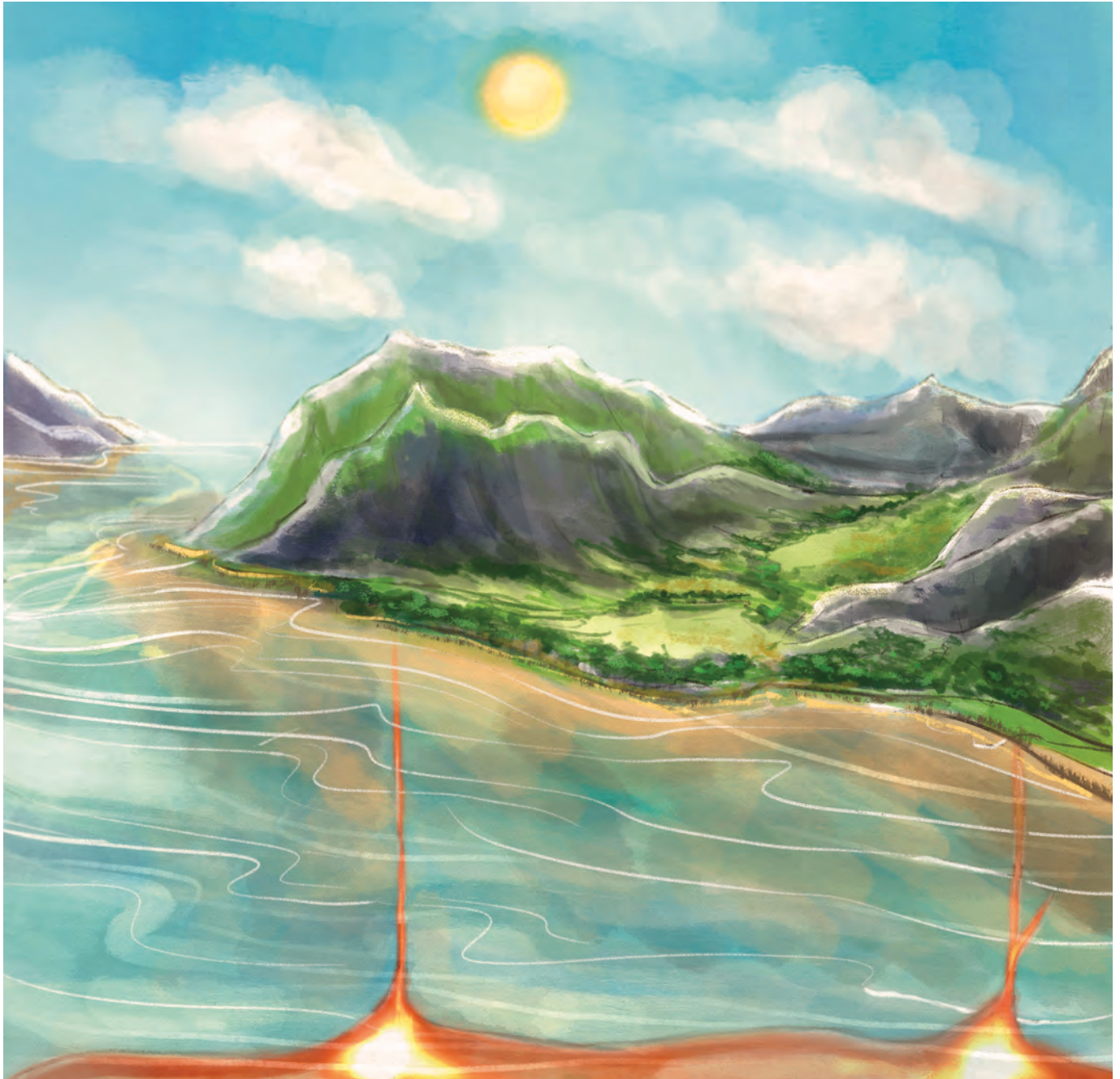
“Yes,” chuckled Dad. “We should have just enough time.”

Pete closed his eyes and tried to picture what his father described. “Deep down beneath the hard ocean floor is a rock that is so hot it flows like honey,” started Dad. “This liquid rock flows into cracks that are found in the hard outer layer of the earth.



“One day there was so much of this hot liquid rock trying to push into the cracks that it broke through the ocean floor! The melted rock cooled and created a small mountain at the bottom of the sea. More liquid rock pushed up through the new mountain, and it continued to burst up from below and cool again and again.

“Each time this tiny underwater volcano erupted, more layers cooled on top of it, and the little mountain grew until it wasn’t very little anymore. In fact, it grew so big that it became taller than the surface of the ocean. It’s now our beautiful island of Hawaii,” finished Dad.



“So, that’s how lava rock is born?” asked Pete.

Dad smiled. “Yes, and these types of rocks are called *igneous* rocks. However, rocks aren’t really born, and they never die; they just change.”

Polar to Tropic

EXPLORING CLIMATE
- ZONES -





Illustrated by Shannon Vogus

Carter squirmed in his seat in the car. Only a few more minutes and they would be there. His excitement for this long-awaited field trip was bubbling up inside of him and coming out in sporadic wiggles. His older sister Zion took one look at him and giggled. “Mom, I’m not sure Carter is going to make it to the zoo. He looks like he might fall out of his seat at any moment,” she said with a kind smile.

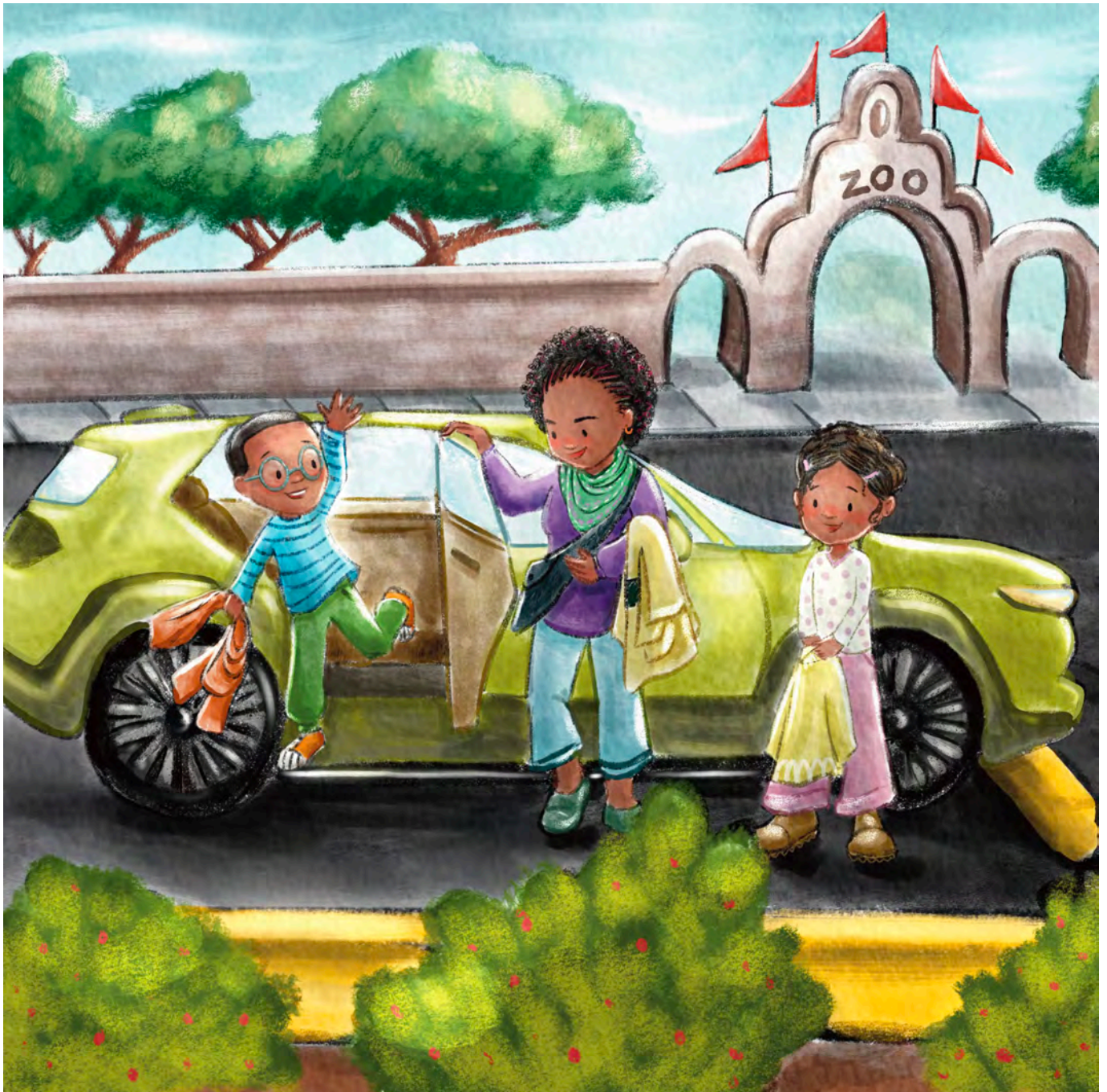


“I’m sure he can wait two more minutes. I can see the zoo parking lot now,” Mom replied, shooting a quick glance back at the bobbling Carter.

“I know. I know. I’m too excited to sit still! But will we really get to experience all three climate zones? I’ve loved learning about them at home, and I just want to see them come to life! Let’s go!” Carter trilled.

“Yes, Carter,” began Mom. “That’s why we are going to the zoo today. I love letting you see science come to life, too.”

Mom parked the car and unlocked the doors, and Carter sprang out of his seat, ready for adventure.



The family hurried through the ticket lines and into the zoo. They could just see the first building; it had a big sign above it that said “Into the Cold.” Mom had picked this zoo specifically because it had a set of buildings to teach about each climate zone so the kids could learn about them in an active way.



“Anyone have any guesses which climate zone this building will be about?” Mom asked the kids.

“Polar!” they chimed together. Carter continued, “There are two polar zones—one at the North Pole and one at the South Pole. The sun doesn’t shine straight at these areas of the earth, so the temperature is below freezing most of the time there.”



As they walked into the building, the summer warmth faded away, and a blast of cold air whooshed over them. They all shivered and put their sweatshirts on.

Inside, walls were painted white to look like the snowdrifts of one of the coldest places in the polar zone—the Arctic. Carter scurried over to the glass enclosure of an arctic hare, while Zion turned to admire a beautiful snowy owl.

“What else do you two remember about this zone?” Mom asked as she watched them delightedly.



“In the polar zone, the winters are long, and the summers wouldn’t even feel like summer to us,” Zion recited. “Plants don’t grow as well there, but there are lots of amazing animals, such as polar bears and this fluffy white snowy owl.” Just as she finished explaining, the owl she was watching took off from its perch with a great flapping of its wings and flew across the enclosure.



“Yes! And I love that most of the animals there are white so they can blend in with the snow! Check out this cool hare!” Carter squealed, jumping up and down in time with the hare. Zion and Mom laughed.

Carter continued, “I love that when He made them, God thought of every detail these

animals would need to survive—even their fur color!”

After watching the hare hop around its enclosure, the family explored more of the building. They were able to see . . .



an arctic fox,



lemmings,



penguins,



seals,

and a small flock of snow geese.



As they left the building, they crossed over a small bridge that led to the next building with a sign saying “Into the Forest” above the entrance.

Carter held the door for his mom as they walked inside. “What a gentleman, Carter. Thank you!” Mom exclaimed, then asked both kids, “What zones come next on our planet? They’re the ones that are not too hot and not too cold.”



Zion took a look around, noticing the beautiful forest-themed paintings on the walls. She noticed that the air temperature felt warmer, similar to the way it felt outside today. “Oh, I know! You’re talking about the temperate zones, where we live!” She pulled the sleeves up on her sweatshirt.

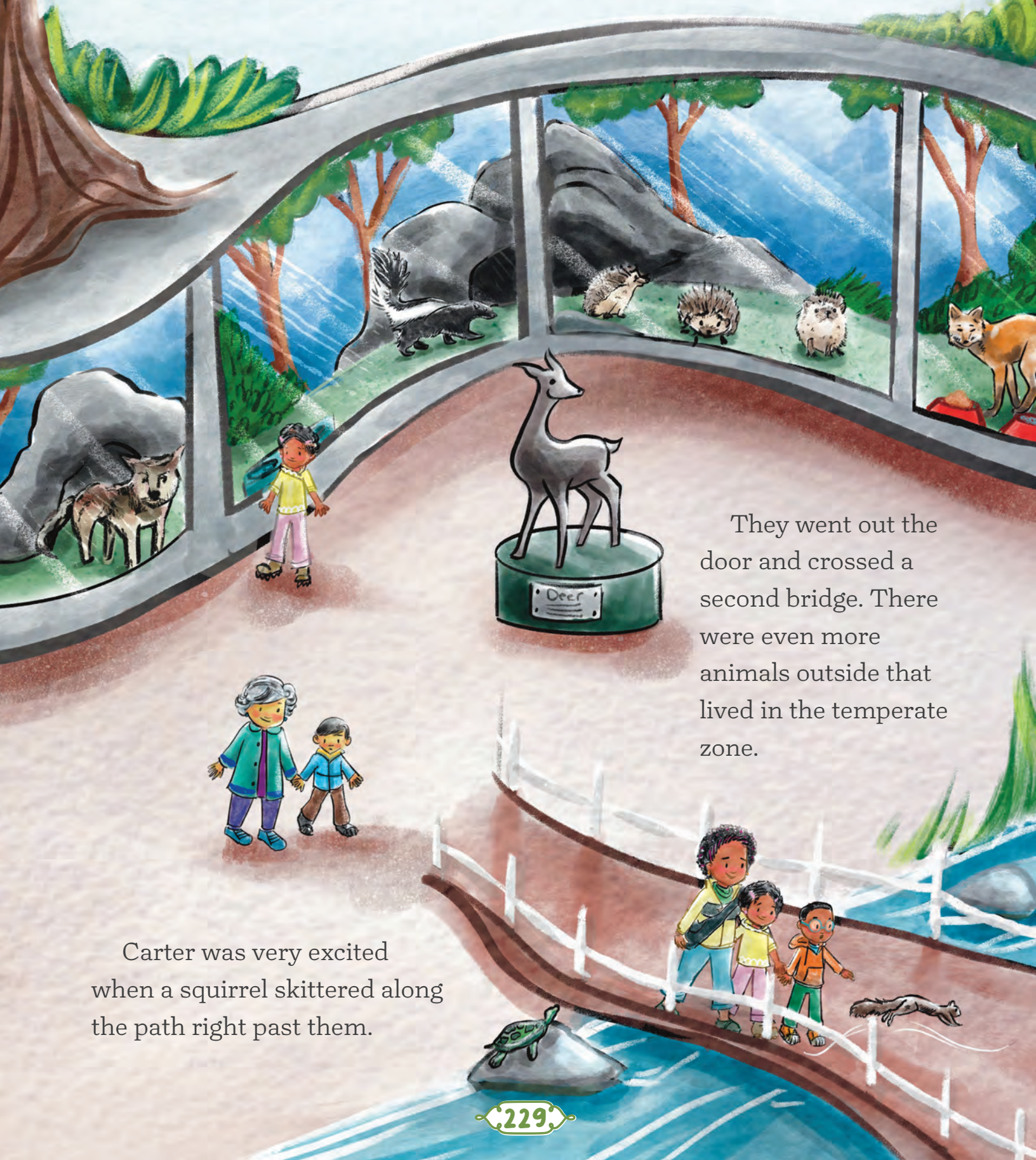
“Good job, Zion!” Carter gave her a thumbs-up. “The sun shines more directly on these zones because they’re closer to the middle part of the earth that sticks out the most. My favorite thing about living in the temperate zone is having four different seasons every year: winter, spring, summer, and fall,” Carter remarked.



“I’m glad you two remember all that,” Mom praised. “Most of the people on the planet live in temperate zones, and many kinds of plants and animals can live in these zones because the temperatures don’t get extremely high or low. Oh, wow! Check out that raccoon!” Mom quickly pointed to a raccoon just as it jumped into its water bowl and splashed drops everywhere.



The temperate zone building was larger than the first building, and they visited all kinds of animals, such as deer, foxes, wolves, hedgehogs, skunks, turtles, and even a majestic-looking moose.



They went out the door and crossed a second bridge. There were even more animals outside that lived in the temperate zone.

Carter was very excited when a squirrel skittered along the path right past them.

The last building was called “Into the Rainforest.” As they went in, the air became warm and heavy, like a blanket wrapping around them. The walls were mostly hidden behind leaves and vines from the plants growing everywhere. Before Mom could ask the kids what zone this could represent, Zion asked, pulling her sweatshirt over her head, “Isn’t this the tropic zone?” She was already starting to sweat!



Fanning herself, Mom took off her sweatshirt too. “That’s right, Zion. Why do you think the zoo made it so hot in here, Carter?” Mom asked as they followed Carter over to a huge tank with a giant anaconda.

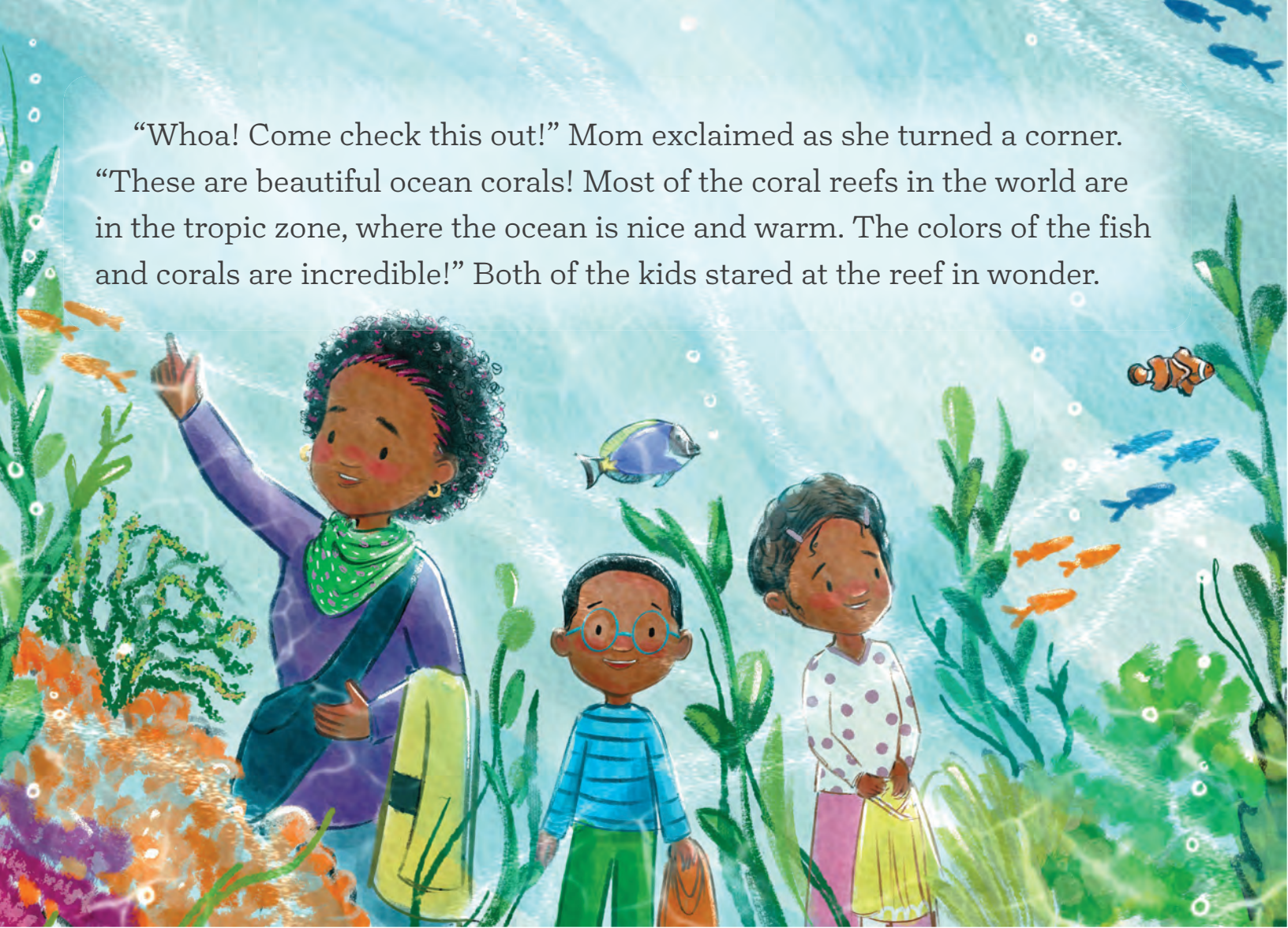
“Because the tropic zone is right at the equator—the part of the earth that gets the most sunlight. This zone has forests where it rains a lot. Get it? Rain. Forest. Rainforest,” Carter answered, grinning. “Can you help me take my sweatshirt off?” he said as they walked. It wasn’t raining, but the hot air felt wet anyway.



“Of course, buddy,” Zion said as she helped Carter remove his sweatshirt. “I remember learning that it rains a lot in the tropic zone, and it doesn’t get very cold. And that the amazing tropical fruits, such as bananas, pineapples, and mangoes that I love to eat, come from this climate zone.” She rubbed her stomach, thinking of lunch.



“Whoa! Come check this out!” Mom exclaimed as she turned a corner. “These are beautiful ocean corals! Most of the coral reefs in the world are in the tropic zone, where the ocean is nice and warm. The colors of the fish and corals are incredible!” Both of the kids stared at the reef in wonder.



They couldn't stay too long, though, because they wanted to check out the animals that live in the tropic zone—monkeys, jaguars, toucans, poison dart frogs, anteaters, and sloths.



Near the exit of the building was a colorful model of the earth—a globe. It was taller than Mom and showed where all the climate zones were. A small plaque next to it explained about each zone and said that they could be broken down into even more specific climate zones with longer names, such as tropical rainforest, desert, temperate oceanic, and polar tundra.



Looking at the globe, Zion realized how much more there was to learn about climate zones! She turned to Mom, ready with questions. This trip had been perfect. She and her brother had experienced what it might be like to be in each of the planet's major climate zones. Zion hoped they would go visit them all one day.

FUN FACTS ABOUT



ZONES OF THE WORLD

Birds can be found in most zones of the world, but some birds that live in temperate zones take a "vacation" during the colder months of the year. These birds will travel to warmer areas, such as near the tropic zones, to be able to find food.

Many well-loved foods, such as chocolate, sugar, and coffee, grow in tropic zones.



COCOA BEANS

There are over 200 species of monkeys, and they live in tropical forests in Asia, Africa, and the Americas.

Fungi, such as mushrooms, are an important part of life in the forests of temperate zones. One such mushroom is called the giant puffball mushroom. As its name suggests, this large white mushroom is shaped like a sphere and can be as small as a golf ball or even bigger than a soccer ball!

Polar bears live in polar climates and have fur that appears white for camouflage in their snowy environment. Surprise! The skin underneath their warm coat of fur is actually black!



Ever wonder where the temperate zone gets its name? It makes perfect sense because the word temperate actually means "mild" or "pleasant!"

Rainforests usually make us think of tropic zones, but a temperate rainforest is a special type of rainforest with mild climates and temperatures that are found in temperate zones.

The snowy owl has tiny rough hairs, called **bristles**, around its hooked beak that help it feel when it is close to something. This same beak helps it catch and grip its food, which it can swallow in one gulp!

