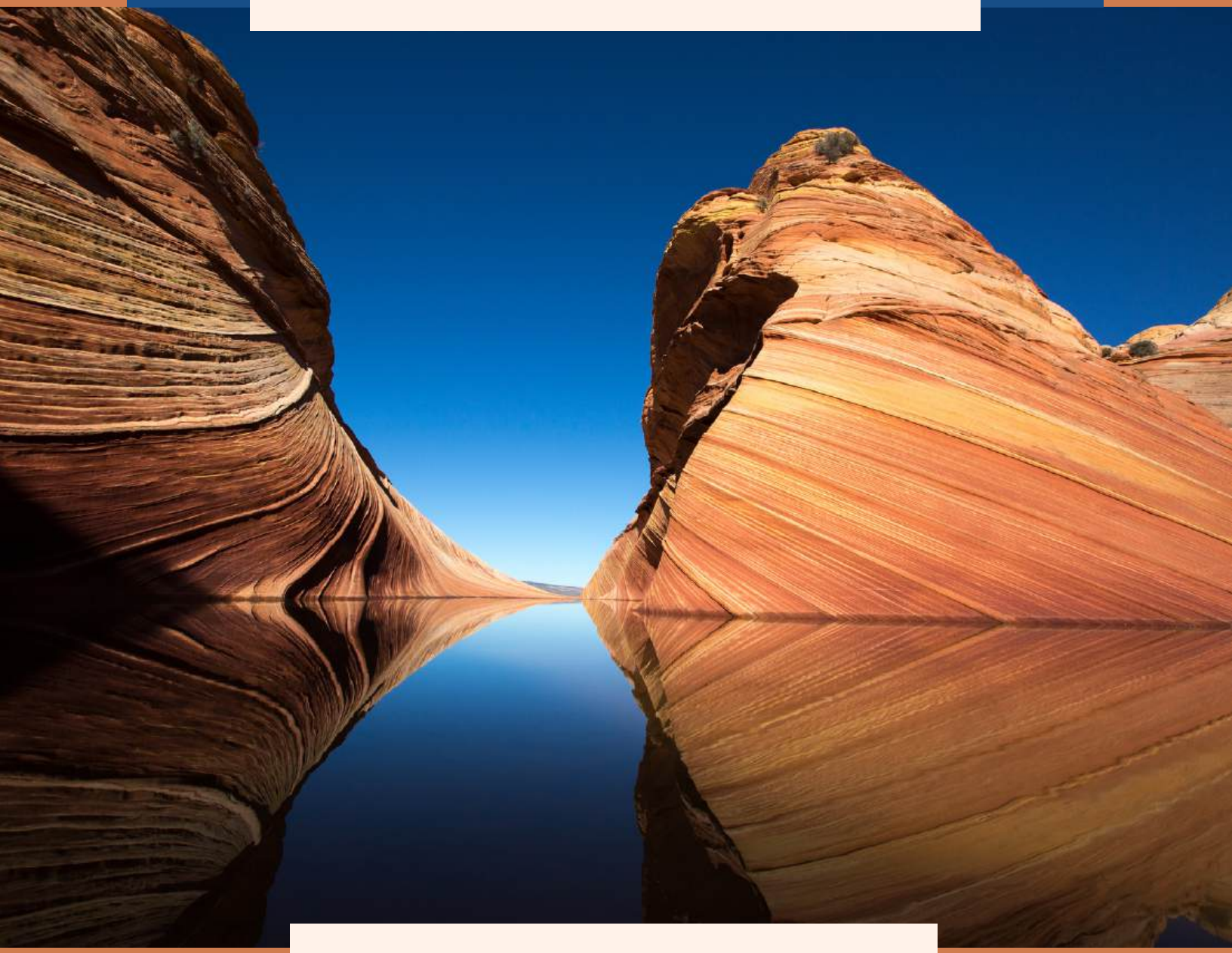
BLOSSOM & ROOT

ELEMENTARY SCIENCE // LEVEL 1 // SECOND EDITION

Wonders of the Earth & Sky

PARENT GUIDE



LEVEL 1

Exploring Geology, Weather, and Seasons

www.blossomandroot.com

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Blossom & Root

Elementary Science,
Level 1:

Wonders of the Earth & Sky

Second Edition

A Complete, Hands-On Secular Science Curriculum

Adaptable for Grades 1 - 5

Blossom & Root Elementary Science
Level 1: Wonders of the Earth and Sky

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Welcome to a Year of Wonder

A Relaxed, Hands-On, and Adventurous Approach to Science in the Early Grades

When I decided I wanted to homeschool my daughters, one of the most difficult tasks I faced was finding a science curriculum that suited our needs. We wanted a curriculum that was completely secular, hands-on, and full of opportunities to take our learning outside. We wanted books, and lots of them! We wanted permission to explore, dig deeper, and go off to explore rabbit trails from time to time. But we also wanted structure--just enough to build concepts upon one another in a linear way without the pressure of a rigid schedule. When it came to recording our discoveries, we wanted freedom from the worksheets, tests, and time-consuming lap books that seemed to dominate most of our options--something more akin to a scientist's field journal.
When I couldn't find this particular unicorn, I decided to do what I had done for my early years and kindergarten curriculum--I created it. Since I knew we couldn't be the only family looking for such a thing, I put my heart, soul, and complete focus into crafting a solution for those families, too. I created *Wonders of the Earth and Sky*, brought to you by Blossom and Root. It is designed to be flexible, adaptable, inspiring, and gentle. My fondest hope is that it will provide discovery, joy, and wonder for the families that use it. Thank you for your support of Blossom and Root. Please feel free to reach out to me at any time--I am always happy to help!

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Options for Scheduling This Curriculum:

Traditional Schedule:
Aim to complete one unit per week, in order, for a 36-week school year. If you do science once a week, this may mean reading one of the suggested books, completing one of the activity options, and ending with your child recording their experience in the student notebook. If you do science twice a week or more, you may wish to incorporate multiple books and video links, and more of the activities per unit.

Relaxed Schedule:
Begin at the beginning and spend as much or as little time in each unit (or "wonder," as we call them) as desired. You can even split this curriculum into two year's worth of science by doing half of it in the first year and half in the second. This will allow time for families that like to incorporate lots of field trips without added pressure to complete the entire curriculum in one school year.

Scheduling for Seasonal Relevance:
If you'd like to complete each of the seasonal units (Wonders 33 - 36) during the season as it happens, you may wish to begin the year by completing "Wonder No. 32: The Reason Behind the Seasons" first, followed by the unit that corresponds with your current season. Once you complete that initial seasonal unit, move on to Wonder No. 1 and proceed through the curriculum as scheduled, pausing at the change of the seasons to spend a week (or more) completing each relevant seasonal unit. Then, resume with the curriculum as planned. This will allow you to explore the seasons as they happen (for temperate climates.)

How to Plan Out Each Unit (the Simple Way):
A few weeks before you begin a unit, look over it and decide which books or video links you'd like to use and which projects you'd like to do. Highlight them in the parent guide here or write them into a separate planner. Refer to the recommended activities for specific supplies you'll need, depending on which activities you plan to do.

Important Note: An adult should lead the child through the activities in this curriculum. They are **not** designed for a child to do independently.

Make It Yours

How to Teach This Curriculum

This curriculum is designed to provide support and inspiration to the parent educator. Above all else, please make it *yours*!

Step One: Wonder
Each unit begins with an introduction to the wonder at hand--whether that is volcanoes, sedimentary rock, or thunderstorms. Together, you and your child will delve into the topic through engaging literature, videos, and guided conversations.

Step Two: Explore
The next step is to explore the topic through hands-on activities, projects, demonstrations, and experiments. Our curriculum is flexible, providing several options for each wonder so that you may tailor it to your budget, time available, personal preferences, and your child's learning style.

Step Three: Record
The final step is to allow your child to record their experiences. Once again, our curriculum allows for maximum flexibility. Children who are already eager, confident writers may use the student notebook to employ written narration. Others may wish to draw or color a picture of their experience, and their parent can dictate their oral narration. Still, others may prefer to tape or paste in photographs taken of their adventures and activities during that unit--the choice is yours!

Permission to Go Off the Grid
One of the greatest gifts of homeschooling is the ability to follow rabbit trails and delve deeper when inspiration calls. We fully encourage this, and promise that the curriculum will be here, waiting for you when you're ready to come back and move on to the next wonder!

Step One: Wonder

Setting the stage for discovery

"*Wisdom begins in wonder.*"
Socrates

The Main Goal
You will begin each unit (or "wonder" as we call them) by introducing the topic to your child through books, videos, and guided conversations. **The primary goal of this stage is simply to introduce the topic and inspire curiosity.**

Options for Step One
As with the rest of this curriculum, we focus on providing multiple options for you to choose from, unit by unit:

Category 1: For the Minimalists
If you're pressed for time, short on resources, or simply not as excited about a specific unit, stick with Category 1: For the Minimalists to introduce the topic. This category is designed to touch on the main points with as few resources and as little time as possible.

For each unit, choose from one or multiple categories to introduce the topic and inspire curiosity.

Category 2: For the Book Basket Folks
This category will provide a rich list of engaging literature to pick and choose from for your initial introduction. ***You absolutely do not need to provide all of these books every week.*** This list is meant to provide *options* for families that prefer a literature-based approach to learning.

Category 3: For the Visual Learners
Some children prefer a more visual model for receiving information, and some topics can be difficult to explain without a visual demonstration. Therefore we provide suggested video links, most of which are hosted on YouTube, to help introduce each topic. **Please screen them ahead of time to be sure they are in line with your family's values and developmental appropriateness for your child.**

Please note that a PDF with clickable links is included in your purchase. Use this guide to easily access video content from your computer, phone, or tablet during lessons. The link PDF is updated periodically to fix or replace broken links, usually once every November/December.

Step Two: Explore

The Main Goal
The next step for each unit is to explore the topic through hands-on activities, demonstrations, projects, and experiments. **The primary goal of this stage is to allow your child the opportunity to make discoveries about the topic at hand.**

Options for Step Two
As with the rest of this curriculum, we focus on providing multiple options for you to choose from, unit by unit:

Category 4: For the Outdoor Learners
This category was designed for families that prefer to do their learning outdoors. If you and your children love to explore, take field trips, and get your hands good and muddy, this is the category for you!

Category 5: For the Table-Lab Crowd
For families that love "table science," we have designed activities that can be done indoors using (mostly) common household objects. These activities and demonstrations can bring big ideas closer to home and provide hands-on fun for children of multiple ages.

Category 6: For the Crafts-and-Projects Families
Some families really love projects--hand-made exploration of a topic through art projects, crafts, and writing activities. For these families, we have provided suggested projects that are designed to be "on display."

Mix and Match to Choose Your Own Adventure!
Pick and choose from any of these categories to design a unit of science for your family. If you're short on time, one activity will do--you can even stick to the "minimalist" category in step one and call it a week. If you're loving a topic, you may wish to combine multiple categories for exploration and extend your learning for several weeks.

Choose your own adventure

For each unit, choose from one or multiple categories to provide rich and engaging opportunities for discovery.

Step Three: Record

Documenting the journey

The presentation of the topic belongs to you, the parent educator. What your child takes from that presentation belongs to them.

For each unit, have your child document their experiences using one of these options for the student notebook.

The Main Goal

The final step for each unit is to give your child a chance to document their experiences through the student notebook. **The primary goal of this stage is to allow your child to record whatever they are inspired to, concerning the topic you investigated together during the previous two steps.**

Options for the Student Notebook

As with the rest of this curriculum, we focus on providing multiple options for you to choose from, unit by unit:

1) Oral or Written Narration

For this option, your child will give a brief oral narration of what they have learned. You, the parent, may choose to take dictation of their words into the student notebook. They may wish to draw or color something before or after the oral narration in the student notebook. This can also be done in the form of casual conversations together. If your child is already confidently writing and enjoys doing it, they may wish to record their own written narration, with or without a drawing, in their student notebook.

2) Copywork

Choose one or more of the "big picture messages" to use as a copywork exercise, which your child may illustrate if they like.

3) Collage or Scrapbook

You may wish to treat the student notebook as a scrapbook instead, allowing your child to tape or glue photographs into it that you (or they) take during your activities together. They may wish to add brochures or postcards from field trips, make drawings or notes in the margins, or have you take dictation.

4) Guided Prompts

We include prewritten notebook prompts as an option for each wonder. If you need a little more structure than the open-ended options above, choose one or more of these prompts to guide your child's notebook entry. We often include a special prompt for older/advanced learners, many of which will require additional independent research.

Incorporating the Book Seeds

Optional Mini-Unit Studies

Your purchase of *Wonders of the Earth and Sky* includes six special edition Profiles in Science Book Seed issues that you may use at any time for deep dives, extra learning, or a short break from the usual routine.

What is a Book Seed?
Book seeds are mini-unit studies. They can be integrated into other Blossom and Root curricula or used independently at any time. They can be expanded into wider units, or you can pull a handful of activities from a single issue and lightly sprinkle them into a day, week, or month just for fun.

There are currently two different kinds of Book Seeds: seasonal issues and Profiles in Science issues. Your purchase of *Wonders of the Earth and Sky* comes with six special Profiles in Science issues. Profiles in Science issues include a variety of activities adaptable for ages 6 - 12 and are centered around the contributions of an individual or group of individuals.

When Do I Use the Book Seed Issues?
You can use them whenever you want! Many people like to save them to use during summer break or sprinkle them into the "winter slump" when you need to take a brief pause from the usual routine to shake things up a little. Others like to fold them into the science curricula to take deeper dives and add in extra learning. Some of the six issues you receive with this curriculum work well with particular units, while others can be done at any time. Here are some suggested placements for people who want to incorporate them into the science curriculum:

- The issue inspired by *Solving the Puzzle Under the Sea: Marie Tharp Maps the Ocean Floor* by Robert Burleigh fits beautifully with Wonders 3 and 4.
- The issue inspired by *Mary Anning and the Sea Dragon* by Jeannine Atkins is an excellent deep-dive option for Wonder 17.
- The issue inspired by *Young Water Protectors: A Story About Standing Rock* by Aslan Tudor works well with Wonder 22.*
- The issue inspired by *The Boy Who Harnessed the Wind* (picture book edition) by William Kamkwamba and Bryan Mealer fits well with Wonder 26.
- The remaining two issues don't relate directly to any particular Wonder and can be done at any time. They work well for "winter slump" and summer break options.

Additional Book Seed Issues
In addition to the six issues that come with *Wonders of the Earth and Sky*, we offer many seasonal issues that would work well with this curriculum. You will see these suggested from time to time in the curriculum, next to a little sprouting seed icon. Some of these issues are free, but most of them are available to purchase. You can find information and a listing of available issues here: https://www.blossomandroot.com/book-seeds

*Disclosure Statement: Kelly Tudor has worked as a consultant with Blossom and Root on another project (A River of Voices Vol. 1 and Vol. 2).

Review and Recall

What About Quizzes and Tests?

Blossom and Root is a Waldorf and Charlotte Mason-inspired program. While we do not strictly follow either philosophy, we are very much influenced by both of them. Most of our recommendations for review and assessment come from these influences. That being said, please feel free to adapt this curriculum to suit the individual needs of your family.

Narration
Narration is such a powerful practice when done regularly and effectively. It can be used frequently to review and assess retention, and it's an excellent method for testing at the end of a term or at the end of the year. Use the "big picture" message from each unit and/or the notebook prompts to help guide narrations as needed. For more information on narration, we highly recommend *Know and Tell: The Art of Narration* by Karen Glass. Hands-on learners can be asked to narrate a concept using props you provide for them.

Gameshow Review
For a fun approach to review and assessment, a gameshow-style review is the way to go. Work together with your child to create a board with clues or questions on it. Bringing your child in to help write the clues or questions is a fantastic way to review material before "testing" with the game itself. You could also create an online game using Google Slides, PowerPoint, or one of the many Jeopardy template apps and websites available. Use the "big picture" messages and notebook prompts from each wonder to help you create your clues and questions.

Let Them Write the Test
Another excellent review strategy is to allow your child to write a test that they would present to a class if they were the teacher. Allow them to use a variety of testing techniques (multiple choice, fill-in-the-blank, true and false, short answer, etc.) Make sure they also write an answer key.

Teach What You've Learned
Teaching someone else what you have learned is a wonderful way to review and assess understanding. If your child is up for the challenge, help them to create an in-person presentation on a favorite topic from the term or the year that they might give to another group of learners. You can reach out to local preschools, library programs, youth centers, or your homeschool meetup groups/co-ops to find a good platform for their workshop/presentation. They can also film a presentation and share it with friends and family.

In addition to these strategies, you're welcome to create your own quizzes or tests if traditional review and assessment methods are a better fit for you and your family. There are many online platforms that make it easy to prepare tailor-made quizzes. Use the "big picture" messages and notebook prompts from each wonder to help you along the way.

"*Curiosity is the wick in the candle of learning.*"
William Arthur Ward

It's All About the Journey, NOT the Map!

As you move through the following "wonders," you will naturally come across forks in the road where your child wants to stop and dig deeper or follow a rabbit trail that springs up. These side-trails can provide some of the richest learning opportunities there are--curiosity-driven, interest-led investigations--so don't ignore them if you can help it.

Many of us feel nervous about "veering off the path" of a curriculum. The thought of learning gaps and self-imposed deadlines can keep us awake at night. We are here to assure you that it is 100 percent a-okay to follow your child's curiosity. This curriculum will be here when you are ready to come back and continue on.

It is also 100 percent a-okay to hurry through a topic that is not very interesting to you, or skip it entirely. We want this curriculum to be yours, so take the liberty to mold it the way you want it, and be sure to indulge in those rabbit trails! *(We love them so much that we even flag you down in places where side voyages may feel natural! If you see the rabbit icon, it means there's an opportunity for a possible rabbit trail.)*

Follow those rabbit trails

Bringing Big Ideas Closer to Home

Where Nature Study Fits Into This Curriculum

> "*We all have the need to be trained to see, and to have our eyes opened before we can take in the joy that is meant for us in this beautiful life.*"
>
> Charlotte Mason

Why a Coordinating Nature Study?

With the exception of a stand-alone purchase of Nature Study: *Wonders of the Earth and Sky*, our science and nature study programs for level one are meant to be done together. This does not mean that you must always be on the same unit number in the science program as the corresponding prompt in the nature study program. It just means that these two programs were designed to be done throughout the same year.

We believe that science in the early grades should largely concern the natural and physical world of the child: the rocks, trees, and worms that they can see and touch first-hand. However, many of the concepts in geology, biology, meteorology, etc., can be lofty and abstract for the young mind. Nature study--the investigation and observation of the intimate landscape immediately surrounding a child--can help to bring these big ideas closer to home.

For example, an early elementary child may not be able to wrap their mind around the different qualities and origins of several rocks or minerals, but if given the opportunity to collect and curate their own rock collection from the local landscape, they will begin to notice the varying traits from specimen to specimen, connections between these traits and where the rocks were found, and ultimately that the concepts they learned in the related science unit are very much present in their world. Therefore, they are part of those big ideas, too.

Our level one nature study curriculum is meant to be relaxed. Choose prompts that call to you in your current season with the time and resources you have available to you. Repeat favorite activities. Skip ones that don't fit your family or speak to their interests. Adapt activities in any way needed to support the learner you have right now. And please don't feel pressured to check off every single prompt and project.

Contents

Contents

Book List: Spines

There are no required books for this curriculum. Theoretically, you could complete this curriculum without using any books at all, simply by using our "big picture" messages listed in each unit and our suggested video links. However, we do have several books that are highly recommended (see below) to help truly bring each topic to life in a visual way for your child. Further in this guide, you will find many pages of optional supplemental books to consider as well.

Directions: Choose **ONE** of the spines below. You do not need to use more than one of the following selections. Please take some time to preview all of the options before purchasing so you can decide which one will be the best fit for your learner.

Spine Options:

Option 1:
Planet Earth! (DK Smithsonian)

- ISBN: 978-0-7440-5625-9
- This is an excellent choice featuring DK Smithsonian's typical layout. It is very informative, with lots of examples, illustrations, and photographs. This one would be appropriate for most elementary learners.

Option 2:
Super Earth Encyclopedia (DK Smithsonian) by John Woodward

- ISBN: 978-1-4654-6187-2
- This was the original spine in the first edition. It features the easy-to-read layout typical of DK Smithsonian with more specific examples of landforms, bodies of water, geological features, etc., and less general information than *Planet Earth*! (Option 1.) This one would be appropriate for most lower-to-middle elementary learners. It also does not have as much weather and seasons content as some of the other options.

Option 3:
An Anthology of Our Extraordinary Earth (DK) by Cally Oldershaw

- ISBN: 978-0-7440-8390-3
- This option provides more detailed information about specific features. It has more of a "storybook" narrative style with short passages that pack a lot of information in a gentler way.

Option 4:
Explanatorium of the Earth (DK Smithsonian)

- ISBN: 978-0-7440-9205-9
- This slightly more advanced option would be great for deep-divers, extra-curious kids, and advanced learners.

Option 5:
DK Find Out!*: Earth* by Maryam Sharif-Draper

- ISBN: 978-1-4654-6309-8
- Short, sweet, and to the point, this condensed spine would be better for very young learners (ages 4 to 6.)

General Supplies

STOP! READ BEFORE PURCHASING ANYTHING!

Full supply lists for each activity, project, demonstration, or lab suggested in this parent guide can be found in the instructions for each activity option at the end of every wonder/unit. This is not a complete list for every single activity. It is only a general list to help you get an idea of what to have on hand and for budgeting purposes. Since the supplies needed will depend on which activities you select for each unit, there is **NO NEED** to purchase every supply in this list or in the full curriculum. Please do NOT purchase the entire list of supplies for every single activity. We highly recommend planning three to four weeks ahead, writing down, and gathering the supplies you need for your chosen activities **only**.

- access to natural areas around your home
- various natural items gathered responsibly outdoors
- occasional photos and other images
- general kitchen supplies (plates, measuring cups, etc.)
- occasional items from the grocery store (like graham crackers, frosting, Starburst candies, sugar, salt, Borax, mini-marshmallows, toothpaste, etc.)
- occasional up-cycled items from around your home (like cereal boxes, food container lids, etc.)
- scissors
- glue stick, white school glue, and tape
- writing and drawing supplies like pens, markers, crayons, and pencils
- watercolor paint
- acrylic craft paint
- paint brushes
- jars to hold water for painting
- paper towels
- sidewalk chalk
- twine
- paper confetti, glitter, etc.
- poster board and foam core (please see specific activities)
- play-dough
- dental floss
- stapler
- wax paper
- toothpicks
- ruler
- spray bottles
- food coloring
- Ziplock baggies
- construction paper/colored paper
- aluminum foil

Wonder No. 1: Born From Stardust

Welcome to Wonder No. 1: Born From Stardust.

In this unit, you and your child will explore the age and the origins of planet Earth. Before we can dive into geology, we must understand where everything on Earth came from in the first place.

If you have minimal time, stick with Category 1: "For the Minimalist" and have a casual conversation with your child over the selected pages in the spine(s) you have chosen to use for the year. If you have more time, mix and match from all of the other categories to create a unit of science that resonates with your child and your family's unique rhythm and needs.

Please use the "clickable links" PDF that came with your purchase to easily access the videos listed in each lesson. That PDF is updated periodically, so it always has the most up-to-date link suggestions.

We highly recommend that you always screen the suggested videos and books before sharing them with your child.

There are 3 "big picture" messages to focus on during this unit:

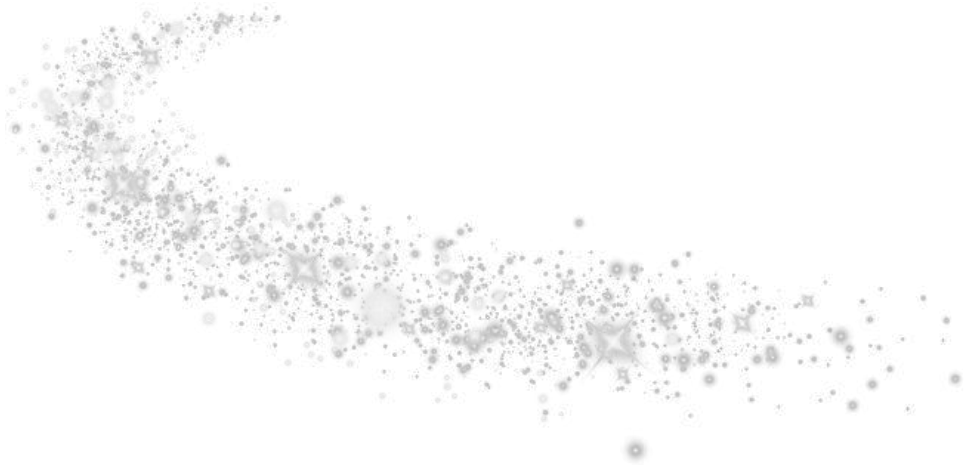
1) Geology is the study of the earth. When you study geology, you learn about the history of the earth and how it was formed. You learn about the rocks and minerals of which it is composed, and you learn about the physical, chemical, and biological changes that it has undergone and is still undergoing. The first 18 "wonders" of this curriculum focus on geology.

2) Earth was formed 4.5 billion years ago from dust, gas, and rock.

3) Everything on Earth, including us, came from the same material.

Vocabulary Words for this Wonder:

- **geology:** the study of the earth, including its history, its formation, its composition, and the changes it has undergone and is still undergoing



1. For the Minimalists:
Talk about the "big picture" messages together and read the following pages, according to the spine(s) you've chosen to use.

- *Planet Earth*!: read pages 8 - 15, 20 - 21
- *Super Earth Encyclopedia*: read pages 9 - 13
- *An Anthology of Our Extraordinary Earth*: read pages 4 - 5
- *Explanatorium of the Earth*: read pages 8 - 15, 244 - 245
- *DK Find Out*!*: Earth*: read pages 4 - 5

2. For the Book Basket Folks:
- *Geology for Kids* (Junior Scientists) by Meghan Vestal: pages 1 - 3 (stop before "An Ever-Changing Planet")
- *When Planet Earth Was New* by James Gladstone and Katherine Diemert
- *You Are Stardust* by Elin Kelsey
- *Here We Are: Notes For Living on Planet Earth* by Oliver Jeffers
- *Older Than the Stars* by Karen C. Fox
- *Annabelle and Aiden: Worlds Within Us* by Joseph Raphael Becker

3. For the Visual Learners (always screen first):
★ Remember--all of the links in this curriculum can be found in the clickable links PDF included with your purchase! That PDF is updated periodically, so it always has the most up-to-date link suggestions. We highly recommend that you always screen the suggested videos and books before sharing them with your child.

Younger Learners (K - 2nd Grade)

From SciShow Kids, "Where Did Earth Come From?": https://youtu.be/i42otfB4xBk?si=mGECLNbukTHMfVEv

From TED-ed, "Four Ways to Understand the Earth's Age": https://youtu.be/tkxWmh-tFGs?si=TOeHCBock4iZ27ZT

From Discovery UK, "Stardust": https://youtu.be/--kw2vMD8Nc?si=CkgfHLX-KQUBKv34

From Science with Mr. Harris, "What is the Geologic Time Scale?": https://youtu.be/XMjkO72KVjE?si=MC11V8lRPteVvNTH

Older / Advanced Learners (3rd Grade+)

From the Smithsonian Channel, "We're all made of stardust. Here's how.": https://youtu.be/xIV-k39Kukw?si=t4X_Jjm9Zhl93gl3

From Reaction, "Where do elements come from?": https://youtu.be/2bm479V8qPs?si=HzN3TB9giKUyCu43 (Recommended for students who have covered some chemistry already.)

Activities and Labs:
Below is a list of activity and lab options for planning purposes. Instructions for the activities and labs can be found at the end of Wonder 1: Born From Stardust.

4. For the Outdoor Learners:
- Go on an "Age of the Earth" Walk
- Build an Outdoor Mobile: "Star Stuff"

5. For the Table-Lab Crowd:
- "Age of the Earth" Clock Demonstration
- Tabletop Demonstration: "Star Stuff"

6. For the Crafts-and-Projects Families:
- Art Project: "You Are Stardust"

From the Student Notebook:
Document what you've learned in the student notebook, using one of the options below. Please see the beginning of the parent guide for more information.

- **Open-ended narration** (written or oral with an adult transcribing the student's words)
- **Collage** (add photos and notes about the activities conducted in this wonder)
- **Copywork** (choose one or more of the "big picture messages" to use as a copywork exercise, which your child may illustrate if they like)
- **Prompt 1:** Explain what geology is and/or what a geologist studies.
- **Prompt 2:** Write a narration about the formation of the Earth.

Remember: You are the master of the curriculum. You can finish each wonder in one week, take multiple weeks for the topics that intrigue you the most, and follow rabbit trails. You can pick and choose activities from any given category in any given unit. The focus in these early grades should be on discovery and wonder. This is the time to play and to explore.

Instructions for Activities and Labs

Go on an "Age of the Earth" Walk
For the Outdoor Learners

Supplies needed:

- A place to walk for approximately 100 yards (a football field would be ideal)
- Sidewalk chalk (if not using a football field)

Instructions:

1. Find a place to walk with your child for approx. 100 yards. A football field would be best, but you may also use your phone's GPS to track 100 yards between two obvious markers. It is best if you can see the end of the 100 yards from the beginning. You may wish to measure and mark the milestones listed below with a piece of chalk before beginning, though this is not required.
2. Stand together at the point where your 100-yard walk will begin. Explain to your child that the Earth is very, very old--4.5 billion years old, in fact. Explain that we (humans) have been on the Earth a very short time, compared to its age. Tell your child that you are going to take a little walk and that you are going to pretend that the place where you stand now (at the starting line of the 100 yards) represents the beginning of the Earth. If your child is older, you can explain that every inch you cover (show the approximate length of an inch with your fingers here) represents 1.3 million years of time passing.
3. Begin walking very slowly across the 100 yards, pointing out the milestones listed below at the approximate distance noted. It is NOT essential to be precise--you are just trying to get the idea across that the Earth is very old, and we as a species are very young comparatively.
4. As you stand at the ending point, looking back over the 100 yards you have covered, you can ask your child questions or have a casual discussion about what you discovered. Keep in mind that in the early grades, this exercise is done simply to put the enormous and abstract concept of the age of the Earth into a concrete representation that your child can visually and kinesthetically understand.

Milestones

- **The very first forms of life appear** (approx. 15 yards from the start, 3.8 billion years ago)
- **Photosynthesis begins** (just past 20 yards from the start, 3.5 billion years ago)
- **Oxygen begins to build up in the atmosphere** (just before you hit 50 yards, 2.3 billion years ago)
- **Multi-cellular life appears** (at approximately 82 yards, 0.8 billion years ago)
- **The ozone layer becomes present** (approx. 86 yards from the start, 0.6 billion years ago)
- **Fungi, sea anemones, and mollusks appear** (between approx. 87 and 89 yards, 0.5 billion years ago)
- **Fish, land plants, insects, sharks, and amphibians appear** (walking between approx. 89 yards and 95 yards, approx. 0.5 to 0.2 billion years ago)
- **First dinosaurs and first mammals appear** (approx. 95 yards, approx. 176 million years ago)
- **T-Rex appears** (approx. 4 feet from the ending point, approx. 68 million years ago)
- **Approximately 75% of all species disappear from the Earth in the most recent mass extinction** (approx. 1 yard from the end, 66 million years ago)
- **Age of mammals** (covering the final yard, 66 million years ago to present)
- **Apes appear** (1 foot from the end, 15 million years ago)
- **Humans appear** (1/8 of an inch from the finish line)

Instructions for Activities and Labs

Build an Outdoor Mobile: "Star Stuff"
For the Outdoor Learners

Supplies needed:

- Twine (or string or yarn)
- Scissors
- Seasonal objects found in nature (sticks, pinecones, small rocks, shells, flowers, etc.)
- A couple of photos of your child, your family, your pets, etc. (these may get damaged or weathered, so choose them accordingly) with a hole punched in the top and sides of each
- A tree with a low branch

Instructions:

1. Spend some time in nature, collecting seasonal objects with your child. (Don't tell them why you are doing this just yet.)
2. Together, bring the found objects, the photographs, the twine/string/yarn, and the scissors to a tree with a low branch.
3. Work together to tie the objects to the branch at varying lengths using the twine to make a loose mobile. Try to keep the picture of your child more or less in the center of everything.
4. Use twine to tie lengths between different objects so that they are connected to one another and to the photo of your child. There is no right or wrong way to do this, just try to make a casual "web" with the objects connected. This is a great fine motor activity for younger children, but you are encouraged to help them as much as needed.
5. Once you are finished, ask your child if they know why you made this mobile (or "nature art") today. Listen to their answer, and then explain to them that everything on their mobile is connected because they are all made of the same "star stuff."
6. Remind your child of the material you covered when you first explored this wonder (or "unit.") Remind them that the Earth and everything on it came from the same dust and gas. Therefore, everything in the mobile, and everything around you, is made of the same materials: your child, the tree, all of the objects, all of the animals and plants around you, your home, etc.
7. Spend some time admiring your mobile and enjoying your time outdoors together. If you like, you can leave it up on display for a while, or you can carefully transfer it to a large stick and hang it in your child's room.

We would love to see your creations! Please feel free to share photos on Instagram using #blossomandroot!

"Age of the Earth" Clock Demonstration
For the Table-Lab Crowd

Supplies needed:

- A phone or a timer that allows you to set multiple alarms
- A 24-hour period between noon on day 1 and noon on day 2, during which you can be interrupted periodically by the timers you set and tell your children about what milestone has just passed (don't worry about the overnight part)

Instructions:

1. Set your phone's alarms to go off at the times for the following milestones at the bottom of the page. If you have a phone that allows you to label your alarms, you may wish to label each alarm with the corresponding events. (Please note that these are approximate times, and the point of this exercise is not to drill down the precise timing of events but to give your children a concrete demonstration of an abstract concept that can be difficult to grasp in the early grades.)
2. The morning of the day that you plan to conduct the demonstration, spend some time reviewing whatever materials you chose for this first unit/wonder. Talk to your children about how the Earth is very, very old, and humans have just recently become a part of that story.
3. Explain to your children that you're going to pretend that the entire history of the Earth can fit into one full 24-hour period. You will pretend that the Earth forms at noon today. You will tell them, throughout the day, evening, and following morning, when certain things have happened.
4. At noon, announce to your children that "the Earth has just formed."
5. Every time your alarm goes off, stop what you're doing to tell your children what event has just taken place in Earth's timeline.
6. The next morning, remind your children about the activity. If you wish, you may tell them that, while they were asleep, single-celled algae appeared.
7. Continue until the very last milestone. This is a good one to announce very excitedly--confetti optional.
8. Once you've announced the appearance of humans, have a casual discussion about the exercise. Welcome input and comments from your children.

Milestones to Set Alarms For:
Day One

- Noon, Day 1: Earth is Formed
- 4 pm, Day 1: Simple life appears
- 5:36 pm, Day 1: Oldest fossils we have discovered date back to this moment in time

(Nothing will be tracked overnight.)

Day Two

- 8:28 am, Day 2: Seaweeds appear
- 8:48 am, Day 2: Jellyfish appear
- 9:52 am, Day 2: Land plants appear
- 10:56 am, Day 2: Dinosaurs appear
- 11:39 am, Day 2: Mammals appear
- 11:58:43 am, Day 2: Humans appear

Instructions for Activities and Labs

Tabletop Demonstration: "Star Stuff"
For the Table-Lab Crowd

Supplies needed:

- A large, round plate (with a lip) or pie pan
- Glitter or paper confetti (ideally in several different colors)
- White school glue

Instructions:

1. Prepare for the lesson by setting the plate (or pie pan) on the table, along with the glitter or confetti you've chosen for the demonstration.
2. Remind your child of the material you covered when you first explored this unit/wonder. Remind them that the Earth and everything on it came from the same dust and gas. This material came from the sun. (For the early grades, this simple explanation can suffice, though you may certainly go deeper and into more detail according to your child's comprehension level.)
3. Tell your child that these materials were blown into space by solar winds, into orbit around the sun. Eventually, these materials began to cling to each other, forming the Earth.
4. Explain that you're going to show your child what that may have looked like. Carefully pour glitter/confetti into a compact pile in the center of the plate. Then, very carefully, trace a circle of glue on the outer part of the plate, about an inch from the edge. (You are tracing the path of "orbit" around the sun / the materials.)
5. Have your child blow very gently into the pile in the center of the plate as you turn it slowly. This will disperse the glitter/confetti all around the plate. Have your child run their hand along the outside edge, across the glue line you traced, gathering materials as they go.
6. Eventually, the glitter/confetti will clump together (with the help of the glue), forming a lumpy "planet."
7. This activity can be messy, but it's a great way to demonstrate how the Earth and everything on it was formed from the same "star stuff." Don't worry if your planet is not forming a tight ball--it likely won't. If you want to make it a little more precise, you may wish to include small chunks of fresh play-dough in the "star stuff" pile in the center. When everything is dispersed, this play-dough can help to form a more spherical planet. It will be ruined by the glue, though, so it won't be reusable after this exercise.

Tip: You can make your own paper confetti with a hole punch

Instructions for Activities and Labs

Art Project: "You Are Stardust"
For the Crafts-and-Projects Families:

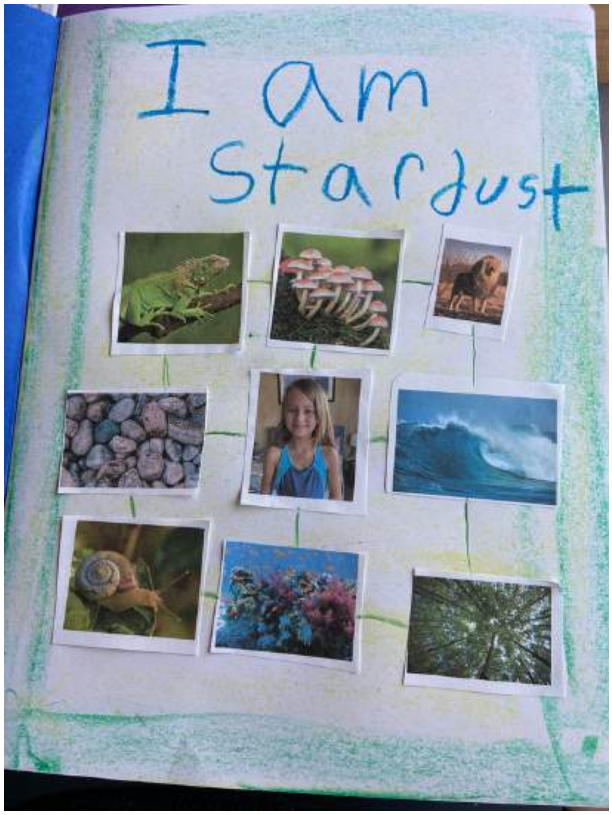
Supplies needed:

- Several photos of your child, family, pets, home, city, etc.
- Several pictures (clipped from a magazine or printed off an image search online) of various animals, plants, inanimate objects, etc.
- Scissors and glue or tape
- A piece of poster board
- A crayon or marker

Instructions:

1. Remind your child of the material you covered when you first explored this unit/wonder. Remind them that the Earth and everything on it came from the same dust and gas.
2. Have your child make a collage on the poster board using all of the photos you've collected. Instruct them to use the crayon or marker to draw lines connecting all of the pictures to one another.
3. Display their artwork for the family to enjoy.

Inspired by the book *You Are Stardust* by Elin Kelsey



Wonder No. 2: Layers of the Earth

Welcome to Wonder No. 2: Layers of the Earth.

Wonder No. 2 focuses on the layers within the earth. As with the origins of Earth, it is important to understand this concept before moving on to rocks, minerals, volcanoes, and other geology topics.

Many of the suggested books for week two will also be helpful for exploring Wonders Three through Seven. You will notice that several of these selections are books of poetry. These are a delightful way to add language exploration and whimsy to your science days. You may even want to have a science-themed poetry tea time during the next few weeks. (A layers-of-the-Earth cake would be a fitting treat!)

In addition, this is the first unit with a suggested selection from *Nature Anatomy: The Curious Parts and Pieces of the Natural World* by Julia Rothman. This wonderful book provides beautiful, simplified visual references for many of the topics we will be exploring in the year ahead. These pages can be very helpful in explaining complicated topics in a visually appealing yet simple way. They are also wonderful to prop the book open to (ideally on an easel) in a science corner or in front of your child while they work on the various projects or on their notebook entry.

There are 2 "big picture" messages to focus on during this unit:

1) The Earth is made of several different layers, including an inner core, an outer core, a mantle, and a crust.

2) We live on the Earth's crust.

Additional Big Picture Messages for Older / Advanced Learners:

1) Earth's crust is thinner beneath oceans and thicker beneath land. We call the crust beneath oceans oceanic crust and the crust beneath land continental crust.

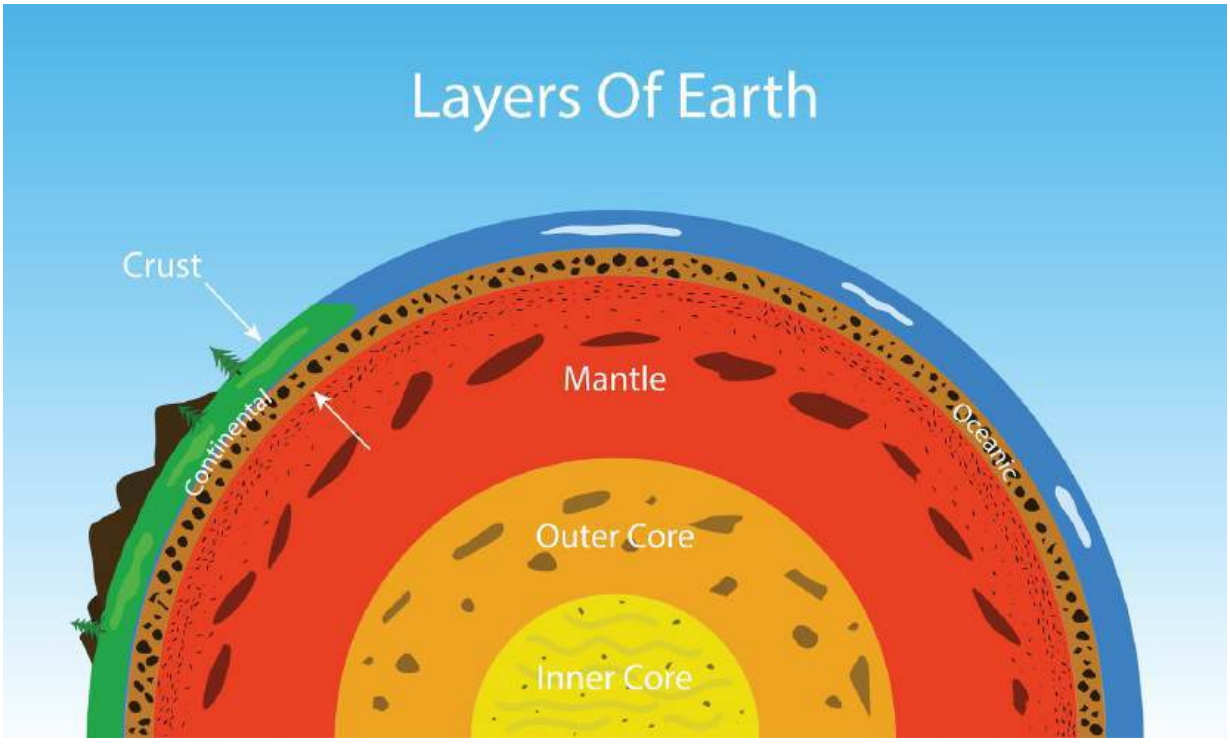
2) The mantle is Earth's thickest layer. The mantle is solid but soft--because it is extremely hot-- so it is always flowing very slowly beneath the crust.

3) The outer core of the earth is made of molten nickel and iron. The heat-driven circulation of these metals creates a magnetic field around Earth, which protects it from radiation. This magnetic field is one of the things that makes life on Earth possible.

Wonder No. 2: Layers of the Earth

Vocabulary Words for this Wonder:

- **inner core:** the inner-most layer of the earth, a solid sphere of iron and nickel
- **outer core:** the layer surrounding the inner core of the earth, made of molten iron and nickel
- **mantle:** the layer surrounding Earth's core, and the thickest of Earth's layers, made of soft, solid rock that flows slowly and constantly beneath the crust
- **crust:** Earth's outermost layer
- **oceanic crust:** crust beneath oceans
- **continental crust:** crust beneath Earth's continental landmasses



Wonder No. 2: Layers of the Earth

1. For the Minimalists:
Talk about the "big picture" messages together and read the following pages, according to the spine(s) you've chosen to use.

- *Planet Earth*!: read pages 32 - 35, 42 - 43
- *Super Earth Encyclopedia*: read pages 14 - 15
- *An Anthology of Our Extraordinary Earth*: read pages 6 - 13
- *Explanatorium of the Earth*: read pages 24 - 27
- *DK Find Out*!*: Earth*: read pages 8 - 9

2. For the Book Basket Folks:
- *Geology for Kids* (Junior Scientists) by Meghan Vestal: read "Chapter Two: Digging Deep"
- *Planet Earth for Kids* (Junior Scientists) by Stacy W. Kish, MS: pages 17 - 20
- *Nature Anatomy: The Curious Parts and Pieces of the Natural World* by Julia Rothman: pages 14 - 15
- *Planet Earth Inside Out* by Gail Gibbons
- *Earthshake: Poems from the Ground Up* by Lisa Westberg Peters
- *Thunder Underground* by Jane Yolen
- *Earth Verse: Haiku from the Ground Up* by Sally M. Walker
- *The Street Beneath My Feet* by Charlotte Guillain

3. For the Visual Learners (always screen first):

Younger Learners (K - 2nd Grade)

From SciShow Kids, "Could I Dig a Hole Through the Earth?": https://youtu.be/oEW_Qwj6ZCE?si=VxCK5l8SebZWZ5iL

From Science with Mr. Harris, "What is the structure of the Earth?": https://youtu.be/zsm7NkbQXdY?si=duwH5uBJoij8QuCd

From BBC, "Three Minutes to the Center of the Earth": https://youtu.be/SeFT0ewzM6g?si=x_8bT1WwgPG2wtjg (Screen first--mentions the word "hell")

Older / Advanced Learners (3rd Grade+)

From Be Smart, "Why Does the Earth Have Layers?": https://youtu.be/WwiiOjyfvAU?si=LVWY8KlZHhPVHOCj

From NOVA PBS Official, "How Earth's Magnetic Shield Protects Us From the Sun": https://youtu.be/URN-XyZD2vQ?si=ftryatS4p4T3cMZZ

From SciShow Space, "Why Does Earth's Magnetic Field Keep Flipping?": https://youtu.be/aVqN1tW1k7w?si=1NRGABRlIOIJSp20 (Screen first--not recommended for anxious or sensitive learners)

From SciShow, "What's Actually Inside Earth's Crust?": https://youtu.be/tquABLc3Hhs?si=oS9jzTmkpAOQkPrL (a very deep dive for the advanced learners)

Activities and Labs:
Below is a list of activity and lab options for planning purposes. Instructions for the activities and labs can be found at the end of Wonder 2: Layers of the Earth.

4. For the Outdoor Learners:
- Messy, Muddy Model of the Layers of the Earth

5. For the Table-Lab Crowd:
- "Layers of the Earth" Egg

6. For the Crafts-and-Projects Families:
- Play-dough Model of the Layers of the Earth

From the Student Notebook:
Document what you've learned in the student notebook, using one of the options below. Please see the beginning of the parent guide for more information.

- **Open-ended narration** (written or oral with an adult transcribing the student's words)
- **Collage** (add photos and notes about the activities conducted in this wonder)
- **Copywork** (choose one or more of the "big picture messages" to use as a copywork exercise, which your child may illustrate if they like)
- **Prompt 1:** Describe the layers of the Earth.
- **Prompt 2:** Illustrate and label a picture of the layers of the Earth.
- **Prompt 3 (for older/advanced learners):** Explain what the Earth's magnetic field is, how it is formed, and how it makes life on Earth possible.

Instructions for Activities and Labs

Messy, Muddy Model of the Layers of the Earth
For the Outdoor Learners

Supplies needed:

- A small, round rock (about the size of a golf ball)
- Access to an area with lots of clay and mud (you may need to bring your own water and shovel to get to a good supply)
- Grass to help hold the mud and clay together
- Loose, dry dirt or sand

Instructions:

1. This fun and messy activity will produce a very simplified model of the layers of the Earth.
2. Remind your child that the Earth is made of several layers: an inner core, an outer core, a mantle, and a crust. Remind them that we live on the crust, which is the outermost layer.
3. Hold up the rock and explain that it is like the inner core of the Earth. Ask your child to cover the rock with mud/clay. Help them as needed, mixing grass into the mud to help it keep its shape if required. After a good layer has formed, declare that they've made the outer core.
4. Instruct your child to cover the mud-ball with a good, thick layer of clay/mud. Again, help them as needed. Try to make this layer very thick compared to the last layer. Once you have a good-sized layer, declare that they've made the mantle.
5. Finally, have your child roll the ball in dry dirt or sand, covering it in a thin "crust" of dry material. Explain that they've made the crust, the part of the Earth we live on.
6. Continue to enjoy your time outside, playing in the mud and talking about your discoveries.

"Layers of the Earth" Egg
For the Table-Lab Crowd

Supplies needed:

- A hard-boiled egg
- A length of wire or floss to cut the egg in half

Instructions:

1. Hard-boil an egg. When it has cooled, cut through it as carefully as possible (shell and all) from top to bottom using the wire wrapped around your two index fingers. The shell may crack at the edges a bit, and that is okay.
2. Remind your child that the Earth is made of several layers: an inner core, an outer core, a mantle, and a crust. Remind them that we live on the crust, which is the outermost layer.
3. Show your child the egg, and explain that it is layered like the Earth. The yolk represents the core of the Earth, the white represents the mantle, and the shell represents the crust--the part we live on.
4. Point out how much thicker the mantle is compared to the crust (just like the Earth), and like an egg (when it's not cooked), the mantle is liquid. But, unlike the egg, the crust fits on top of the mantle in many pieces, and these pieces are constantly in motion.

Instructions for Activities and Labs

Play-dough Model of the Layers of the Earth
For the Crafts-and-Projects Families:

Supplies needed:

- Play-dough in yellow, red, blue, and green (optional fifth color if you're going to make an outer core as well.)
- A length of dental floss (approx. 12 inches)

Instructions:

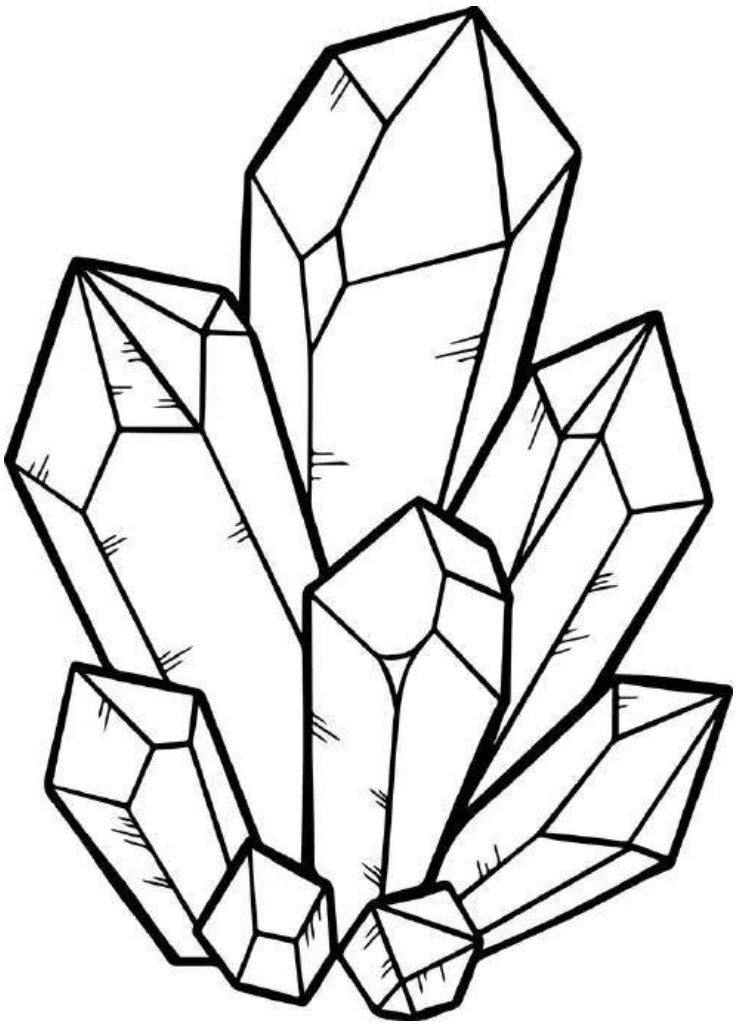
1. Remind your child that the Earth is made of several layers: an inner core, an outer core, a mantle, and a crust. Remind them that we live on the crust, which is the outermost layer.
2. Have your child form a ball using the yellow play-dough. Explain that this is like the core of the Earth. (You may wish to use a fifth color to create an "outer core" as well.)
3. Give your child the red play-dough and have them cover the "core" in a thick layer, continually shaping it into a sphere. Explain that this is like the mantle.
4. Give your child the blue play-dough and have them form a thin layer on top of the "mantle." Explain that this is like the crust, the part we live on. Allow them to make "continents" with the green play-dough on top of the blue "crust" layer. These needn't be accurate.
5. Using the dental floss, carefully cut the sphere in half, exposing the stacked layers of the "Earth." Review the layers together.

BLOSSOM & ROOT

ELEMENTARY SCIENCE // LEVEL 1 // SECOND EDITION

Wonders of the Earth & Sky

STUDENT NOTEBOOK

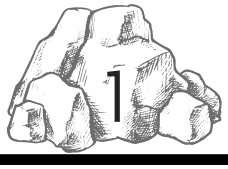


This book belongs to:

LEVEL 1

Exploring Geology, Weather, and Seasons

Born From Stardust



Layers of the Earth