Earth Science Activities and Worksheets

50+ Pages

Made by Liesl at homeschoolden.com

Topics we covered:

• Solar System
• Layers of the Earth
• Earth's geologic timeline covering the 6 main eons
• Latitude, Longitude, Using a Compass
• Plate Tectonics
• Volcanoes
• Earthquakes
• 4 Types of Mountains

This is a packet of hands-on activities and worksheets that I made for my kids for our Earth Science unit. The kids were 6, 9 and 11 when we did this unit.

Answers for the worksheets start on page 45.

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Earth Science Unit: Solar System

To start off our Earth Science unit, I felt like we really need to cover some basics about the Solar System again. We got a hands-on kit called the Solar System Planetarium ($9.27 from Amazon in Sept. 2014) that my homeschooling friend used with her kids last spring. I got one for each of the kids and I’m really glad I did. They all really enjoyed putting it together and painting it. I know we could have done something similar with foam balls or paper mache or what have you, but to be honest it was really lovely just opening the box and letting the kids go.

This kit required the kids to pop out the plastic pieces, snap the planets carefully together, paint the planets, and assemble the model’s base. The kids really enjoyed this. For some parts, my 6 and 8 year olds needed help from me (like snapping the planets together.), but for the most part they worked on their own. ED really loved that it glows in the dark (after it is painted with the “glow” paint.)

While they worked on the project, I read a number of books about the planets. I would definitely recommend this as an easy, hands-on project. If you have a science-loving child I think they would really enjoy this as a gift (mine would!). I would recommend it for ages 6-11 or so.

Earth Science Pages: After that we went over some basic facts about the solar system, which you'll find on the following pages:
Earth Science

How old do scientists believe Earth is? How did it form?

Earth orbits around what star?

In the picture below can you find the inner planets? Outer planets? Asteroid belt?

What are the four inner planets known as?

What are the four outer planets known as?

![Solar System Diagram](image)

What are the four inner planets?

What are the four outer planets?

Name a dwarf planet:
Earth Science: Layers of the Earth Hands-On Activity

I mentioned that we learned a bit about the Solar System in general. Next, we began looking more closely at Earth’s long history. We’ve been going over the four major eons and looking more closely at what happened in each (Hadean Eon, Archean Eon, Proterozoic Eon, Phanerozoic Eon). At first 4.6-4 billion years ago, the Earth would have been molten. Then as the Earth cooled it went from liquid to solid. Heavier molten iron sank into the core, while lighter rock rose to the surface, cooled and became the crust. This was the activity we did as we learned about the layers of the Earth.

To get ready for this activity, I made several batches of homemade play dough.

In a pan, place the following ingredients. Cook on the stovetop until the dough sticks together in one big clump.

- 1 cup flour
- 1/3 cup salt
- 1 Tablespoon cream of Tartar
- 1 Tablespoon oil
- 1 cup water
- 5 drops of vegetable glycerine (optional)
- dye — We made globs of dough in different colors for the different layers of the Earth. Be sure to add the dye before you start heating it on the stove.

We read through Gail Gibbon’s book *Planet Earth/Inside Out*. We talked about how thick each layer was and filled in the worksheet I made for the kids.
The inner dark layer represents the solid iron core which is 1500 miles across. Then we added the outer core, the mantle, the crust (oceans/continents).

Once it was assembled the kids took a knife and cut it apart. It’s definitely a visual way to see the layers of the Earth!
Label the Layers of the Earth in the diagram below:

How many miles across is the inner core?

How thick is the outer core?

How thick is the mantle?

The Earth's crust is divided into 7 smaller pieces called plates. The plates are ______________ miles thick.

At least how tall must a mountain be?

About __________ of the Earth's surface is covered by water.

The oceans hold about _______ of Earth's water.

Only about __________ of Earth's water is freshwater.
What is the Earth's axis?

Draw a picture of the Big Dipper. Then show which stars point to Polaris, the North Star.

Place a compass in the middle of the room. Wait for the needle to stop moving. One end of the needle will point north and the other end will point south. Place 4 pieces of paper around your room to show where north, south, east and west are.

What is a compass rose? Why is it called that? Draw your own compass rose in the space below:
What is the Earth's axis?

Because of the tilt of the Earth, we have ________________ seasons.

When the Earth's axis is pointed away from the sun, we have ____________________________.

When the Earth's axis is pointed toward the sun, we have ________________

---

Earth's rotation axis always points to Celestial Pole. As Earth moves around Sun, sometimes one hemisphere is tilted toward the Sun and sometimes away. The seasons shown are for the Northern hemisphere. The Southern hemisphere's seasons are opposite to those shown.

Image from NOAA
We talked about the age of the Earth and did an impressionistic activity that is meant to impress kids with the enormity of time on Earth. For those of you who know much about Montessori, you’ll recognize “The Black Strip.” Our version was the purple ribbon strip — and it is only 21 feet (as my ribbon ream was 7 yards!). But it still shows how very little time we humans have been on Earth relatively speaking. I’m showing you a picture of our long ribbon (that includes all of “human history” in a mere 1/2 inch)...

Before we started, I asked the kids if they knew how tall I am (I’m about 5’5). “Well,” I said… “Every time we roll out five feet a BILLION years have passed. Are you ready?” As DD unrolled it I’d have her pause every five feet or so and say dramatically, “Earth has been around a billion years. Do you think human history will start soon?” A bit later… “Now?” Then ED took over and continued unrolling the strip… I really tried to make it as dramatic as possible. And finally when we came to the teensey white strip of human history I let the dramatics truly flow: “Whoa!! Do you see all of history? It’s just THIS long? How long is that… What do you think LD… is that even a half an inch??!! And this strip is 21 feet long! Whoa!” You get the idea… I was as dramatic as possible. But even without that, I think the kids would truly have been impressed!
We spent about a week learning about Earth's four eons and most recent eras. Today I wanted to share several of the activities we did to go along with this part of our unit.

We did another activity to help the kids understand the vast stretches of time. The Montessori teaching albums have an exercise called the "Clock of Eras." When I first did this activity with the kids, my youngest two didn't really "get" the idea of a clock fully. I didn't think it would really teach them the enormity of time as well as a long set of ribbons would... so instead I used the proportions of the clock and made a very long geologic ribbon (it's almost 60 feet in length)!

I used red for the Hadean Eon (a time of flaming gasses, volcanoes, etc.) -- 9ft 4 inches
I used sage green for the Archaean Eon (a time of great rains, poisonous oceans) -- 17 feet 4 inches
I used yellow for the Proterozoic Eon (a time when cyanobacteria and the sun worked together to put oxygen into the atmosphere) -- 26 feet
I used blue for the Paleozoic Era (a time when most life lived in the seas to protect it from harmful rays of the sun) -- 3 feet 9 inches
I used gold for the Mesozoic Era (a time of the great reptiles, among other life) -- 2 feet 5 inches
I used green for the Cenozoic Era (a time with plants, animals birds, humans) -- 10 inches

For the activity, I explained in general what happened during each eon and era. The first day, we slowly unrolled the ribbon and I explained that there were four eons. As we got down to the Phanerozoic Eon, I explained that we break time into smaller chunks called eras to keep things straight.

Another day, I printed out some pictures, brought out our collection of fossils (a set that I bought years ago), and added in some plastic animals (dinosaurs, mammals, etc.). The fossil set included a trilobite, dinosaur coprolite (dung), crinoids, brachiopods, fern fossils and things like that. I gave the kids the pictures and fossils and as I went over each eon/era, we put down the pictures and fossils. When we saw where all the fossils were placed, it really drove home how old the Earth is:
I then brought out a copy of the Clock of Eras and we talked about how the clock explains the passage of time in a different way than our ribbon timeline.

I made timelines that the kids filled in with some basic information:

The last activity we did relating to the Geologic Timeline was "What Came First?" This was based on activity I found at the UC Berkley's website. I wrote out index cards and let the kids try to put them into the correct order. The cards included things like

- bacteria
- green algae
- jellyfish
- trilobites
- sharks
- spiders
- ferns
- the first mammals
- the first birds
- ants
- Triceratops
- camel
- grass

We found it amazing is that grass came into the fossil record *after* camels (ants, dinosaurs and so forth). I will share the Geologic Timeline pages I made in the Earth Science Packet I'll be sharing soon. Because of copyright issues, I cannot share the pictures and information I used, but I got a lot of my information from Fossil Facts and Finds, which is also where I got the Clock of Eras pictured above.
# Earth's Geologic Timeline

<table>
<thead>
<tr>
<th>Eon</th>
<th>Time Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hadean Eon</td>
<td>4.6 billion to 4 billion years ago</td>
</tr>
<tr>
<td>Archean Eon</td>
<td>4 billion to 2.5 billion years ago</td>
</tr>
<tr>
<td>Proterozoic Eon</td>
<td>2.5 billion to 541 million years ago</td>
</tr>
<tr>
<td>Phanerozoic Eon</td>
<td></td>
</tr>
<tr>
<td>Paleozoic Era</td>
<td>541-0 million years ago</td>
</tr>
<tr>
<td></td>
<td>541 - 252.17 million years ago</td>
</tr>
<tr>
<td>Mesozoic Era</td>
<td>252.17 - 66 million years ago</td>
</tr>
<tr>
<td>Cenozoic Era</td>
<td>66 - 0 million years ago</td>
</tr>
</tbody>
</table>
# Earth's Geologic Timeline

<table>
<thead>
<tr>
<th>Era / Period</th>
<th>Time Range</th>
<th>Major Events</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hadean Eon</strong></td>
<td>4.6 billion to 4 billion years ago</td>
<td></td>
</tr>
<tr>
<td><strong>Archean Eon</strong></td>
<td>4 billion to 2.5 billion years ago</td>
<td>Bacteria</td>
</tr>
<tr>
<td><strong>Proterozoic Eon</strong></td>
<td>2.5 billion to 541 million years ago</td>
<td>Green algae, Jellyfish, Trilobites</td>
</tr>
<tr>
<td><strong>Phanerozoic Eon</strong></td>
<td>541-0 million years ago</td>
<td>First vertebrates, Sharks, Spiders, Ferns, Earthworms</td>
</tr>
<tr>
<td><strong>Paleozoic Era</strong></td>
<td>541 - 252.17 million years ago</td>
<td>Greatest Extinction</td>
</tr>
<tr>
<td><strong>Mesozoic Era</strong></td>
<td>252.17 - 66 million years ago</td>
<td>Pangaea Forms, First Mammal, Archeopteryx, First Flowering Plants, Ants, Triceratops</td>
</tr>
<tr>
<td><strong>Cenozoic Era</strong></td>
<td>66 - 0 million years ago</td>
<td>Camel, Grass, &quot;Lucy&quot;, People</td>
</tr>
</tbody>
</table>
Hadean Eon:
- Solar system was forming. Oldest known mineral (Zircon) Formation of Moon (4533 Ma), probably from giant impact. Formation of Earth (4567.17 to 4570 Ma) Earth (and other planets) would have been molten, then in time the Earth would have begun to cool.

Archean Eon
- 4000 - 2500 million years ago
- Surface of the Earth went from liquid (molten) to solid (rocks)
- Oldest rock 3.8 million years old
- Simple single-celled life (probably bacteria and archaea). Oldest probable microfossils.

Proterozoic Eon
- 2500 - 541 million years ago
- The atmosphere becomes oxygenic.
- First complex single-celled life: protists with nuclei.
- At the end of this era: Good fossils of the first multi-celled animals.

Phanerozoic Eon - 541 - 0 million years ago
- Paleozoic - Cambrian explosion, in which most modern phyla first appeared. Fish, arthropods, amphibians and reptiles all evolved during the Paleozoic. Life began in the ocean but eventually transitioned onto land, and by the late Paleozoic, it was dominated by various forms of organisms. Great forests of primitive plants covered the continents, many of which formed the coal beds of Europe and eastern North America. Towards the end of the era, large, sophisticated reptiles were dominant and the first modern plants (conifers) appeared. The Paleozoic Era ended with the largest mass extinction in Earth's history, the Permian–Triassic extinction event. The effects of this catastrophe were so devastating that it took life on land 30 million years into the Mesozoic to recover
- Mesozoic- age of reptiles Gradual rifting of the supercontinent Pangaea into separate landmasses that would eventually move into their current positions. Non-avian dinosaurs appeared in the Late Triassic and became the dominant terrestrial vertebrates early in the Jurassic, occupying this position for about 135 million years until their demise at the end of the Cretaceous. Birds first appeared in the Jurassic, having evolved from a branch of theropod dinosaurs. The first mammals also appeared during the Mesozoic, but would remain small—less than 15 kg (33 lb)—until the Cenozoic.
- Cenozoic -- also known as the Age of Mammals, because the extinction of many groups allowed mammals to greatly diversify.
What is the equator?

What is the weather like near the equator? Why?

What is the measurement of the equator?

What are lines of latitude? They are sometimes called _______________________.

What are lines of longitude? They are sometimes called _______________________.

Where do the lines of longitude start?

Where do the Eastern and Western Hemispheres start?
Using a globe, find the global address for each city below. Then check it by entering "latitude and longitude, city and country (or city and state)" on google to see how close you came.

London, England

Beijing, China

Capetown, South Africa

Denver, Colorado

Alice Springs, Australia

Nairobi, Kenya

Seattle, Washington
Our activities for Latitude, Longitude and Using a Compass

Also in this unit we learned about how we show and locate the exact positions of the land and water on the globe.

I explained that most maps and globes are marked with lines that help us pinpoint an exact location on the Earth. These lines form an imaginary grid. The equator is just one of these imaginary lines. The others are lines of latitude and longitude.

Lines of latitude are sometimes called parallels. They circle the globe are parallel to the equator. The lines of longitude run from North to South. They start at the Prime Meridian in Greenwich, England and circle the globe. Longitude lines are also known as Meridians.

Once they knew that basic information, it was time for the real challenge. Using the globe or a map, how close could they come to finding the exact locations of some cities around the world (like Nairobi, Kenya or Denver, Colorado). The kids found this to be a lot of fun and were VERY excited when their answer was close to the information provided by google!
Next, we pulled out a compass and talked about how a compass works and what a compass rose is on a map. I had the kids each take turns trying to line up North and turn the dial to the direction they wanted to go.

Then they lined the compass point up, picked a spot across the room and placed their card on the wall to show the four cardinal directions.

Next we went outside and made a giant compass rose out on the driveway.
Here are some step-by-step pictures of the kids making the compass rose.
Plate Tectonics: Hands-On Activities

Our next topic in this unit was Plate Tectonics.

According to a theory developed in the early 20th century, the super-continent Pangaea formed about 300 million years ago. The continent began breaking apart about 100 million years ago. We traced and cut out the continents and moved them around to see how they best fit together. Then we looked closely at the picture of Pangaea (on a notebook page I made for the kids… which I’ll share once it’s polished and ready!). Each of the kids had their own set of continents (which is why there are yellow and white continents in the picture below):

When we studied plate tectonics several years ago, we did this activity with paper to show how the continents could move without our touching them. This was perfect for the kids at that age (DD was about 5 and LD was 7), since it let them “see” the continents move without our touching them. I cut the continents out of foam. The kids folded construction paper. First we set the continents close together with a piece of play dough to weight the continents down. As the kids pulled each side of the construction paper, they could see the continents move apart. We got this idea from Robert Gardners” Earth-Shaking Science Projects About Planet Earth.
We did this activity again with several of the continents and of course the kids took turns “moving” the continents apart over and over!

This time around, we into much more depth about the mechanics of plate tectonics. We went over the evidence for there having been a super-continent (geologic evidence, fossil evidence and climate studies). We also talked in some depth about convection currents that occur deep within the Earth as the heated rock rises cools, sinks and is heated again. We did a couple of activities to help the kids really understand how this movement of heated rock helped geologists develop the theory of plate tectonics.

**Materials to have on hand:**

- 2 sponges cut into the shape of South America and Africa
- 3 push pins
- 1 aluminum pan
- 2 or 3 small tea candles
- 2 thick books

We poured water into the pan and let it sit until the water stopped moving around. Then we carefully put the sponges in place. We read that one of the sponges should have push pins placed in the side. I’m not sure whether this was to weight it down or keep the sponges from touching. Then we set the experiment up as follows (with books holding the pan up).
Once the water stopped moving, we lit the tea candles beneath the pan. We made sure the candles were in between the two continents. It was pretty neat watching the continents drift apart!

We spent several days talking about convection currents and looking at various diagrams. After we watched the continents drift apart, we carefully dropped dye into the water to see convection currents in action. The dye dropped to the bottom of the pan and then moved upward and outward with the heated water. I should have videoed this since the series of pictures isn’t terribly exciting to look at, but at any rate, with the dye, the kids could see how the water moved with the heat source (candles) underneath and it gave them a better understanding of convection currents and how they work.

We read about plate tectonics in several different resources. Two that we found especially helpful were *The Changing Earth* (A middle school science text by McDougal Littel) and Plate Tectonics by Linda George. Both worked well for my kids (ages 6, 9, 11).
What is the theory about Earth’s land?

When did Pangaea form?

In early 1900, German scientist Alfred __________________________ proposed a hypothesis known as ___________________________ ________________________.

What evidence is there for the Continental Drift?

1.) ____________________________________

2.) ____________________________________

3.) ____________________________________
Fossil evidence of the Lystrosaurus can be found where?

Where is there evidence of the Mesosaurus?

There have been fossil remains of the Cynognathus on the continents of __________________ and ________________________________.
This diagram helps explain the "birth of an ocean" as material from the mid-ocean ridges push the plates apart. Convection currents form when heated rock rises... then cools and sinks before being heated again and rising.

Can you see where the ocean ridges occur? What color are they on the map to the right?
**Understanding Convection Currents:**

Fill a pan with water, let it sit until there is no movement. Gently drop food coloring into the center of the pan. Do not disturb the water. Light two candles and place them beneath the pan. Observe.

**Understanding Plate Movement:**

Cut 2 sponges into the shape of South American and Africa. Insert push pins into the east coast of South America. Place the 2 sponges next to each other, fitting them together. Keep the sponges together until the water is still then let them go.

Do the same activity again. Place the sponges together along their coast line. Light the candles until the water heats up, then carefully let go of the sponges. Observe.

**Tectonic Plates of 3 Types of Boundaries:**

1. ________________________________ boundary

2. ________________________________ boundary

3. ________________________________ boundary
What are the different types of mountains?

<table>
<thead>
<tr>
<th>Types of Mountains</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fold mountains</td>
<td>These have great sheer rock faces. Underground pressure causes a whole rock face to break away from another.</td>
</tr>
<tr>
<td>Dome mountains</td>
<td>Molten rock erupts onto the Earth's surface</td>
</tr>
<tr>
<td>Block mountains</td>
<td>The Earth's crust pushes together at the ends causing it to fold and ripple in the middle.</td>
</tr>
<tr>
<td>Volcanic mountains</td>
<td>Igneous rocks which uplift earlier sedimentary layers. Magma causes the layers to bulge upward forming a dome.</td>
</tr>
</tbody>
</table>
Match the type of mountain with its picture:

fold mountains

dome mountains

block mountains

volcanic mountains
Draw your own pictures of the four kinds of mountains:
Hands-On Activity Ideas for Fold Mountains

Here are two activities we did after we talked about the different kinds of mountains:

we went over the four types of mountains. We talked quite a bit about fold mountains again. This was one of the activities we did. On a deep plate, we added a small bit of water and placed two graham crackers on top. Slowly, we pressed the two graham crackers together with slow-but-steady pressure:

This Earth science activity can also be done with towels. Just be sure to press them together slowly, not quickly. When we compared these to a picture of the Alps, the kids could really understand how the two tectonic plates converging could make mountains rise (and fold too).
Look at the Earth's earthquakes from 1963 to 1998. What do you notice about where they occur?
Volcanoes

- The word volcano comes from the Roman God of fire, Vulcan.
- More than 80% of the earth's surface is volcanic in origin.
- Lava flows can reach 2,000 degrees Fahrenheit.
- An erupting volcano can trigger tsunamis, flash floods, earthquakes, mudflows and rock falls.
- There are 1,500 active volcanoes on Earth. About 500 of these have erupted in historical times. On average 20-30 volcanoes erupt each year.
- Some volcanoes are dormant which means:

75% of the world's active and dormant volcanoes are along the Pacific Ring of Fire.

The biggest volcanic eruption ever recorded by humans was the explosion of Mount Tambora on Sumbawa Island, Indonesia, in 1815.
Explain the different terms below and draw a picture for each:

<table>
<thead>
<tr>
<th>Shield Volcano</th>
<th>Cinder Cone Volcano</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
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</table>

<table>
<thead>
<tr>
<th>Composite Cone Volcano</th>
<th>Caldera</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

![Volcano Diagram](image-url)
Locate the following:

- magma chamber
- crater
- central vent
- ash cloud
- lava and ash layers
- side vent
- lava flow
Research one of the volcanoes in the Ring of Fire:

Mt. St. Helens, Mt. Fuji, Mauna Loa, Popocatepetl, Mt. Pinatubo, Mt. Krakatoa
Hands-On Volcano Activities: Tissue Paper Volcanoes

Have the kids draw a rough outline of a volcano on a thick paper (like watercolor paper). Create a glue-water mixture. Wad up tissues, get the tissue completely wet and place it on the paper. Cover the entire volcano with tissues.

After the tissue has thoroughly dried out (this may take 3 or 4 days), you are ready to paint the sky area blue and the volcano brown. Set it aside for a day or so to dry.

Now the fun part begins. Bring out red, orange, yellow and grey paint and let the explosions begin!

The kids were pretty proud of their final projects!
Hands-On Volcano Activities: Exploding Volcano Flapbook

If your kids keep science notebooks or are creating a volcano lapbook or Earth Science lapbook, they might enjoy creating this “Exploding Volcano Flapbook” that I found at scholastic. Cute, isn’t it?!

Hands-On Volcano Activities: Gelatin Volcano

We spent a lot of time learning about plate tectonics. Earth's volcanoes are generally found where Earth's plates are expanding or converging. We looked closely at the parts of the volcano and also learned about the four types of volcanoes: shield volcanoes, cinder cone volcanoes, composite cone volcanoes, and caldera.

For our first activity, we made small "volcanoes" out of gelatin. To make our molds, we used 1 package of Gelatine (also spelled gelatin) and 1 cup boiling water. Stir til dissolved, pour into small cups or bowls and chill in the fridge for a few hours.
We cut a circle out of a paper plate and poked a hole in the middle before resting the gelatin volcano on top. Then we took a medicine syringe and filled it with water (dyed red). We pressed the water/dye up into the gelatin mold and watched as a "magma chamber" formed. Then we could see streaks as small "vents" were made.

What we didn't remember at first, was to form a "crack" in our volcano!! Actually, I'm SO, SO glad we forgot because that drove home the point that volcanoes form along plates where there are large cracks in the surface of the Earth. We were unable to get the "lava" to explode out of the top of our volcano, until we got a needle and formed a "crack" in the gelatin! From then on we TRULY understood how/why volcanoes explode!!! So, if you're willing to get your fingers pretty red (like ours are above)... I highly recommend doing it "wrong" and trying to figure out what went on when much of the "magma" squirts out along the bottom of the volcano.

Then, take a needle, puncture your gelatin volcano and try again!
Of course, we also had to do the well-known baking soda - vinegar volcano. As always, the kids loved this! Don't forget to mix the dish soap, dye and vinegar together before adding it to the baking soda. We did it backwards and our volcano was much pinker than it should have been!

What else did we do for this portion of our Earth Science unit?

And as always, we read a number of books and science texts. ED especially loved Pompeii...Buried Alive! (Affiliate Link)

Some of the videos we watched for this portion of our unit included:

- National Geographic: Colliding Planets
- National Geographic: Forces of Nature
- How the Earth Was Made: The Ring of Fire
Earthquakes

The next part of our Earth Science unit was earthquakes. Below I’ll explain how we made our shake table, but before I do that I want to talk a minute about some of the activities we did leading up to that.

We used a lot of the activities from Engineering Adventures. The kids’ first activity was building towers. Their first project was to build a tower of index cards and 12 inches of tape that was 10 inches high and could support a stuffed animal. Before they began we talked about some of the ways they could build with index cards, but rolling them, folding them, or cutting slits and slipping them together.

Their next project was to build a tower with sticky notes (and nothing else).

Another day, we talked about the importance of making earthquake-resistant buildings. The kids learned about building codes and we talked about the building skeleton. We peeked into the attic area and checked out the building skeleton of our house:

How to Make an Earthquake Shake Table

We talked quite a bit about building design and then we got to the *really* fun stuff! Our earthquake shake table:
To build our shake table we used

- foam
- 2 large pieces of cardboard
- heavy screws attached with duct tape
- elastic
- 2 PCV pipes that I cut down to be about 10 inches long

Cut 2 large pieces of cardboard, use duct tape to attach heavy screws (to weigh down the shake table). Cut a large piece of foam into 4 pieces. Make sure to make marks on the foam to line them up perfectly. Put elastic around both pieces of cardboard. Insert 2 PCV pipes between the 2 cardboard pieces, one in front and one toward the back. Add a pull tab (with super glue and duct tape).

We have a quick video of how to make it on the blog:

http://homeschoolden.com/2015/01/26/making-a-shake-table-for-our-earthquake-studies/
From there, we went on to build the skeleton of a building out of marshmallows and spaghetti. We tested those on the shake table.

The next day we made "brick" structures:

we made “brick” structures out of sugar cubes and peanut butter. We put on the documentary, Deadliest Earthquakes, and set to work.

We all built our structures and then brought out our shake table to test them out!
The most exciting structure we tested was ED’s. The first time they pulled the shake table, one brick fell off the top. With the second earthquake, the entire wall fell down!

As we finished up our unit we talked about the plate movements again. We reviewed the three types of plate boundaries:

1. divergent boundary — plates move apart. Most divergent boundaries are found in the ocean such as the mid-ocean ridges.
2. convergent boundary — occurs where plates push together
3. transform boundary — occurs where plates scrape past each other.
How old do scientists believe Earth is? How did it form? 4.5 million years

Earth orbits around what star? the Sun

What are the four inner planets known as? the terrestrial planets because they are solid like Earth and are made of rock.

What are the four outer planets known as? the Jovian Planets, named after Jove (Latin) or Jupiter, the king of the ancient Roman gods. (Sometimes known as the gas giants.) They may have a core of rock and ice, but their outer layers are made of gas.

What are the four inner planets? Mercury, Venus, Earth, Mars

What are the four outer planets? Jupiter, Saturn, Uranus, Neptune

Name a dwarf planet: Pluto

Layers of the Earth

- How many miles across is the inner core? 1,500 miles (a little less than the distance from New York City to Denver, CO)
- How thick is the outer core? 1,300 miles
- How thick is the mantle? 1,800 miles
- The Earth's crust is divided into 7 smaller pieces called plates. The plates are 40-60 miles thick.
- At least how tall must a mountain be? 2,000 feet above sea level

Water distribution:

- About 71% of the Earth's surface is covered by water.
- The oceans hold about 97% of Earth's water.
- Only about 2.5 or 3% of Earth's water is freshwater.
The Big Dipper, Cassiopeia and the North Star (Polaris)

**Compass Rose:** In the corner of many maps, you may see a compass rose. It points to all the directions. It is divided into 32 sections, with emphasis on the eight major points - north, northeast, east... etc. The compass rose gets its name because it looks like a flower with many pointed petals.

When the Earth's axis is pointed away from the sun, we have _______. winter
When the Earth's axis is pointed toward the sun, we have __________________________. summer

What is the equator? an imaginary line around the middle of the Earth that divides the northern and southern hemispheres.

What is the weather like near the equator? Why? warm/humid

What is the measurement of the equator? 24,912 miles

What are lines of latitude? They are sometimes called **parallels**.
These lines circle the globe parallel to the equator. Latitude is measured in degrees according to the distance north or south of the equator. The equator is at 0 degrees and the poles are at 90 degrees.

What are lines of longitude? They are sometimes called meridian.

These are vertical lines that meet at the North and South poles. There are 360 degrees of longitude around the earth. They are measured to the east and west of the Prime Meridian which is located in Greenwich, England.

Where do the lines of longitude start? Greenwich, England.

Where do the Eastern and Western Hemispheres start? along the Prime Meridian and 180th longitude line. These divide the eastern and western hemispheres.
What is Pangaea? a supercontinent that formed about 300 million years ago and broke apart about 100 million years ago

When did Pangaea form? Paleozoic and early Mesozoic Eras

Wegener  Continental Drift

1. Fossils -- fossils of ancient reptiles have been found both in South America and Africa (or North American and Europe)... fossils that were not found anywhere else in the world.

2. Climate-- There is evidence for climate change; for example, Greenland today is mostly covered by ice, but there is fossils of tropical plants. Similarly, Africa was once closer to the South Pole and has moved slowly north to a warmer region.

3. Geology -- The kinds of rocks that make up the continents were similar. For example, rocks in Brazil are similar to those found in Africa. Limestone layers in the Appalachian mountains are similar to those in the Scotland's Highlands.

Fossil evidence of the Lystrosaurus can be found where?

Africa, India, Antarctica

Where is there evidence of the Mesosaurus?

South America, Africa

There have been fossil remains of the Cynognathus on the continents of South America and Africa.

Tectonic Plates of 3 Types of Boundaries:

1. divergent boundary -- plates move apart. Most divergent boundaries are found in the ocean such as the mid-ocean ridges.

2. convergent boundary -- occurs where plates push together

3. transform boundary -- occurs where plates scrape past each other.
TYPES OF MOUNTAINS:

Fold mountains - The Earth's crust pushes together at the ends causing it to fold and ripple in the middle.

Dome mountains - igneous rocks which uplift earlier sedimentary layers. Magma causes the layers to bulge upward forming a dome.

Block mountains - These have great sheer rock faces. Underground pressure causes a whole rock face to break away from another.

Volcanic Mountains - Molten rock erupts onto the Earth’s surface
Books and Resources We Used for This Unit

We borrowed a lot of books from the library for this unit. Some of the books and curriculums we used included:

*The Solar System* by Howard Trammel (Good for ages 7-11)

*The Solar System* by Laura Hamilton Waxman (Good for ages 7-11)

*The Planets* by Martha Rustad (Good for ages 4-6)

*Planets Around the Sun* by Seymour Simon (Good for ages 4-6)

*Planet Earth/Inside Out* by Gail Gibbons

*Real Science 4 Kids:*

  *Focus on Middle School Geology, Student Textbook*

  *Focus on Middle School Astronomy, Student Textbook*

*How the Earth Works: 60 Fun Activities for Exploring Volcanoes, Fossils, Earthquakes, and More* by Michelle O'Brien-Palmer

*Geology Rocks!: 50 Hands-On Activities to Explore the Earth* (Kaleidoscope Kids) by Cindy Blobaum and Michael Kline

*The Geography Book: Activities for Exploring, Mapping, and Enjoying Your World* by Caroline Arnold

[Solar System Planetarium](#) ($9.27 from Amazon in Sept. 2014) This kit required the kids to pop out the plastic pieces, snap the planets carefully together, paint the planets, and assemble the model's base. Our family found this a lot of fun. For some portions, my 6 and 8 year olds needed help from me (like snapping the planets together). While they worked on the project, I read a number of books about the planets. I would definitely recommend this as an easy, hands-on project.
For the section on Plate Tectonics we used:

The Changing Earth (A middle school science text by McDougal Littel) and Plate Tectonics by Linda George. Both worked well for my kids (ages 6, 9, 11).

On the next page are some of the books we used for the volcanoes and earthquakes portions of our Earth Science Unit:

ED especially loved *Pompeii...Buried Alive!*
Other activities and materials available at homeschoolden.com:

Simple Machines - Hands on activities on levers, wedges and more.

Digestive System - Hands on activities about digestion, the length of the digestive tract and more

Rock and Minerals - Hands on activities on the three types of rocks

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