

For my notebook

WHAT IS INSIDE THE EARTH?



Have you ever dreamed of digging a hole to the very center of the earth? What would you expect to dig through on your way? People have wondered this for many years, and even though we have been all the way to the Moon, we have yet to see inside our own planet Earth. It's amazing, though, that with the help of earthquakes and scientific equipment we have a very good idea what is in there.

Scientists have divided the earth into four basic layers. Imagine traveling to the center. The outside layer, where you live, is called the crust, just like the crust on a loaf of bread. It is a thin layer of soil and rock. The next layer down is the mantle (man-tl). The mantle is made of rock so hot that it is only sort of solid. It flows slowly along under the crust. The next layer down is called the outer core. It is so hot there that everything is liquid. The center of the earth is a solid ball larger than the Moon. This deepest section is the inner core. Both the inner and outer cores are probably made of the metals iron and nickel. The inner core is the hottest part yet, so why hasn't it melted into a liquid? Well, the weight of rock and metal from the crust, mantle, and outer core push down so hard that it keeps the inner core squeezed into a solid ball of metal.

It's time to return to the surface, so turn around and head back from the solid inner core through the liquid outer core, through the slowly flowing rock mantle, and finally the thin rock crust. You made it! It must be good to get away from all that hot rock!

Earth's Interior Lab #1: PIZZA CRUST TO CORE - instructions

Materials:

- Lab sheet, pencil
- "What's Inside the Earth" notebook page (for reference)
- Pizza pan or large cookie sheet
- Large pizza crust (ready-made like Boboli, or homemade)
- Pizza sauce
- Shredded mozzarella cheese
- Shredded cheddar cheese
- 1 large, thin tomato slice
- Tablespoon
- Crayons (brown, yellow, orange, and red)
- 4 toothpicks
- 4 Post-It sticky notes

Aloud: *Since nobody has been to the center of the earth there are no pictures to see. So today you are going to make your own picture on a pizza! Pretend you have cut planet Earth right in half through the middle and that you are looking at the cut edge. This is called a cross section. Both the real earth and your pizza earth will start at the crust. The earth's crust is so thin that if planet Earth were the size of an apple, the crust would be thinner than the peel on that apple. Because of this, when you put your pizza together, you are going to spread the sauce and first layer of cheese right up to the edge of the crust.*

Procedure:

1. Place the pizza crust onto the pizza pan. Preheat oven to temperature indicated on the pizza crust package (usually about 450°).
2. Use the back of the spoon to spread the pizza sauce over the entire pizza, right up to the edge.
3. Sprinkle the mozzarella cheese over the entire pizza, right up to the edge. Make sure you have a nice, solid layer of cheese. The part of this section that shows beyond the other toppings will be the mantle.
4. Sprinkle a thin layer of cheddar cheese in a circle in the middle of the pizza. This circle should be about twice the diameter of your tomato slice and cover less than half of your mozzarella cheese. (See diagram on lab sheet for approximate proportions.) The cheddar cheese represents the liquid outer core.
5. Place your tomato slice in the exact center of the pizza. The tomato represents the solid inner core.
6. Bake for the time indicated for your pizza crust (usually about 8 - 10 minutes).
7. While your earth bakes, label and color in the earth and the pizza diagrams on the lab sheet. Use your "What's Inside the Earth" notebook page to help you.
8. Write "CRUST" on one Post-It, "MANTLE" on another and so on with, "OUTER CORE," and "INNER CORE." Wrap the edge of each Post-It around the top of one toothpick. You will use these to stick to the pizza earth when it is cooked.
9. When the pizza is done, place the toothpick labels where they belong on the pizza.
10. Admire your work, complete the lab sheet and have some fun eating your earthly creation!

Possible Answers:

- | | | | | |
|-------------------|-----------------------|-----------------|---------------|---------------------|
| 1. crust | 2. mantle | 3. outer core | 4. inner core | |
| 6. and 7. - solid | 8. and 9. - semisolid | 10. - semisolid | 11. - liquid | 12. and 13. - solid |

(continued on the back)

Conclusion/Discussion:

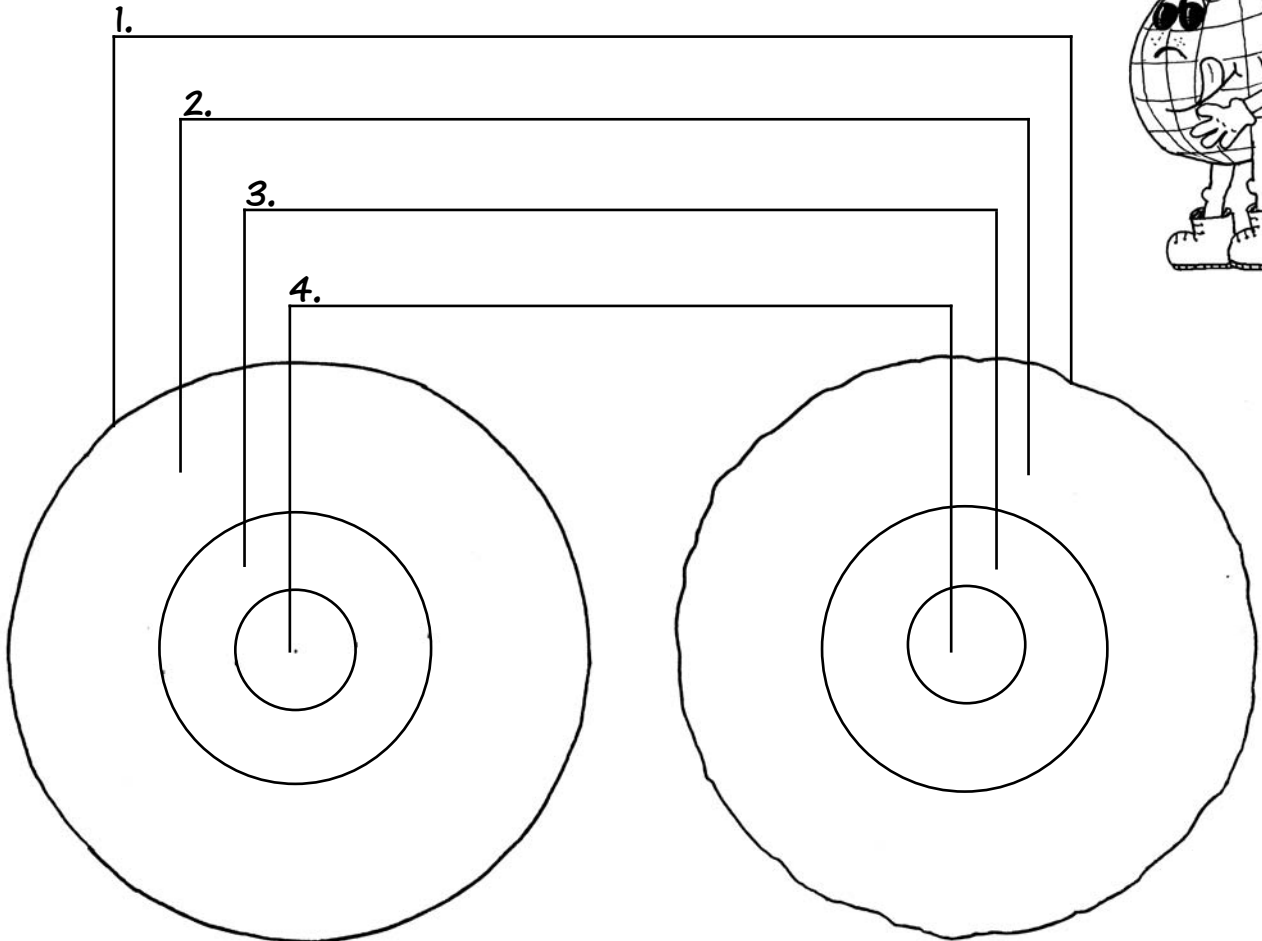
- 1. The closer you get to the center of the earth, the hotter it becomes. The hotter rock becomes, the more liquid it becomes.*
- 2. The closer you get to the center of the earth, the more rock you have pressing down from above. This packs molecules so tightly that it is hard for them to remain liquid, in spite of the high temperature.*

For More Lab Fun:

Cut down the center of an apple and a hard boiled egg. Which is more like the cross section of the earth? Why?

Earth's Interior Lab #1: PIZZA CRUST TO CORE

On the lines below label the four layers of the earth.



THE EARTH

THE PIZZA

5. Color the diagrams like this:

CRUST - brown (just outline this one)

MANTLE - yellow

OUTER CORE - orange

INNER CORE - red

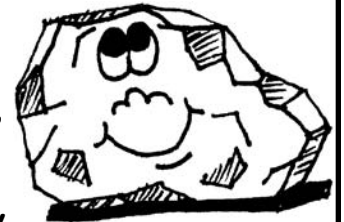
For the earth and your pizza, tell whether each layer is solid, liquid, or semisolid:

LAYER	THE PIZZA	THE EARTH
CRUST	6.	7.
MANTLE	8.	9.
OUTER CORE	10.	11.
INNER CORE	12.	13.

For my notebook

ROCKS ARE MADE OF MINERALS

Do you ever build things with blocks? Maybe you have built a castle, a corral, or a rocket ship. When you are done, you have combined a few rectangular parts together and made something that doesn't look like any one of the parts. Your rocket ship doesn't look like a big red block, it looks like a rocket ship. In the same way, minerals combine together to make up different rocks. Have you ever noticed a rock that has spots or stripes of different colors? What you are seeing are rocks made of different minerals. Sometimes minerals don't mix. Sometimes we find chunks that contain one pure mineral. Diamond, quartz, and salt are all minerals. They can mix with other minerals to form rocks, or they can be found as pure, unmixed minerals.



Some minerals, like diamond, are very hard. Some are soft. Some are shiny, and some are dull. Minerals grow from melted rock and if they have room, they grow into their own special shapes. Minerals that have grown this way are called crystals. Minerals don't often have room to grow like this so crystals can be very valuable. Minerals also break in their own special ways. All of these characteristics help us tell one mineral from another. Being able to do this is very important because we use many minerals every day. Do you have a pencil? Then you are using the mineral graphite. Silver fills the cavities in our teeth, copper carries water through our homes, and salt is vital to our bodies.

Minerals are some of the most important ingredients for life as we know it!

Mineral Lab #1: ROCKS ARE MADE OF MINERALS- instructions

Materials:

- Lab sheets (2 pages), pencil
- 3 paper plates
- 3 different color hard cheeses (such as light cheddar, dark cheddar, and jack) (grate about 1 cup of each)
- Permanent marker
- Clear plastic wrap
- Tape

Aloud: It's easy to be confused about the difference between rocks and minerals. Both rocks and minerals are made in nature. They are both solids and they are also both made within the earth. Minerals have a couple of features that rocks don't have. If it has enough room, each mineral can grow into its own special pattern called a crystal. Also, a mineral is a pure substance. For instance, gold is a mineral, so it is a pure substance. Rocks are made of different minerals, so they aren't pure substances. A rock might have gold in it along with other things, making it a mixture of different things. Today we will do a lab to help you picture how minerals are pure substances and how rocks are made of different minerals.

Procedure:

1. Use the permanent marker to label the paper plates Mineral #1, Mineral #2, and Mineral #3. Place a different kind of cheese on each plate.
2. Lay lab page 1 face up on the table. Lay a sheet of plastic wrap over the paper and tape it all down to the table.
3. Take about one third of cheese # 1 and press lightly into a ball. Place on circle #1 of lab sheet.
4. Press about one third of cheese #2 and place it over circle #2. Repeat with cheese #3 and place this one over circle #3.
5. Mix half of the remaining cheese #1 with half of the remaining cheese #2 together. Press together lightly into a ball and place over circle #4.
6. Mix two more balls of cheese of your choosing with two or three kinds of cheese and place on circles #5 and #6.
7. Complete lab paper.

Possible Answers:

#3. My minerals are made of one thing (substance, chemical). My rocks are made of more than one thing.

#4. mineral

#5. rock minerals or substances or chemicals

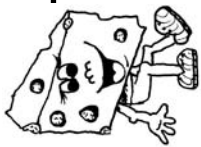
Conclusion/Discussion:

A mineral is an inorganic (i.e., not living), crystalline solid made in nature that has a single chemical composition. A rock is usually made of two or more minerals, so it does not have a pure chemical composition.

NAME _____

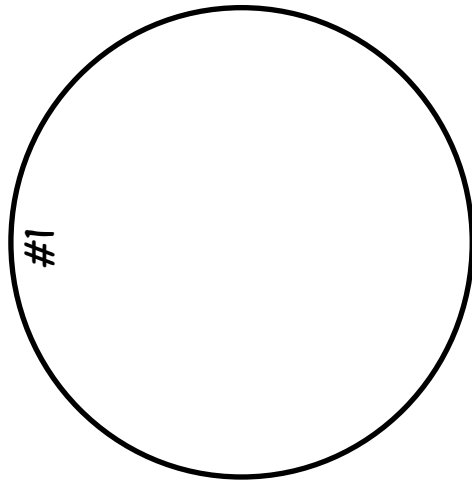
DATE _____

Mineral Lab #1: ROCKS ARE MADE OF MINERALS- p.1



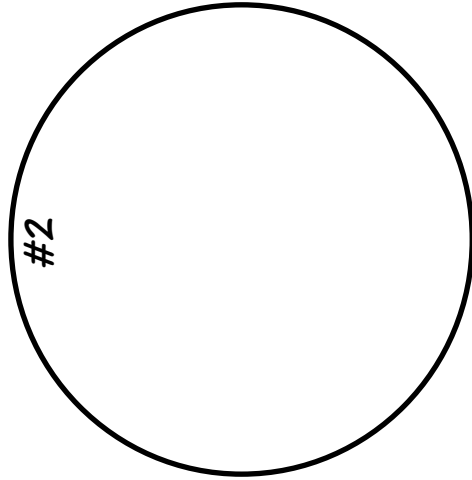
MINERAL

#1



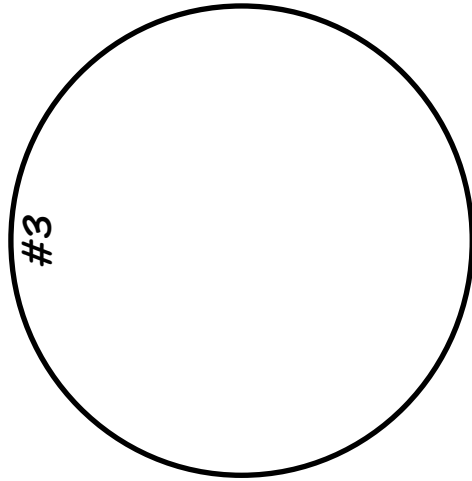
MINERAL

#2



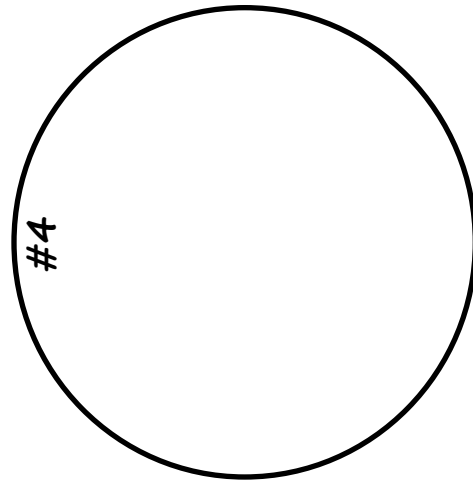
MINERAL

#3



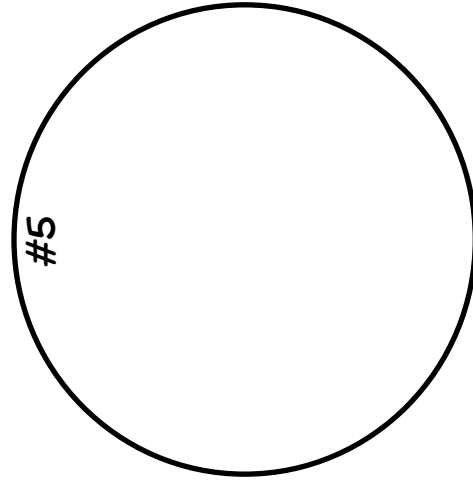
ROCK

#4



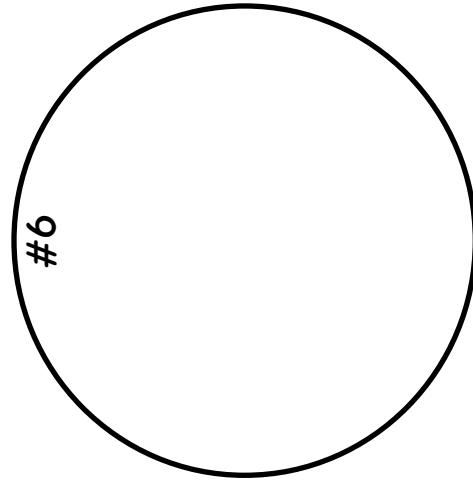
ROCK

#5



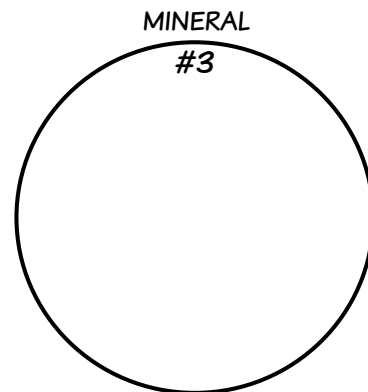
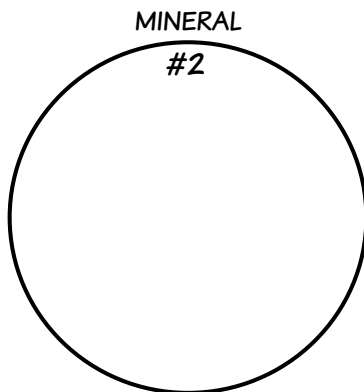
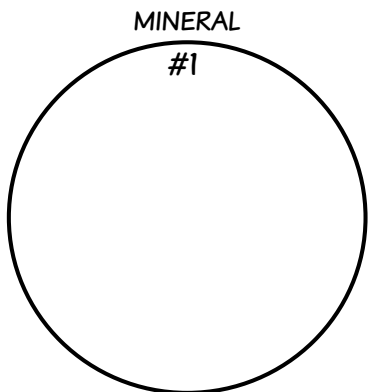
ROCK

#6

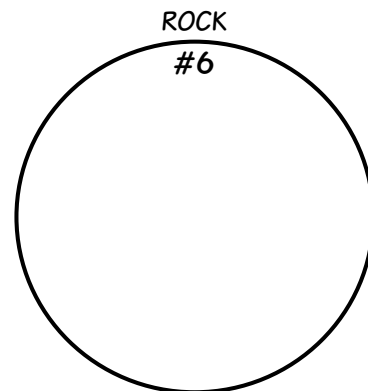
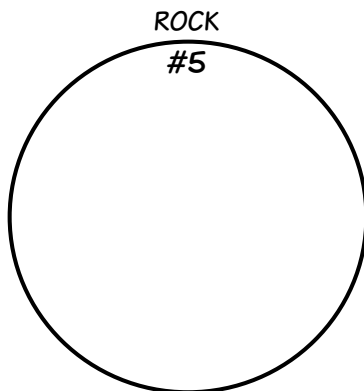
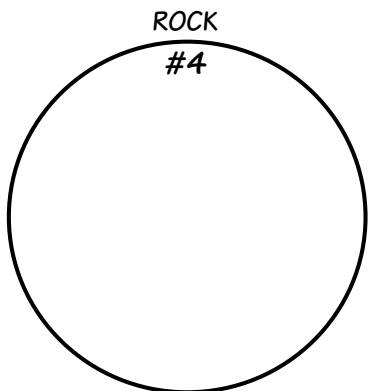


Mineral Lab #1: ROCKS ARE MADE OF MINERALS- p. 2

1. In the circles below, color how each of your cheese "minerals" look:



2. In the circles below, color how each of your cheese "rocks" look:



3. What is different about your mineral and rock models?

My minerals _____.

My rocks _____.

4. So a _____ is made of pure material.

5. A _____ is made of different _____.