

Density Worksheet

1. Pat is given the following items: a rock, sand, water, and metal bar. Pat calculates the density of each object. The results are shown below:

Rock = 3.2 g/mL

Sand = 1.9g/mL

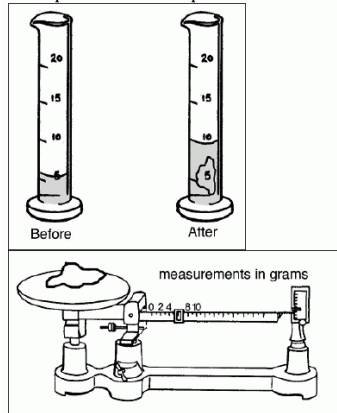
Water = 1.0g/mL

Piece of metal = 6.5g/mL

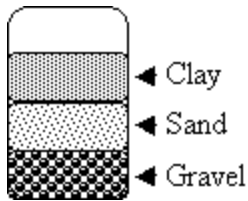
Pat then puts all of the items into a jar and shakes it up. Pat lets the jar settle for 5 minutes. What would be the expected order of the items going from the top of the container to the bottom?

2. What is the density of the rock?

Use the pictures to answer the question.



3. A student was given an assignment to calculate the density of a rock. Which of the following would best describe one of the needed steps to calculating the rock's density?
- The student puts the rock in an empty graduated cylinder and records the measurement in milliliters
 - The student puts the rock in a graduated cylinder filled with water and records the volume of the rock
 - The student uses a thermometer to measure the temperature of the rock in Celsius degrees
 - The student measures the length of the rock in centimeters with a metric ruler
4. A square chunk of plastic has a length of 5 cm, width of 5 cm and height of 5 cm. It has a mass of 200 g. What is its density?
5. Melinda works at a water treatment plant. She wants to find out whether particle size affects the way particles settle in water. Can Melinda use scientific methods to answer her question?
- No. It is not possible to know why particles settle in water the way they do.
 - No. Only scientists can use real scientific methods.
 - Yes. Whenever someone asks a question they are doing science.
 - Yes. Science is a way of knowing used by non-scientists.
6. A group of students designed an experiment to test the effect of density on the sorting of Earth materials. They added particles of various sizes: sand, gravel and clay. They were mixed in a jar and water was added. They shook the mixture and then let it settle. The jar looked like this when they were done:



Their conclusion was "Gravel is the most dense because it sank to the bottom first. Sand is less dense than gravel and clay is least dense." What variable should the experiment have controlled?

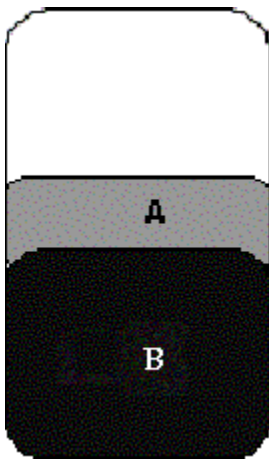
- a. color of particles
- b. size of particles
- c. density of particles
- d. amount of particles

7. Why was the experiment, in question 6, conclusion wrong?

8. When mixed, shaken, and left to settle, what would be the order of the substances starting from the bottom and going up? Use this data to answer the question.

Substance	Density
Oil	.8 g/mL
Water	1.0 g/mL
Plastic	.9 g/ cm ³
Rock	4.2 g/ cm ³
Aluminum	2.3 g/ cm ³

9. What can you assume about liquid A? Use this beaker with two liquids in it to answer the question.



10. In the past, many people thought that Earth was hollow. Why is this model of Earth not accepted now?

- a. Today scientists have collected data that support a layered model of Earth.
- b. The current layered model of Earth's structure has now been proven.
- c. Models of Earth's structure only last a certain amount of time and then they are replaced.
- d. Scientists have now taken samples of Earth's core and know the old model was wrong.

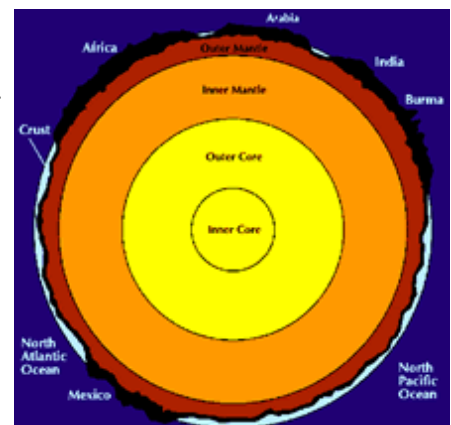
11. Why are iron and nickel found in Earth's core?

- a. They have a higher density than most of Earth's substances
- b. They have a lower density than most of Earth's substances
- c. The core is hotter than the other layers of the earth
- d. The core is colder than the other layers of the earth

12. Which of the following statements best explains why earth is layered in the following order: air -> water -> crust -> core?
- Things in nature like to order themselves by color, red to the bottom and blue to the top
 - Things in nature like to order themselves by density, most dense to the bottom and least dense to the top
 - Things in nature like to order themselves by particle size, largest particles to the bottom and smallest particles to the top
 - Things in nature like to order themselves by temperature, hottest to the bottom and coolest to the top
13. You are given the following materials and their densities and then asked to construct a model of the earth consisting of a core, mantle, crust, water, and air.

Cotton	0.2 g/mL
Glue	1.0 g/mL
clay	1.8 g/mL
Aluminum foil	2.4 g/mL
A Nickel	4.6 g/mL

- Based on density, which material would be the best choice to represent the core of the Earth?
 - Based on density, which material would be the best choice to represent the mantle of the Earth?
 - Based on density, which material would be the best choice to represent the crust of the Earth?
 - Based on density, which material would be the best choice to represent the water of the Earth?
 - Based on density, which material would be the best choice to represent the atmosphere of the Earth?
14. Why is air less dense than Earth's rocks?
- The molecules in rock are larger than the molecules in air.
 - The molecules in rock are smaller than the molecules in air.
 - The molecules in air are further apart than in rocks.
 - The molecules in air are closer together than in rocks.
15. Which parts of the model on the right are accurate?
- The names of Earth's layers
 - The color of the layers
 - The thickness of the layers
 - The height of the mountains
16. A rock and a lead weight both sink when dropped into a lake. What do you know about their densities?
- They have the same density.
 - They have different densities.
 - They are denser than water.
 - They are less dense than water.



17. Why is finding the density of gasses difficult?
- They cannot be trapped.
 - They are often deadly
 - They have a large mass.
 - Their volumes are changeable.
18. A rock dropped in a graduated cylinder raises the level of water from 20 to 35 mL. The rock has a mass of 45 g. What is the density of the rock?
- 1.3 g/cm^3
 - 2.3 g/cm^3
 - 3.0 g/cm^3
 - 4.5 g/cm^3

19. Students mixed sand, gravel, clay and humus in a jar with water and shaken. The substances settle out in the jar as pictured to the right.

- Why did the gravel settle first?
- If this jar were a river, which sediment would wash away first? Why?



20. In the spring, rivers in Utah are often brown in color because they contain very small particles of sediment called silt. Why is silt suspended in the water?
- Silt is in brown in color and contains mica.
 - The water is moving more slowly in spring.
 - Silt particles float easily and have low density.
 - Water has a high density and large particle size.
21. In winter, a layer of cold air settles in the valleys and warmer air is often found higher in the mountains. What might account for this condition?
- There is more warm air than cold air.
 - There is more cold air than warm air.
 - Cold air is less dense than warm air.
 - Cold air is denser than warm air.
22. Which question would help a student learn more about the behavior of materials in a mixture?
- Does lake water dry out in warm winters?
 - How many kinds of minerals form naturally?
 - What happens to soil after a landslide?
 - How is a living thing organized?

23. Describe how you would find the density of air, water and rock.