Density, Deposition, and Earth’s Layers Review

Parent Signature: 2% extra credit on test if review is completed and signed by parent.
I have gone over this study guide with my student for at least 30 minutes. ____________________________

Part 1: Density
1. What are the three descriptions of density?
   a. Mass to Volume Ratio
   b. How much matter in an object compared to how much space it takes up
   c. How tightly packed the atoms/molecules are

2. What is the equation for density?  Mass divided by Volume = Density

3. Which unit is used to measures volume?  Which unit is used to measure mass?
   Volume: mL or cm$^3$
   Mass: g

4. Solve the following density problems (include units in your answer):
   a. An object has 15 grams of atoms and displaces 2.5 mL of water when dropped into a cylinder.
      Density 6 g/mL
   b. A brick has a volume of 134 cm$^3$. When it is weighed, you discover that its mass is 912 grams.
      Density 6.8 g/cm$^3$
   c. An object has a mass of 185 grams and a volume of only 9.7 mL.
      Density 19.07 g/mL
   d. A Lego is measured with a ruler and found to have a volume of 5 cm$^3$. Its mass is 2.3 grams.
      Density 0.46 g/cm$^3$

5. What is necessary for a rubber duckie to float in a liquid?
   It has to be less dense than water.

6. How could you get the rubber duckie to sink in the same liquid?
   Squeeze out the air and let it fill with liquid. Without the air, it will be more dense.

7. What is the density of water (include units!)?
   1 g/mL
8. Fill in the beaker and label how the substances below would layer.

**Liquids:**
- Water (1 g/mL)
- Corn syrup (1.38 g/mL)
- Dish soap (1.1 g/mL)
- Mineral Oil (0.9 g/mL)
- Rubbing alcohol (0.87 g/mL)

**Solids:**
- Candle (0.95 g/mL)
- Rubber Stopper (1.3 g/mL)
- Eraser (1.36 g/mL)
- Plastic Egg (1.07 g/mL)
- Marble (3.2 g/mL)

**Gases:**
- Air (0.001 g/mL)

**Part 2: Deposition and Earth’s Layers**

1. What is deposition?
   *The settling of sediments out of wind or water*

2. What are the two main factors that affect deposition?
   *Particle density and particle size*

3. Explain the deposition in the following diagram:

4. Which layer of the Earth is the:
   - Most dense? *The inner core*
   - Least dense? *The atmosphere*

5. Which layer of the Earth is the:
   - Thickest? *The mantle*
   - Thinnest? *The crust*

6. Why is the inner core a solid when the outer core is hot enough to be a liquid?
   *It is under so much pressure that the molecules can’t move apart from each other.*

7. As you move from the atmosphere in toward the center of the Earth, three important things increase. What are they?
   *Heat, Density, and Pressure*
8. Label the 5 layers of the earth below with their names, thicknesses, and phases of matter: Label the two straight lines in the picture.

From outside to inside:
*Atmosphere, Gas, 100 km thick
*Crust, Solid, Basalt and Granite (rock) 7-70 km thick
*Mantle, Solid, Rock, 2900 km thick
*Outer Core, Liquid, Iron and Nickel and Sulfur, 2200 km thick
*Inner Core, Solid, Iron and Nickel, 1200 km thick

9. In March the American Fork River is going to be full of muddy, silty water. The river may even pick up small rocks and gravel in the upper sections of the canyon where the river is steep and the water is moving fast. Explain to me how that sediment is going to settle out of the water as the river makes its way out of the canyon and down to Utah Lake. Draw a picture with detailed labels if that helps you.

The largest and most dense particles will settle out first, they will settle out in the upper sections of the river where the water is still moving pretty fast. Smaller rocks will settle out as the river gets less steep and the water slows down. The smallest rocks, sand, and silt particles will settle out last when the water is moving much slower or when it stops moving as it enters a large body of water like a lake.

10. Write a paragraph explaining earthquakes. Include information about the layers of the earth involved, convection currents, density changes in the mantle, movement of the tectonic plates, etc.

The center of the earth is very hot. This heat causes the mantle to also get very hot. The molecules in the mantle become less dense (they move farther apart) as they become hot. This causes them to rise, to try to float on top of more dense particles. When they rise and are farther from the core, the molecules cool down, get closer together, and sink. This movement of materials over and over creates a current known as a convection current. As the rock is moving, it causes the tectonic plates above it to move. This movement is an earthquake. When hot material from the mantle escapes to the surface, this is a volcano.
Use the graph to answer the following questions:

1. Which bar represents the atmosphere?
   Bar D

2. Which bar represents the crust?
   Bar E

3. Which bar represents the mantle?
   Bar C

Use the graph to answer the following questions:

1. What is the temperature of the water when the density is the lowest? 12 °C

2. What is the density of water when the temperature is 10°C? 999.7 kg/m³

3. As water gets colder, it gets more dense until it reaches a magical temperature where its atoms move slightly further apart (it becomes less dense.) What is that temperature? 4 °C
Look at the graph above to answer the questions below:

1. How much larger in size is the boulder compared to the pebble?
   a. About 50 mm
   b. **About 220 mm**
   c. About 270 mm
   d. Impossible to tell

2. If all five of these were moving down a stream, which one would most likely be carried the furthest?
   a. The Boulder
   b. The Cobble
   c. The Pebble
   d. The Sand
   e. The Silt
   f. Impossible to tell

3. How do the densities of the following sediments compare?
   a. The boulder has a much larger density
   b. The silt would have a much larger density
   c. Both the boulder and the cobble would have the highest density
   d. **Impossible to tell, the size doesn’t influence the density of the sediment**
1. What is the graph telling us?
   a. As the depth of the earth increases, the temperature decreases
   b. As the depth of the earth decreases, the temperature increases
   c. As the depth of the earth increases, the temperature increases
   d. As the depth of the earth increases, the pressure increases

2. What are the units of measurement used to measure the depth and temperature?
   a. Celsius, Kilometers
   b. Farenheit, Kilometers
   c. Celsius, Miles
   d. Farenheit, Miles

3. What is the change in temperature from a depth of 2000 km to a depth of 4000 km?
   a. Decrease of 2,000 km
   b. Increase of 2,000 km
   c. Increase of 5,000 km
   d. Decrease of 5,000 km

4. Which layer of the earth would you be in at about 3,200 km deep?
   a. Crust
   b. Mantle
   c. Outer Core
   d. Inner Core
**Review**

**Definitions:**

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<th>Solid: A substance with a fixed shape and a fixed volume. (Shape stays the same regardless of container.) (Particles vibrate)</th>
<th>Liquid: A substance with a fixed volume but no fixed shape. (Takes the shape of its container.) (Particles move around slow to medium speed.)</th>
<th>Gas: A substance with no fixed volume or shape. (Fills all space available.) (Particles bounce off every surface in all directions.)</th>
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**Name the changes:**

- Solid to Liquid to Gas  
  ↑  ↑  Melting, Evaporating
- Gas to Liquid to Solid  
  ↑  ↑  Condensation, Freezing
- Solid to Gas  
  ↑  Gas to Solid  
  ↑  Sublimation, Deposition/Desublimation

**Thermal Expansion:** The tendency of matter to change in volume in response to a change in temperature.

**Observation:** Information gathered with your five senses. What you can directly hear, see, smell, taste, or touch.

**Inference:** A guess that is based on your observations.

**Dependent Variable:** The variable you are measuring, it changes in response to the Independent variable. (Y axis of graph)

**Independent Variable:** The variable you change on purpose to discover what effect it has on the outcome. (X axis of graph)

**Controlled Variable:** The variables you keep the same in order to test only the independent variable and make every trial a “fair test.”