Name Key

Period _____ Date _____

Density Notes

Earth Science

Density

- Density is the concentration of matter in an object.
- Which of the following is the most dense?

A B C D

Answer on ESRT

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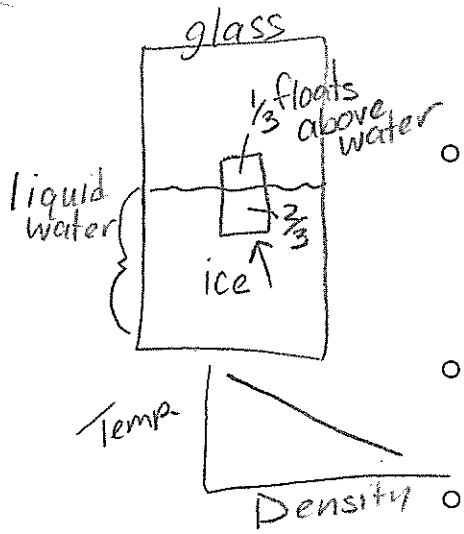
Base your answer to the following question on the *Earth Science Reference Tables*.

Water has its greatest density at a temperature of

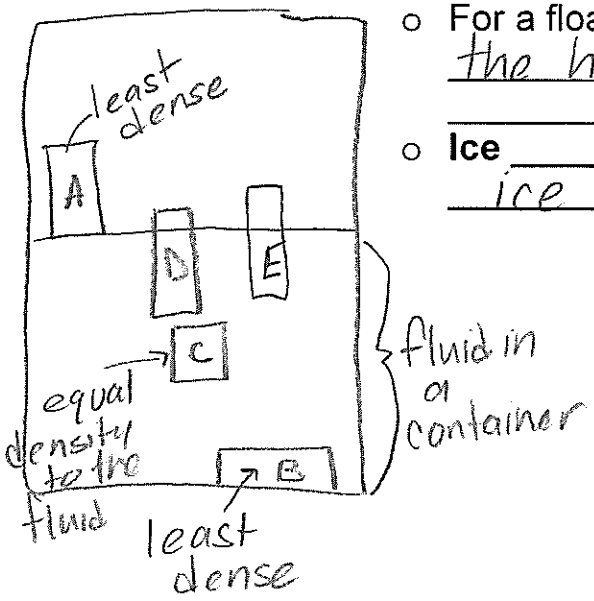
(1) -6° C
(2) 10° C
(3) 32° C
(4) 4° C



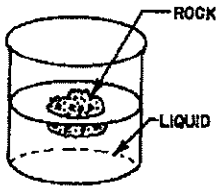
- Most substances are most dense in the solid phase
  - * Exception: Water is most dense as a liquid at 4°C.
- **As the temperature of a substance increases,** the density decreases. (The molecules get farther apart.)
- **As the temperature of a substance decreases,** the density increases. (The molecules get closer together.)

- Floating and Sinking
  - Less dense objects will float ex. ice or wood in water
  - More dense objects will sink ex. most rocks will sink in water.

- If the object and the fluid are equally dense, the object will stay suspended below the surface
- For a floating object, the lower the density, the higher the object will float in the fluid.
- **Ice** floats **in water because** ice is less dense than water.



The diagram below shows a glass jar containing a clear liquid and a floating rock.



Which conclusion about the relative density of the rock and the liquid is true?

(1) The rock is less dense than the liquid.
(2) The rock is more dense than the liquid.
(3) The rock and the liquid have the same density.

mass = amount of matter (g)

Volume = amount of space (mL) or (cm^3)

- Calculating Density
  - The higher the number, the more dense it is.
  - You do not have to remember the formula because it is on page 1 of your ESRT.

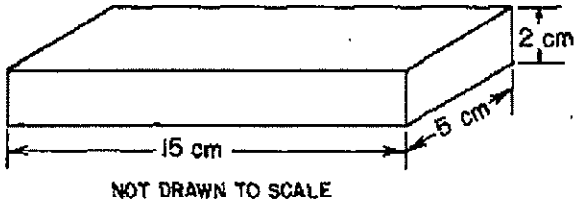
- **Example # 1** The mass of an object is 13.5 grams and its volume is 4.2 milliliters. Round your answers to the nearest tenth.

1. Write the formula: $\text{Density} = \frac{\text{mass}}{\text{volume}}$
2. Substitute the numbers: $= \frac{13.5\ g}{4.2\ mL}$
3. Do the math: $= 3.214285714$
4. Units/Rounding: $= 3.2\ g/mL$

$V = l \times w \times h$
$= 15 \times 5 \times 2$
$= 150\ cm^3$

$D = \frac{450\ g}{150\ cm^3}$
$= 3\ g/cm^3$

The diagram below represents a rectangular object with a mass of 450 grams. According to the *Earth Science Reference Table*, what is the density of the object?



NOT DRAWN TO SCALE

(1) 1 gram per cubic centimeter
(2) 2 grams per cubic centimeter
(3) 3 grams per cubic centimeter
(4) 4 grams per cubic centimeter

Density (continued)

- KEY IDEA: Density does not depend on size or SHAPE.
- If you cut an object in half its density will STAY THE SAME!!!.
- Prove it to yourself and calculate the densities of a wood block and half of the wood block:

- Whole Wood Block
  Mass = 20.0 grams

  Volume = 40.0 milliliters
  ~~milliliters~~ ignore

$D = \frac{m}{V}$
$= \frac{20\ g}{40\ mL}$
$= .5\ g/mL$

Half a Wood Block
Mass = 10.0 grams

Volume = 20.0 mL

$D = \frac{m}{V}$
$= \frac{10\ g}{20\ mL}$
$= .5\ g/mL$

The Plan

1. Notes - p 1 + 2
2. Density Math Practice
3. Notes p. 3
4. Lab: Density of Water
5. Density Quiz -