Eureka – Archimedes Principle Worksheet 1 Name_____

Measuring known objects and finding volumes and densities of unknown objects

Your group will need: 1 ruler, 1 graduated cylinder (half filled with water), 1 scale, 1 collection of sample materials (wood-2 sizes, steel, aluminum, plastic, glass, foam, water and oil), 1 unknown object, and 1 worksheet per student.

First we will measure dimensions and weights of all of the known objects with regular shapes and calculate the density of each.

Take the small block of wood.
Measure its length width and height in centimeters and record the values here:
Length: _____ Width: _____ Height: _____
Calculate the volume of the block in cubic centimeters: _____
Put the block on the scale and measure the weight in grams. Record the value here:
Weight: _____
Calculate the density in grams per cubic centimeters: _____

Now take the large block of wood.
Do you think it has more weight (weighs more) than the small block?

_____

Do you think it will have a different density than the small block? Why or why not?

_____

Now measure the large block of wood and record your results below.
Length: _____ Width: _____ Height: _____
Volume: _____
Weight: _____
Density: _____
Was the density what you predicted? Why do you think this is?

_____

Choose two more samples to measure and record your results below.

Sample Name: _____

Length: _____ Width: _____ Height: _____ Volume: _____

Weight: _____ Density: _____

Sample Name: _____

Length: _____ Width: _____ Height: _____Volume: _____

Weight: _____ Density: _____

Which of your objects will float on water?

_____

Water has a density of 1 g/cm^3, so how can we tell what things will float on water?

_____

After your group has calculated the density of your samples, record the findings on the board for the whole class.

Choose one of your objects that will sink in water and put it in the graduated cylinder. Measure how much the water level changed in milliliters and record that here.

Initial Volume: _____ Final Volume: _____

Displacement volume (Final-Initial): _____

How does this relate to the volume of your object? Why? Remember 1 mL = 1 cm^3.

_____

Now take your mystery object.

Just by looking at it and feeling it, what do you think it is made of?

_____

Do you think it will float on water? Why or why not?

_____

Now measure the weight of your object using the scale and record that here.

Weight: _____

Now put the object in the graduated cylinder. Measure the displacement and record it.

Initial Volume: _____ Final Volume: _____

Displacement volume (Final-Initial): _____

Now calculate the density of the object: _____

Remember that the density of a material will always be the same regardless of size or weight. Based on your findings, what is the object made of?

_____

How sure are you of this? _____

Is it the same as your initial guess? _____

Where do you think there could be room for errors in your calculations?

_____

Would these errors be enough to change what you think the mystery object is? Why?

_____

Why do engineers need to understand the properties of a material? Give **three** examples of when an engineer would need to understand the density of a material:

_____

_____

_____