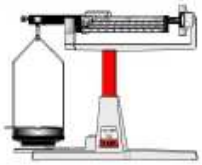
Name: _____

Period: _____

10

Measuring Density

The density of an object is defined as how compact it is. To find an object's density, you must measure its mass and volume.



Measuring the mass of a solid is simple with a balance scale.

Density: → $D = \frac{m}{V}$ ← Mass in grams (g)

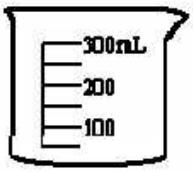
in g/mL or g/cm^3

Volume in cm^3 or mL

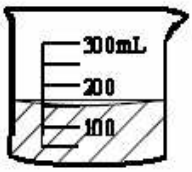
Density = Mass ÷ Volume

Mass of a Liquid

You can't measure a liquid by putting it on a scale. You must measure it while it is inside a container.



Before (empty)
$m_{empty} = 300$ g



After (with liquid)
$m_{with\ fluid} = 450$ g

The beaker has more mass afterwards, since it has a liquid in it.

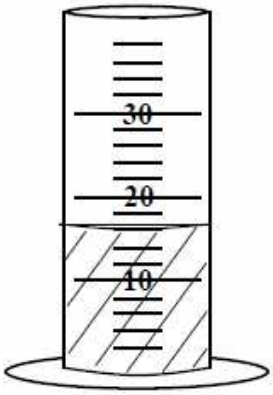
Mass with liquid − Mass empty = Mass of liquid

450g − 300 g = 150 g

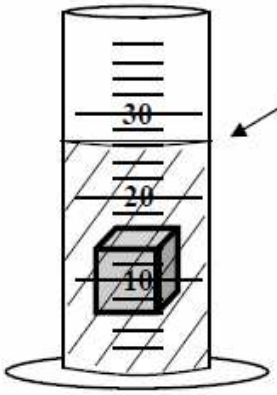
The liquid has a mass of 150 g.

Displacement Method

The displacement method allows you to easily and quickly measure the mass of an object by measuring how much water it displaces.



Before (Just water)
$V_{before} = 16$ mL



After (With object)
$V_{after} = 26$ mL

The water went up because the object displaced the water.

Volume after − Volume before = Volume of object

26 mL − 16 mL = 10 mL

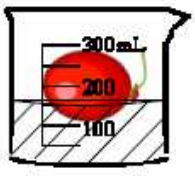
The object has a volume of 10 mL.

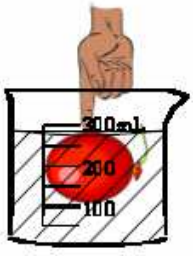
Use the displacement method when an object is hard to measure because it has a strange or irregular shape. OR use the displacement method for regular objects just because it is easy and fast.

Floating Objects

If an object floats, it is necessary to submerge it, push it into the water in order to use the displacement method to find its volume.

The object floats, so you can't find its volume easily.





Push the object into the water until the top of it is at the top of the water

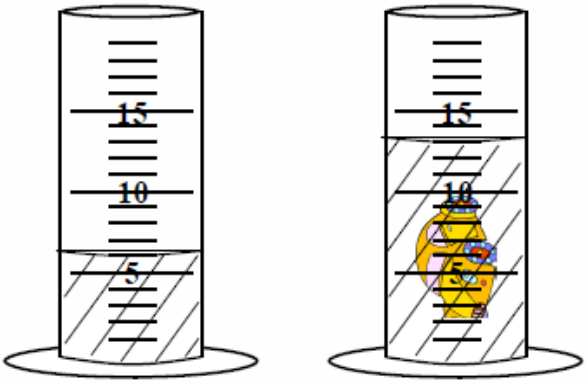
Sinking an object—
If an object is hollow and has a water tight lid you could fill it with a denser object and sink it. Be sure to take the mass of the empty container to find its density, though.

How do you measure the mass of a solid?

How do you measure the mass of a liquid?

How do you measure an irregular shaped object?

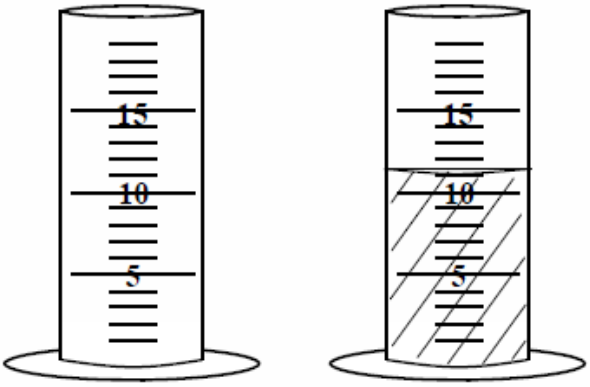
How do you measure the volume of a floating object?



Volume before: _____ Volume after: _____

Volume of the toy car: _____

If the mass of the toy car is 14 grams, find its density.

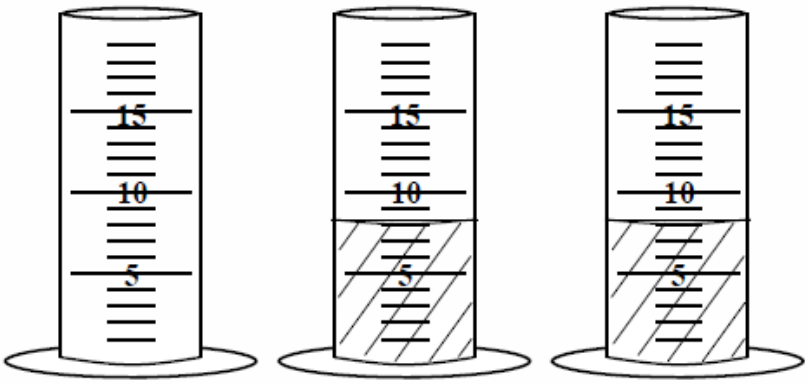


Empty mass: 65 grams Mass with liquid: 88 grams

Volume of liquid: _____

Mass of the just the liquid: _____

What is the density of the liquid?



Empty mass: 65 grams

With Liquid A: 73 grams

With liquid B: 71 grams

The two liquids have the same: _____

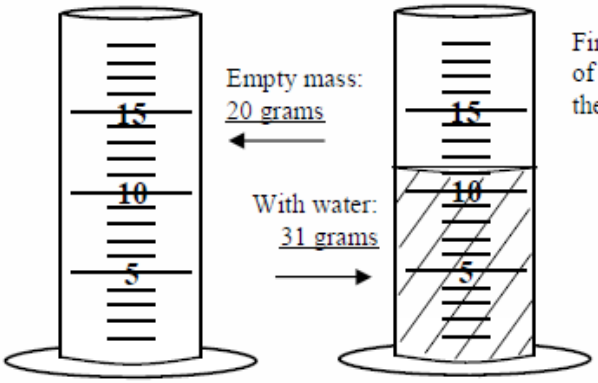
Which one has more mass? _____

Volume of A: _____ Mass of A: _____

Density of Liquid A: _____

Volume of B: _____ Mass of B: _____

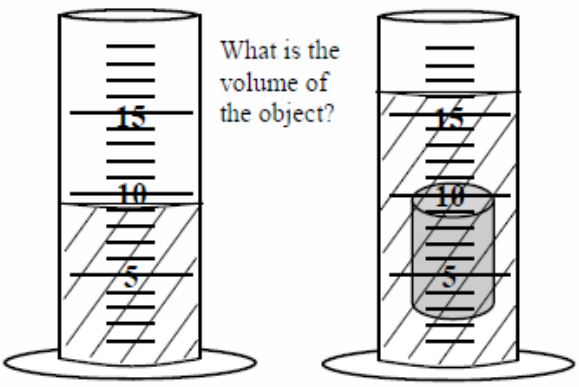
Density of Liquid B: _____



Empty mass: 20 grams

With water: 31 grams

Find the density of the liquid in the cylinder.



What is the volume of the object?