What's Going On?

Checking In

Minds on Measuring Solids and Liquids

Action! Calculating Density

Consolidation Density Mini-Experiment

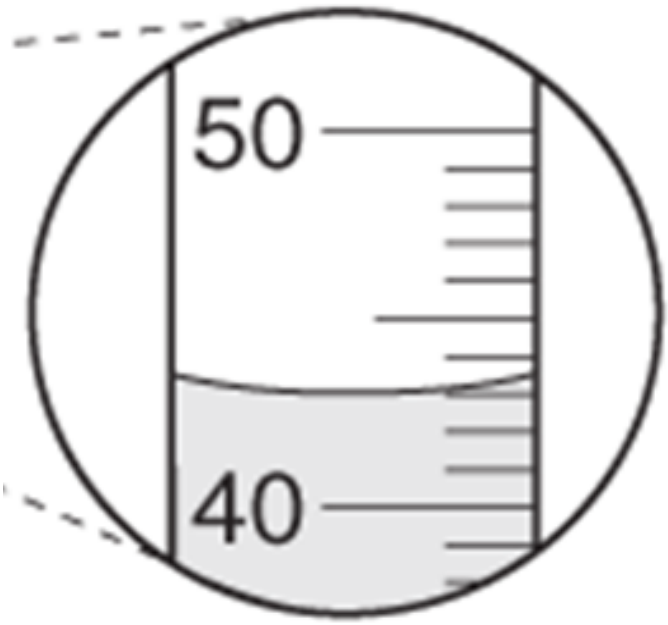
Learning Goal - I will be able to calculate the density of a substance given its mass and volume.

Minds on

Measuring Liquids

To measure the volume of a liquid, we will use a graduated cylinder.

Numbers increase from bottom to top.



Close-up view

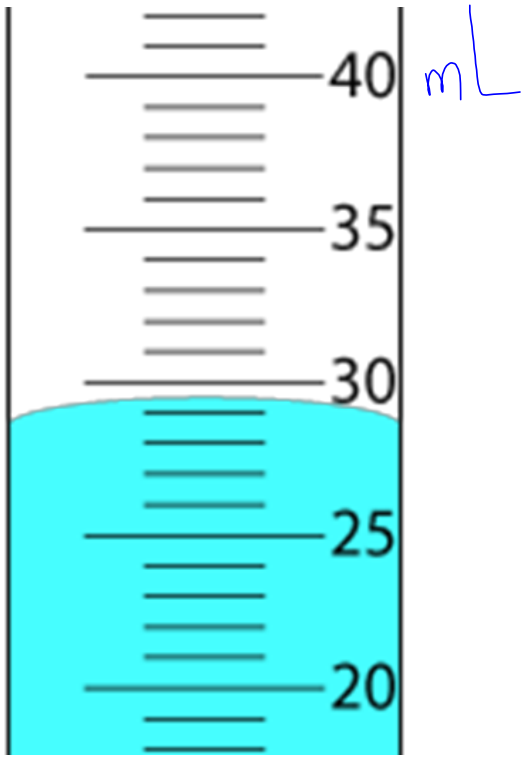
Minds on

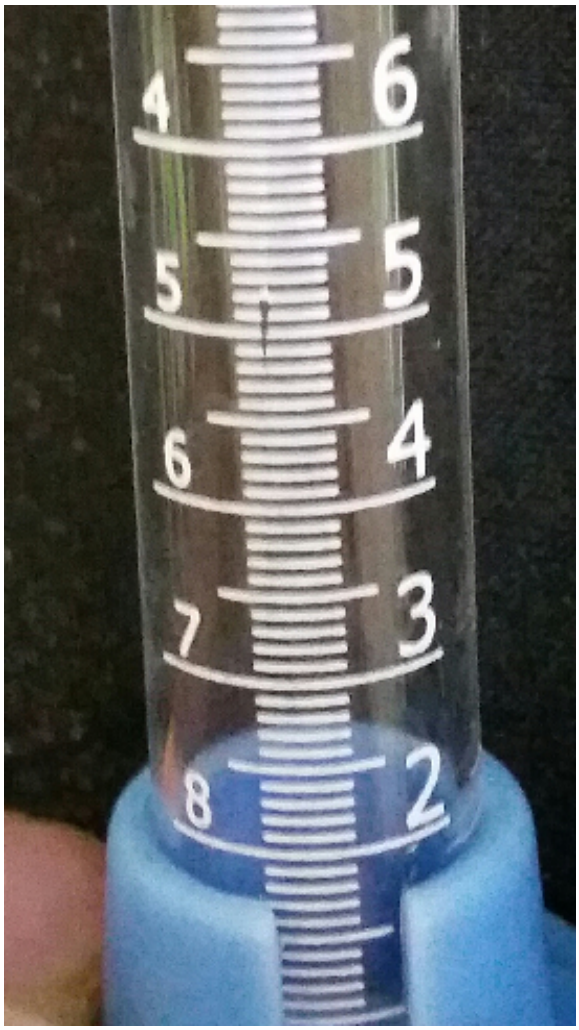
Measuring Liquids

Each cylinder will have its own numerical increase.

What volume does each line represent on this cylinder? 1 mL

Assume we are looking at millilitres (mL)





$$\frac{1\ mL}{10\ lines}$$

$= 0.1\ mL/line$

Minds on

Determining Scale

1. Pick two numbers on the cylinder.

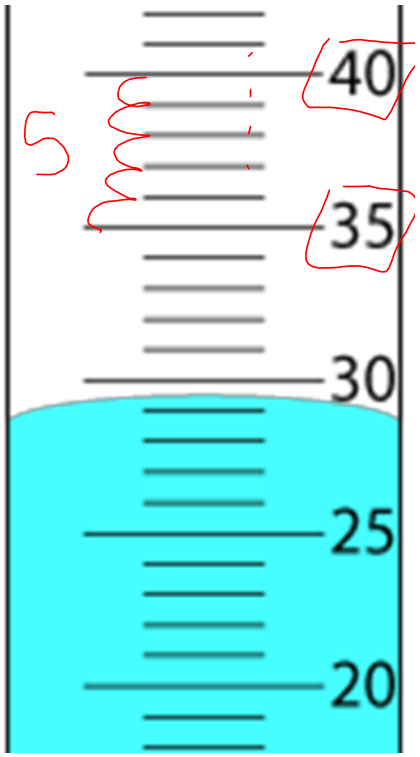
35 & 40

2. Determine the numerical increase. (SUBTRACT)

40-35 = 5mL

3. Count the number of lines to get from one number to the other.

5 lines



4. Divide the numerical increase by the number of lines to determine what volume each line represents.

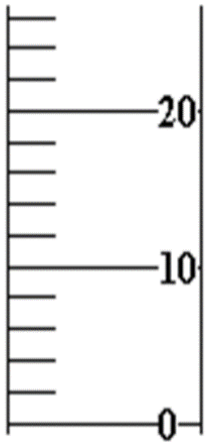
5mL ÷ 5 lines = 1 mL/line

Minds on

Determining Scale

Determine the scale of each graduated cylinder.

a) 1



b) 2

c) 0.2

d) 0.5

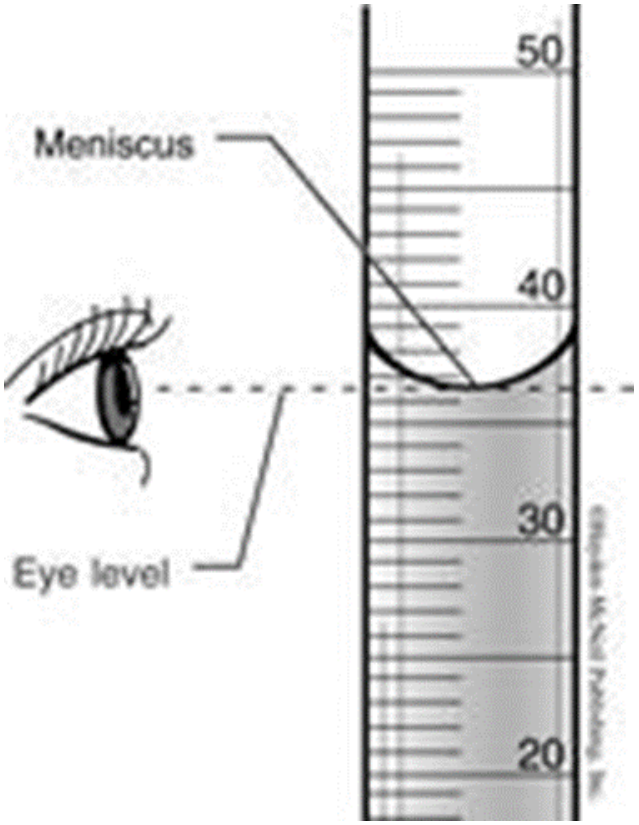
Minds on

Measuring Liquids

The Meniscus

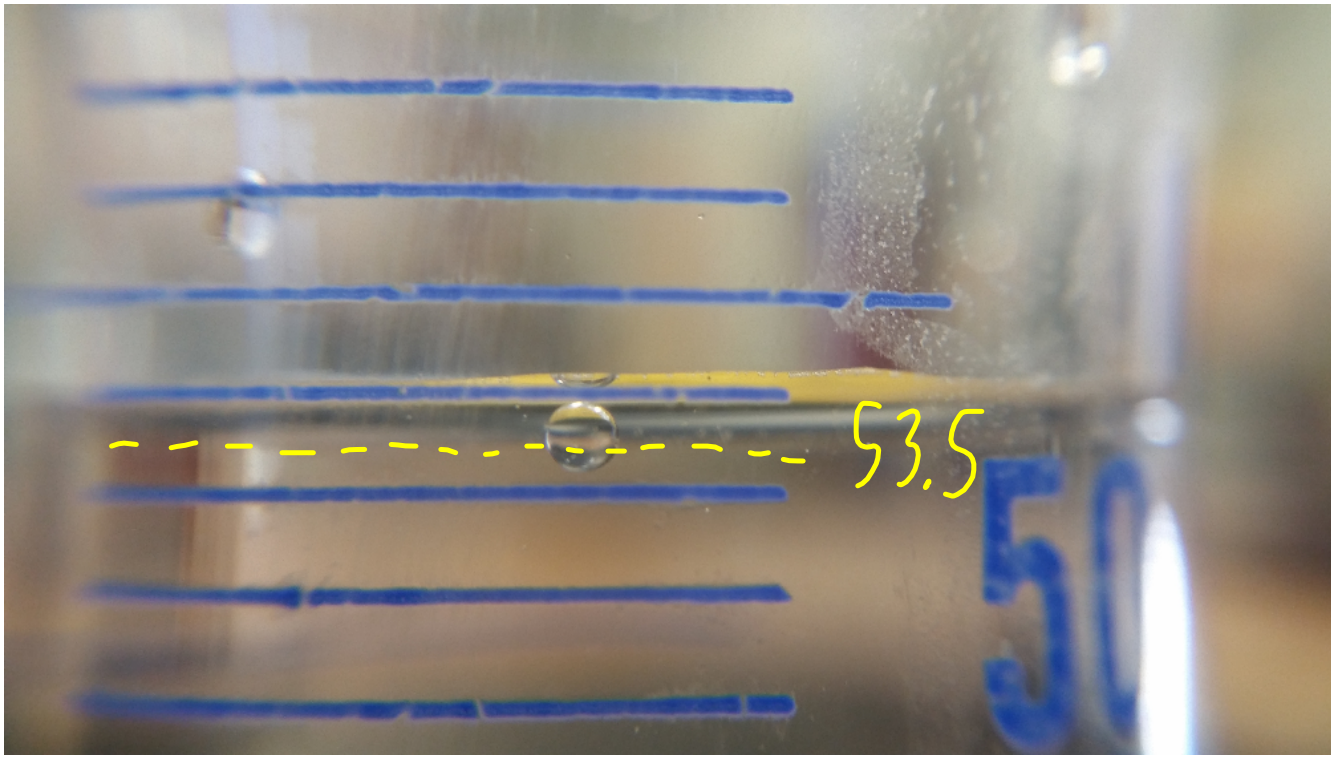
To read the volume of a liquid, we have to use the meniscus.

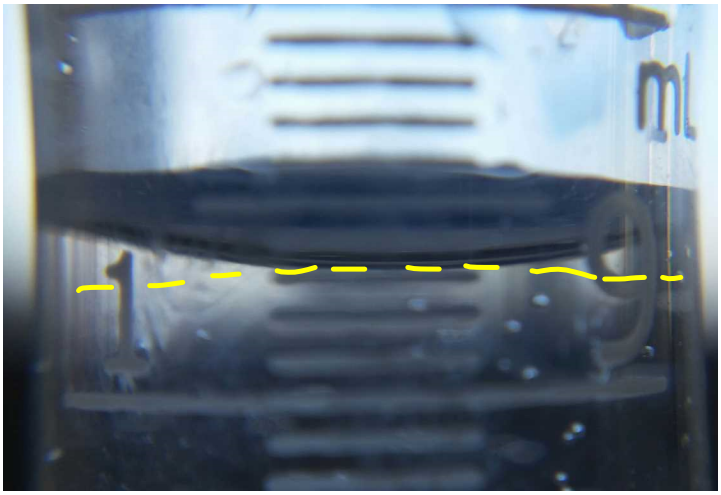
Always take your reading from the **bottom** of the meniscus!



What's the Volume?

36.5 mL


53.5
50


mL
9.3mL

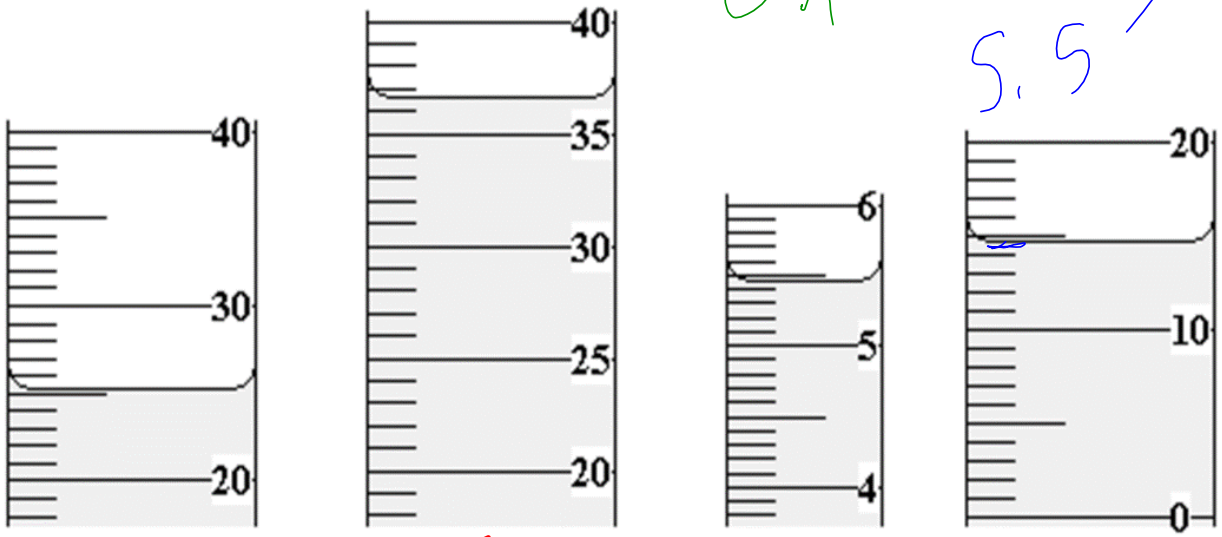
Minds on

Measuring Liquids

0.1 0.15 0.2 0.25

Determine the volume in each graduated cylinder.

0.1 5.4 5.5 > 5.45



a) 25.0mL b) 36.5mL c) 5.45mL d) 14.5mL

Steps

1. Determine the scale of each cylinder.
2. Use the scale and the meniscus to determine the volume in each cylinder.

Action!

Density

What weighs more,

a litre of water or a litre of honey?

Why? Because it's "denser"

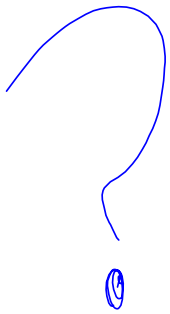
Action!

Density

What weighs more,

100 mL of water or 100 mL of oil?

Why?

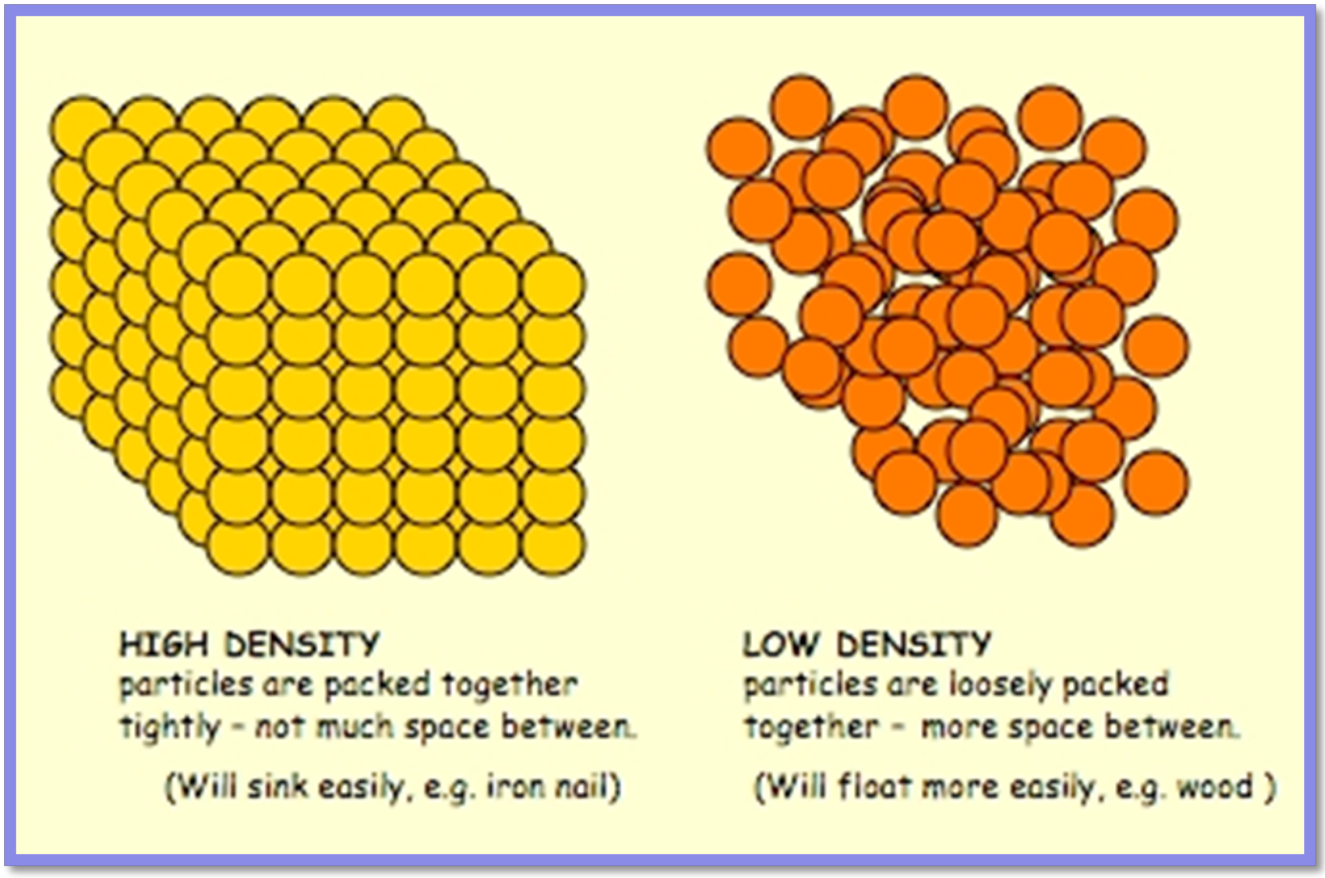


Action!

Density

A litre of honey weighs more because honey is **more dense** than water.

What does it mean for something to be "more dense"?


HIGH DENSITY
particles are packed together tightly - not much space between.
(Will sink easily, e.g. iron nail)
LOW DENSITY
particles are loosely packed together - more space between.
(Will float more easily, e.g. wood)

Action!

Density

Density is all about the mass of a given volume of a substance.

The **mass** of a substance tells us how much matter it contains.

The **volume** of a substance tells us how much space it takes up.

Action!

Density

The units we will use for mass are:

grams (g)

kilograms (kg)

Action!

Density

The units we will use for volume of liquid are:

millilitres (mL)

litres (L)

Action!

Density

The units we will use for volume of a solid are:

cubic centimetres (cm^3)

cubic metres (m^3)

Action!

Density

If we know the mass and volume of something, we can determine the density!

Because density is a measure of the mass in a given volume, we can look at it as mass **per** unit volume.

Action!

Density

The units we will use for the density of a liquid are:

(g / mL) $\frac{\text{mass}}{\text{volume}}$

Read as grams per millilitre

That is, how many grams are in 1 mL.

Action!

Density

The units we will use for the density of a solid are:

(g / cm^3)

Read as grams per cubic centimetre

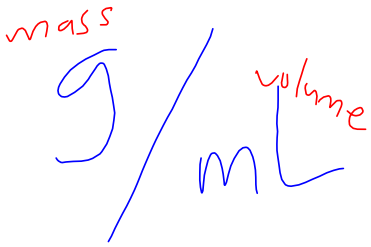
That is, how many grams are in 1 cm^3.

Action!

Density

Calculating Density

We can calculate density by dividing mass by volume.



Action!

Density

The Density Triangle

We can calculate density by dividing mass by volume.

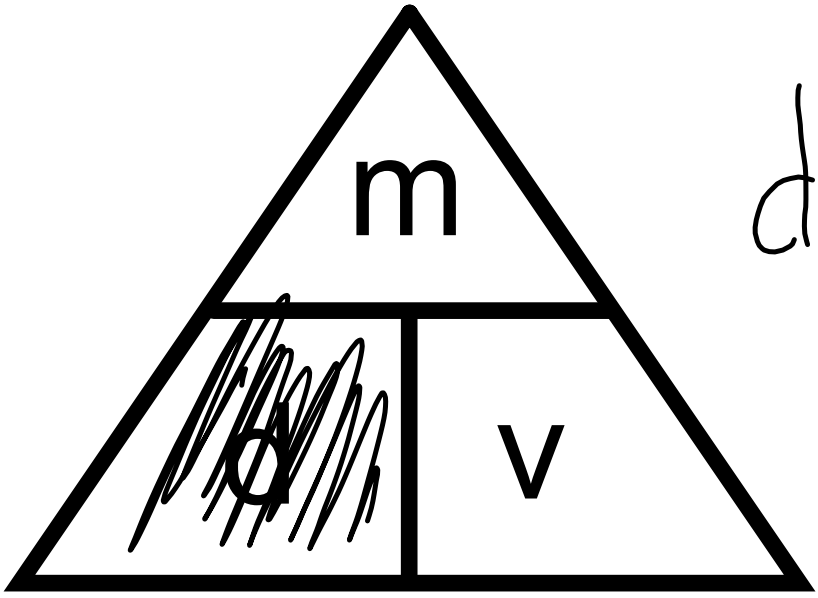
We can also calculate volume or mass if we know the other two!

We use the Density Triangle!

Action!

Density

The Density Triangle

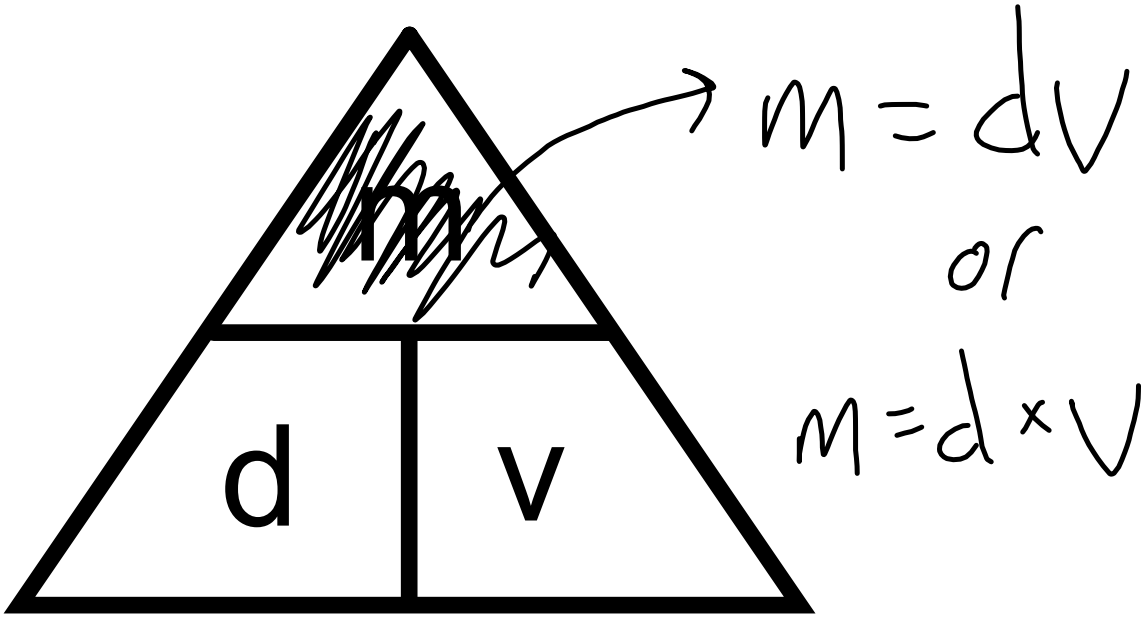


$$d = \frac{m}{V}$$

Action!

Density

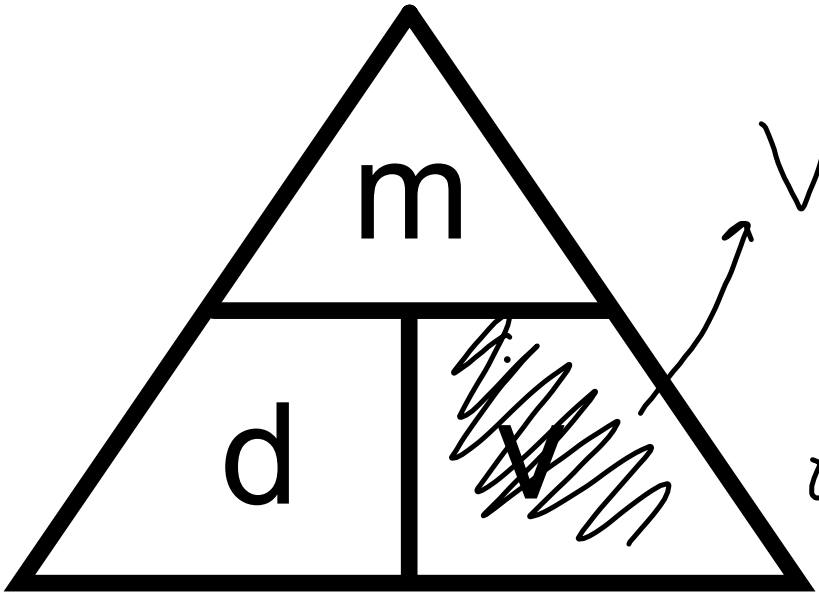
The Density Triangle



Action!

Density

The Density Triangle



$V = \frac{m}{d}$

or $V = m \div V$

Consolidation

Density Mini-Experiment