

Part 4 Volume and Density

Name: _____

Due: _____

Some Water Basics

Science uses _____ as a part of the metric system.

1 cubic centimeter of water weighs _____

Example 1,000 ml weighs 1,000 grams

(1 liter) = (1 kilogram)

Volume: The _____ - _____ space an object occupies.

Volume is also the _____ that matter occupies.

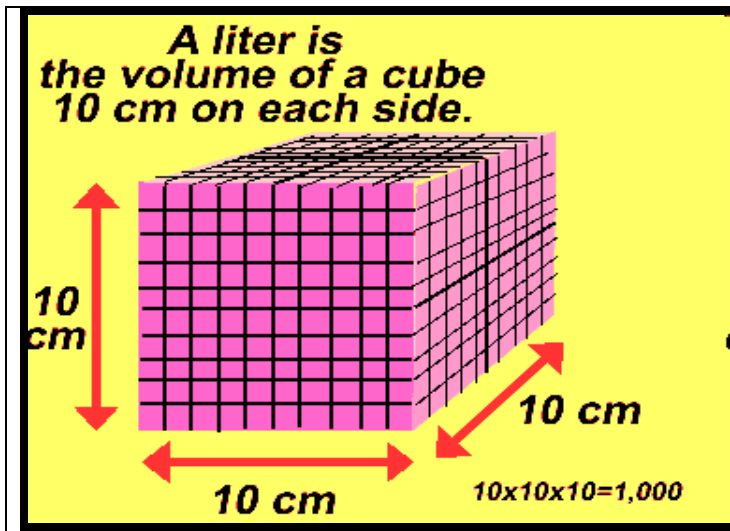
Matter is anything that has mass and takes up space.

Important note: Mass and weight are _____

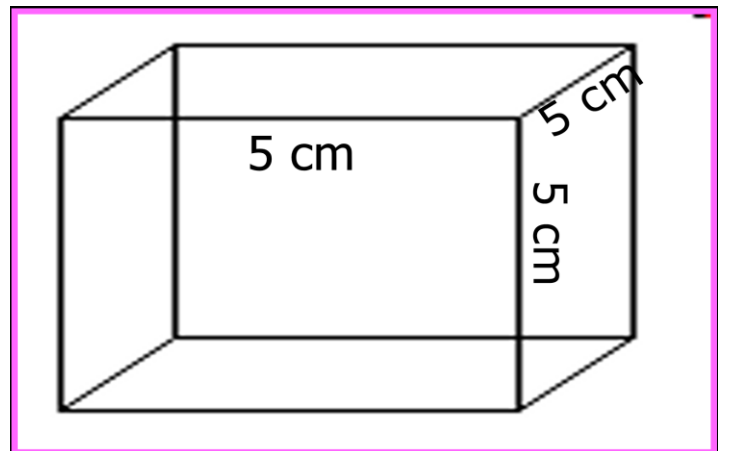
-Mass is a measurement of the amount of matter something contains.

-Weight deals with the pull of gravity.

Even if you are weightless in space you still have mass.



What is the volume of this cube?

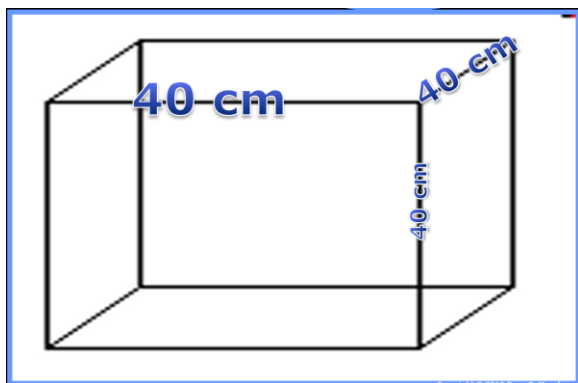


How do you find the volume of a cube?

- Length x Width x Height = _____ cm³

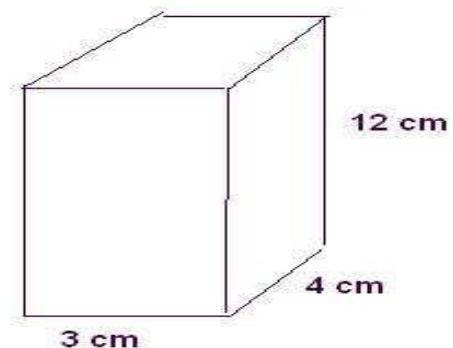
What is the volume of this cube?

Answer=



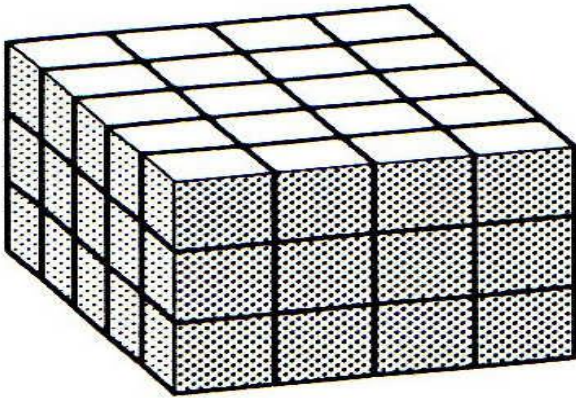
What is the volume of this rectangle?

Answer=



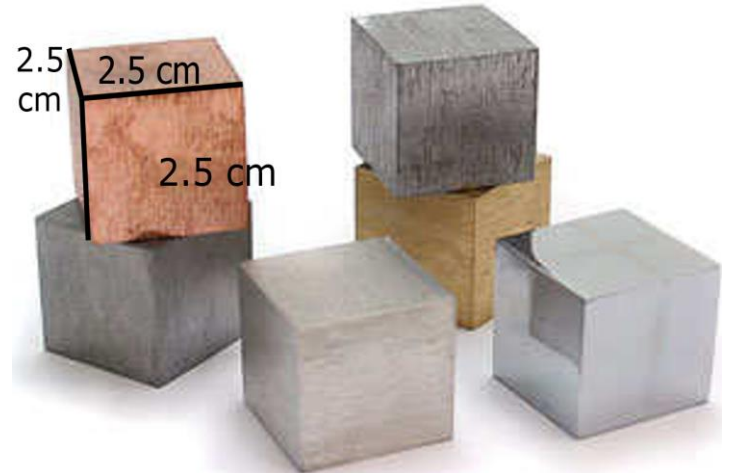
What is the volume of this rectangle? Each unit is equal to 1 cm³

Answer=

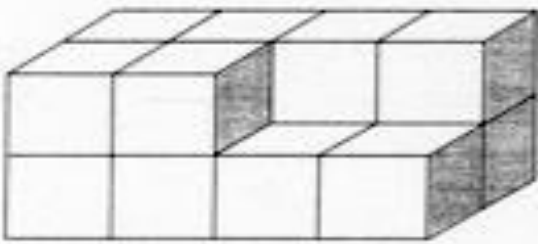
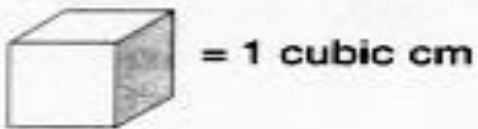


Find the density of the density cubes?

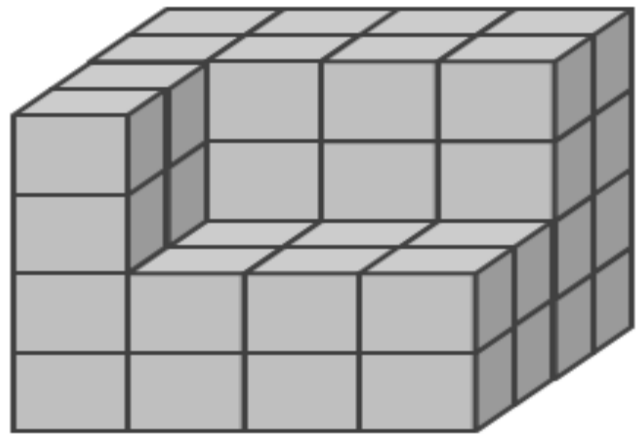
Answer=



What is the volume of this shape?



What is the volume of the shape below?



Volume of a cylinder: Where Pi = 3.14

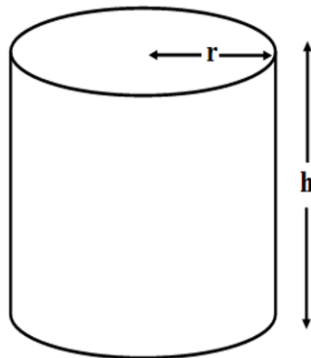
Review! Two important steps.

To square the radius is times the radius by its self.

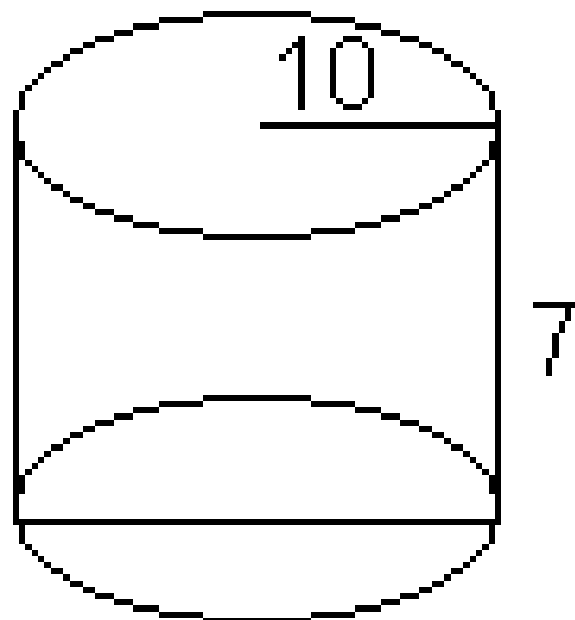
Example: If the radius is 6. Then 6² would be 6 times 6. Answer = 36

Do the exponents first (squaring the radius) before the rest of the problem (PEMDAS)

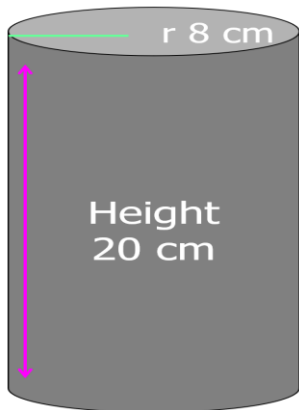
$$V = \pi r^2 h$$



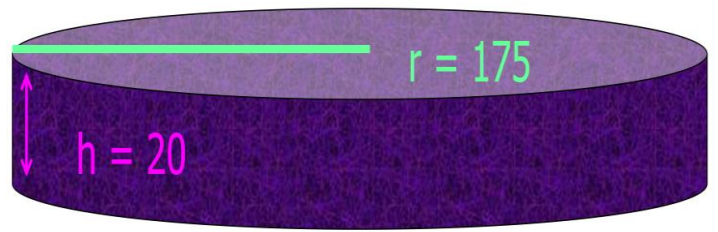
What is the volume of this cylinder?



What is the volume of this cylinder?



What is the volume of this cylinder?



What is the volume of a soda can?



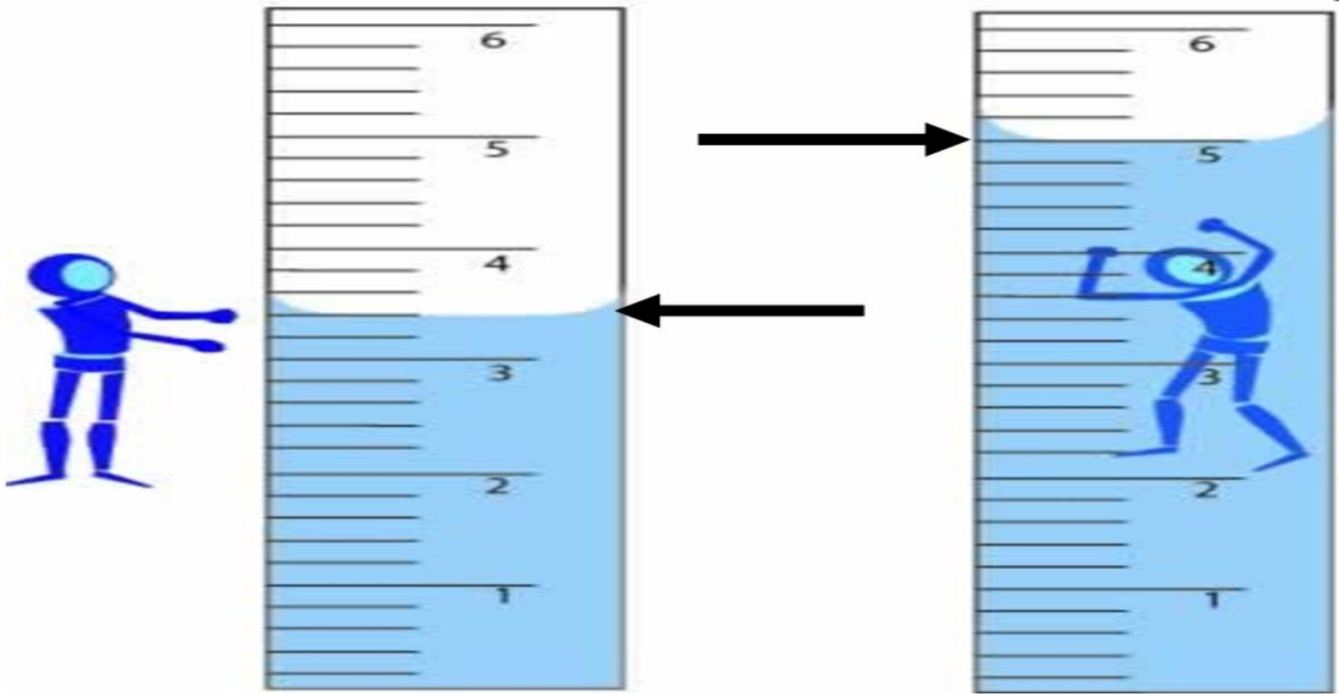
What is the volume of Bowser by water displacement?



What is the volume of Toad by water displacement?



Warning! 4 Part Question. 1) What is the volume of the two graduated cylinders? 2) What is the curve of the water called and where should you measure? 3) What is the volume of the toy diver based on water displacement? 4.) It weighs 1.8 grams so what is its density?

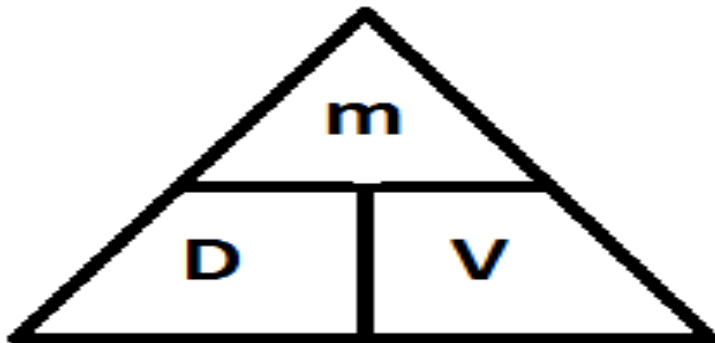


Find the Volume of four Irregular shaped objects? What is the volume of them below?

Density: How much _____ is contained in a given _____. We use grams/cm³

(grams per cubic centimeter)

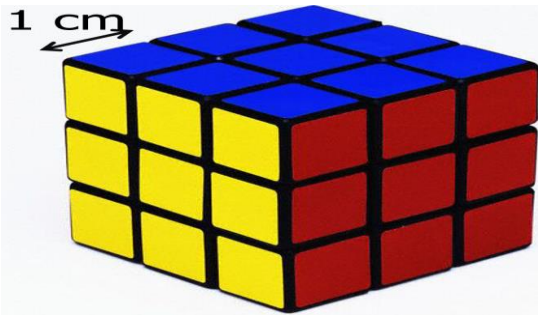
Density = Mass _____ by volume



D = Density
m = mass
V = velocity

Density Formula

What is the density of this cube if it weighs 100 grams?



What's the Density of Wario? His Mass is 200g



Please determine the densities of the following characters. Who is most dense?

Donkey Kong

$$M = 15 \text{ g}$$

$$V = 30 \text{ cm}^3$$

Yoshi

$$M = 13 \text{ g}$$

$$V = 8 \text{ cm}^3$$

Mario

$$M = 8 \text{ g}$$

$$V = 10 \text{ cm}^3$$



Goomba

$$M = 8 \text{ g}$$

$$V = 6 \text{ cm}^3$$

An object will float in water.

Density of less than one = _____

Density of more than one = _____

Density A-L

Find the density of the mystery objects labeled A-Z. Please use multiple types of scales and balances and methods to find volume. Record the density in g/cm^3 .

Remember! Density = Mass divided by Volume $D=m/v$

Find Mass using a... Triple Beam balance, Digital Balance, Equal Balance, Spring Scale, Other. You need to use each one at least twice.

Letter	Device used to find mass	Mass g	Divide \div	Volume ml or cm^3	Density g/cm^3	Float? Y/N
A			\div			
B			\div			
C			\div			
D			\div			
E			\div			
F			\div			
G			\div			
H			\div			
I			\div			
J			\div			
K			\div			
L			\div			
Letter	Device Used to Find Mass	Mass g	\div	Volume ml or cm^3	Density g/cm^3	Float? Y/N

- Density is defined as mass per unit It is how much the mass is confined in a substance. It helps show if are packed closely together or spread far apart. To measure density, measure the mass on a balance, calculate volume and the two. This process does not involve a chemical and is thus a property. Another way to measure density is by using its displacement of

What is the density of an objects whose mass is 500 grams and displaces 250 ml of water?

$$\text{Density} = \frac{M}{V} = \text{-----}$$

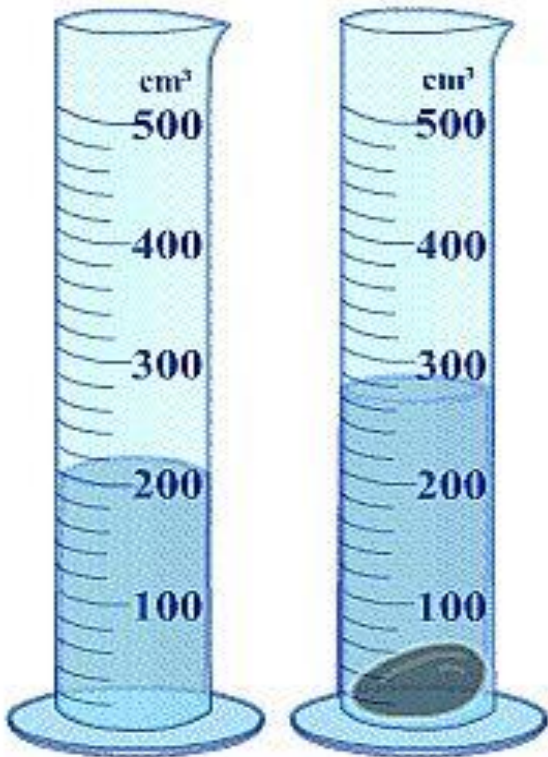
Will the object float in water? Yes / No

What is the density of an objects whose mass is 200 grams and displaces 250 ml of water?

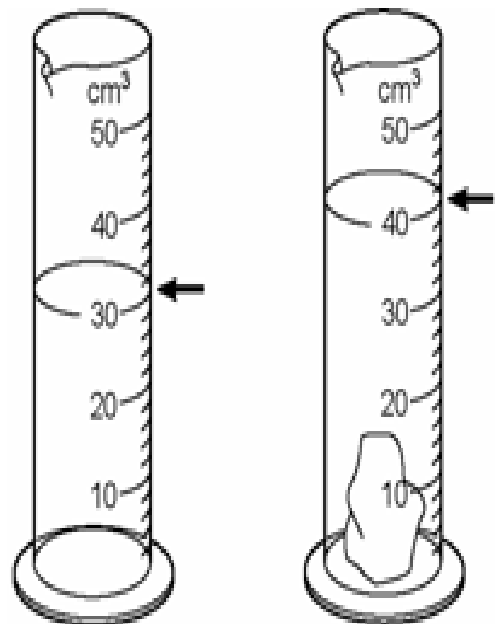
$$\text{Density} = \text{-----}$$

Will the object float in water? Yes / No

What is the volume of the stone by water displacement?



What is the volume of the stone by water displacement?



Please calculate the density of the student volunteer.

Density = Mass (g) divided by volume (cm³)

Example- 45,000g divided by 40,000cm³ = 1.125 g/cm³

Name of Student _____ Weight in pounds _____ x .453 = _____ kg = _____ g

Name of Student _____ Weight in pounds _____ x .453 = _____ kg = _____ g

To convert lbs to kg, multiply the given lbs value by 0.45359237 kg. For example, to convert 5 lbs to kilogram, multiply the given 5 lbs by 0.45359237 kg.

Name of Student _____ Water Displaced / Volume _____

Name of Student _____ Weight Displaced / Volume _____

Name of Student _____ grams _____ divided by cm³ _____ = _____ g/ cm³

Name of Student _____ grams _____ divided by cm³ _____ = _____ g/ cm³

Name of Student _____ Density _____

Name of Student _____ Density _____

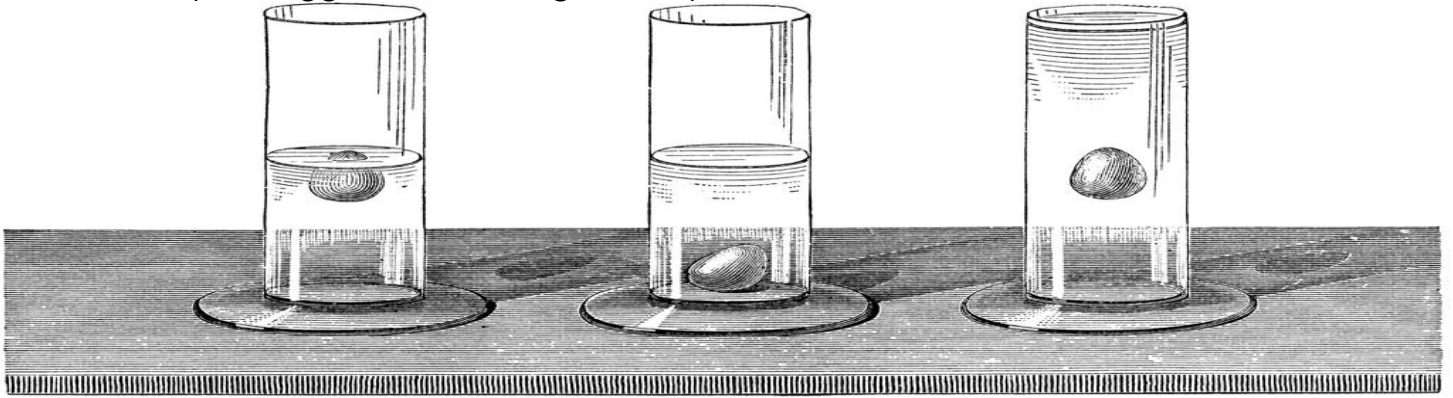
Demo: Magic Ice Cube? (Optional)

- Teacher will place ice cubes into the two different containers filled with fluid.
- Observe what happened and try to explain.

Explain the visual below as it pertains to density?



Describe why the eggs are behaving this way?



Handwriting practice lines consisting of a vertical pink margin line on the left and five horizontal blue lines for writing.

Density Quiz

Name: _____

Please show your work in the boxes

1)	2)	3)
4)	5)	6)
7)	8)	9)
10)	*11) 5 pts	

Score (10 points Each) = _____

Part 4 Volume and Density

Name:

Due:

Some Water Basics

Science uses **water** as a part of the metric system.

1 cubic centimeter of water weighs **1 gram**.

Example 1,000 ml weighs 1,000 grams
(1 liter) = (1 kilogram)

Volume: The **three-dimensional** space an object occupies.

Volume is also the **space** that matter occupies.

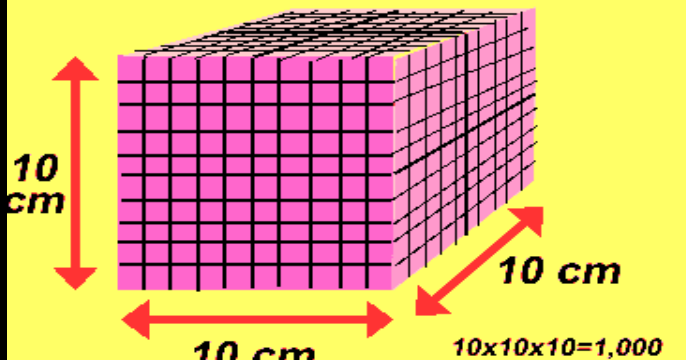
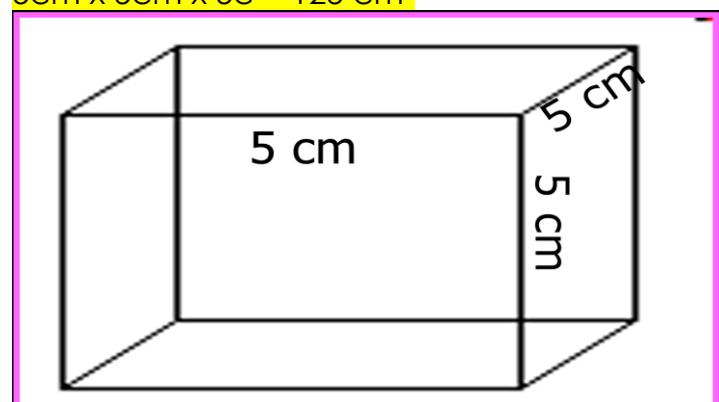
Matter is anything that has mass and takes up space.

Important note: Mass and weight are **different**.

-Mass is a measurement of the amount of matter something contains.

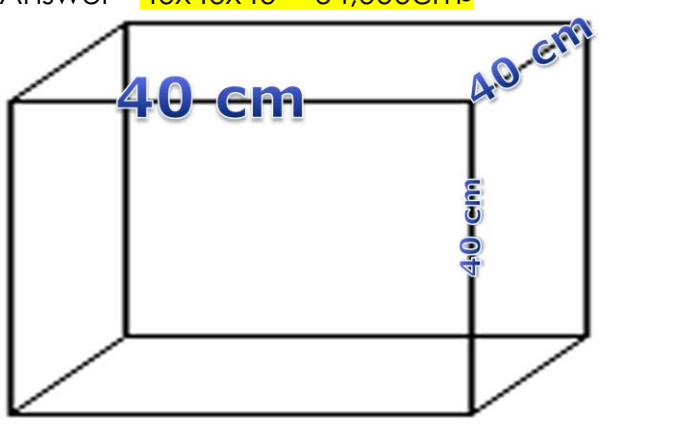
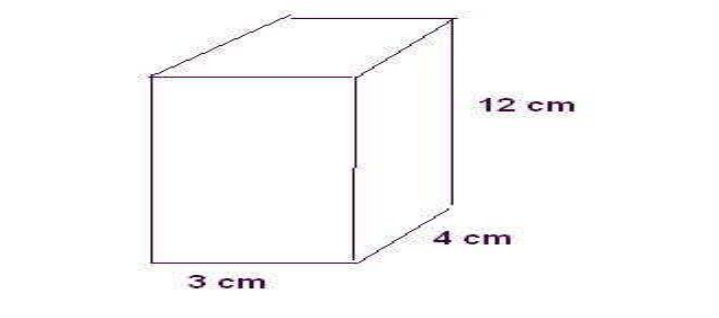
-Weight deals with the pull of gravity.

Even if you are weightless in space you still have mass.

<p>A liter is the volume of a cube 10 cm on each side.</p> 	<p>What is the volume of this cube? $5\text{cm} \times 5\text{cm} \times 5\text{cm} = 125\text{ cm}^3$</p> 
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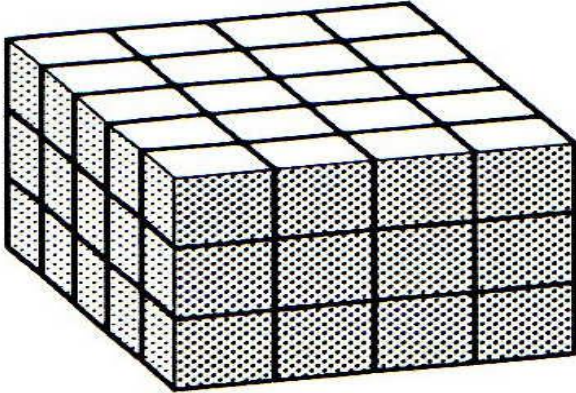
How do you find the volume of a cube?

- Length x Width x Height = ___ cm^3

<p>What is the volume of this cube? Answer= $40 \times 40 \times 40 = 64,000\text{cm}^3$</p> 	<p>What is the volume of this rectangle? Answer= $3\text{cm} \times 4\text{cm} \times 12\text{cm} = 144\text{ cm}^3$</p> 
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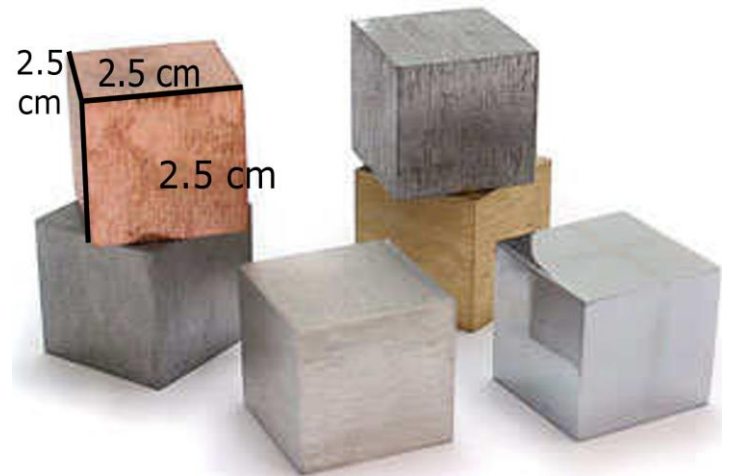
What is the volume of this rectangle? Each unit is equal to 1 cm³

Answer= $3\text{cm} \times 4\text{cm} \times 5\text{cm} = 60 \text{ cm}^3$



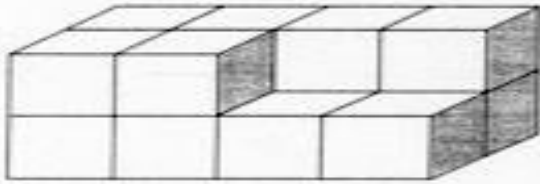
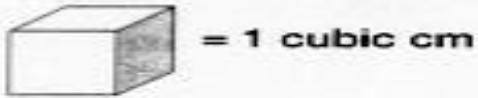
Find the density of the density cubes?

Answer=



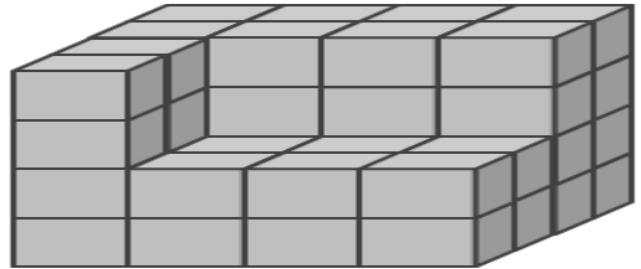
What is the volume of this shape?

$2\text{cm} \times 2\text{cm} \times 4\text{cm} - 2\text{cm} = 14 \text{ cm}^3$



What is the volume of the shape below?

$4\text{cm} \times 4\text{cm} \times 4\text{cm} = (64) - 2\text{cm} \times 2\text{cm} \times 3\text{cm}$
 (12)
 $64 - 12$
 $= 52 \text{ cm}^3$



Volume of a cylinder: Where Pi = 3.14

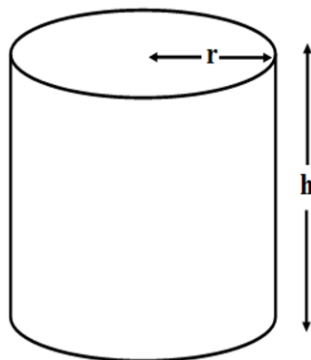
Review! Two important steps.

To square the radius is times the radius by its self.

Example: If the radius is 6. Then 6^2 would be 6 times 6. Answer = 36

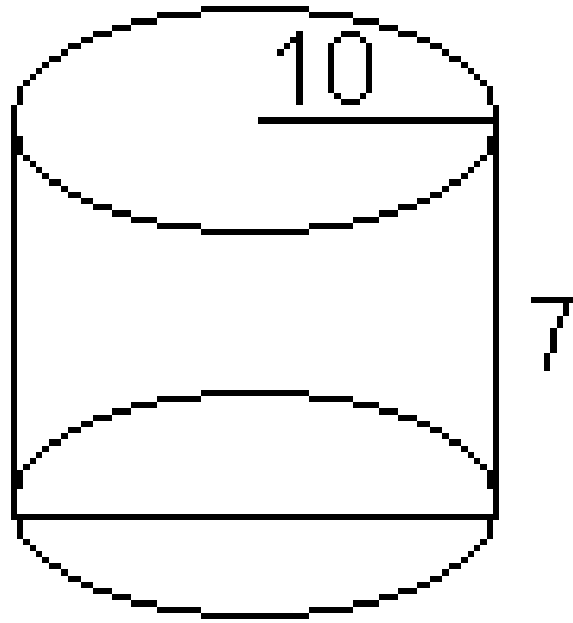
Do the exponents first (squaring the radius) before the rest of the problem (PEMDAS)

$$V = \pi r^2 h$$



What is the volume of this cylinder?

$3.14 (100) (7) = 2,198 \text{ cm}^3$



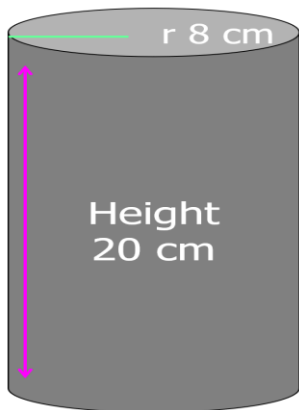
What is the volume of this cylinder?

$$\text{Volume} = \pi \times r^2 \times h$$

$$\text{Volume} = 3.14 (8^2) (20)$$

$$\text{Volume} = 3.14 (64) (20)$$

$$\text{Volume} = 4019.2 \text{ cm}^3$$



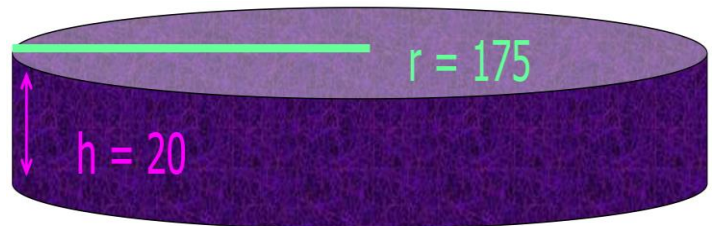
What is the volume of this cylinder?

$$\text{Volume} = \pi \times r^2 \times h$$

$$\text{Volume} = 3.14 (175^2) (20)$$

$$\text{Volume} = 3.14 (30,625) (20)$$

$$\text{Volume} = 1,923,250 \text{ cm}^3$$



What is the volume of a soda can?

Height = 12 cm, Radius = 3cm

$$V = \pi r^2 h$$

$$V = \pi 3^2 h$$

$$V = 3.14 (9) (12) = 339.12 \text{ cm}^3$$



What is the volume of Bowser by water displacement?

$$1000 - 500 \text{ ml} = 500 \text{ ml}$$

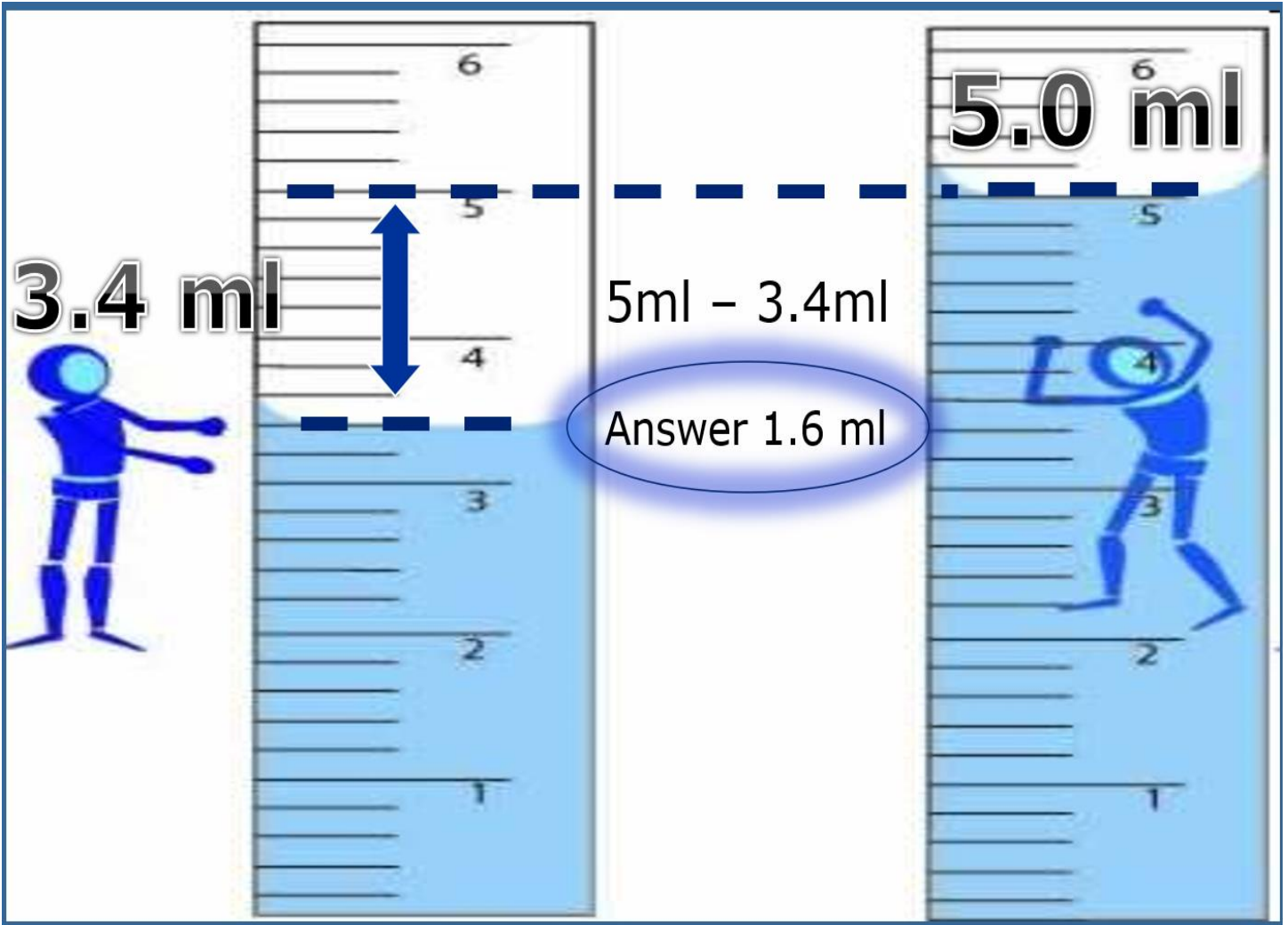


What is the volume of Toad by water displacement?

$$600 - 500 \text{ ml} = 100 \text{ ml}$$



The volume of the two graduated cylinders is 3.4 ml and 5.0 ml. The curve of water is called a meniscus and you should measure at the bottom of the curve. The water displacement was 1.6 ml which is the volume of the toy scuba diver.



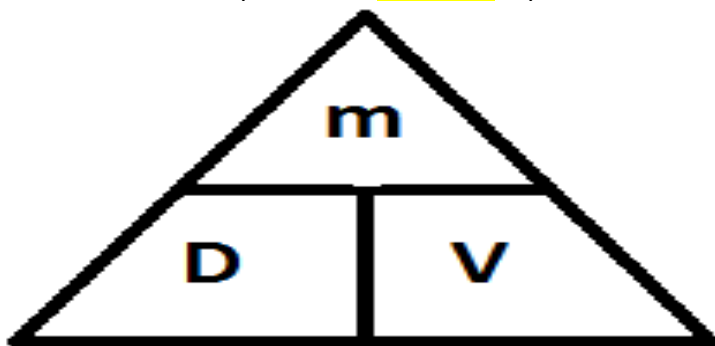
Find the Volume of four Irregular shaped objects? What is the volume of them below?

Answers will vary using water displacement

Density: How much **mass** is contained in a given **volume**. We use grams/cm³

(grams per cubic centimeter)

Density = Mass **divided** by volume



D = Density
m = mass
V = velocity

Density Formula

What is the density of this cube if it weighs

What's the Density of Wario? His Mass is 200g

100 grams?
 $33 = 27 \text{ cm}^3$ for volume

$D = m/v$
 Mass = 100g
 $100g/27\text{cm}^3$
 Answer = Density = 3.7 g/cm^3

- Density = $200g / 250\text{cm}^3$
- Density = $.8 \text{ g/cm}^3$



Please determine the densities of the following characters. Who is most dense?

Donkey Kong
 M = 15 g
 V = 30 cm³

Yoshi
 M = 13 g
 V = 8 cm³

Mario
 M = 8g
 V = 10cm³



Goomba
 M = 8g
 V = 6 cm³

Donkey Kong.
 $.5 \text{ g/cm}^3$

Yoshi
 1.625 g/cm^3

Mario
 $.8 \text{ g/cm}^3$



Goomba
 1.3 g/cm^3



An object will float in water.

- Density of less than one = float.
- Density of more than one = sink.

Density A-L

Find the density of the mystery objects labeled A-Z. Please use multiple types of scales and balances and methods to find volume. Record the density in g/cm^3 .

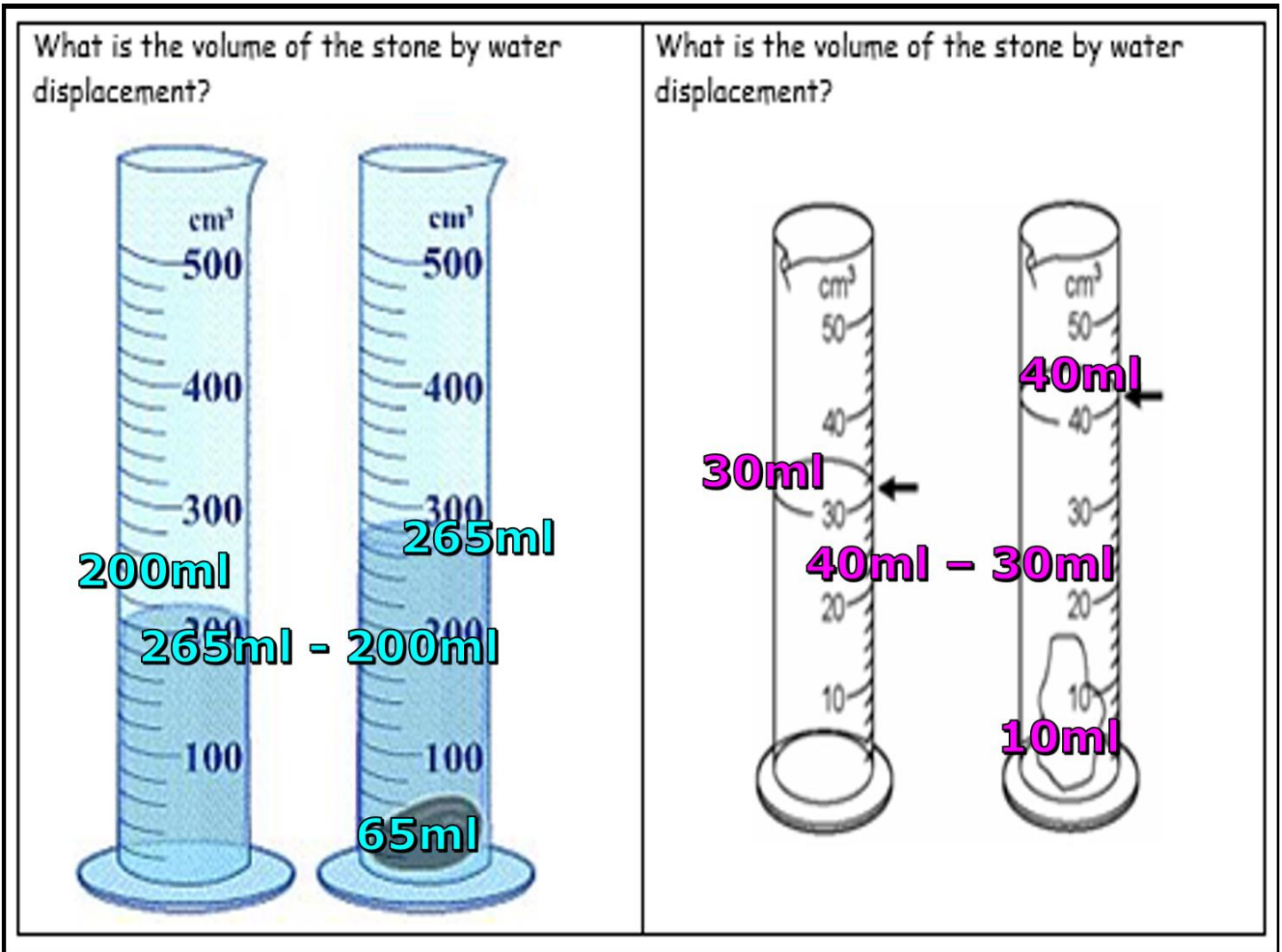
Remember! Density = Mass divided by Volume $D=m/v$

Find Mass using a... Triple Beam balance, Digital Balance, Equal Balance, Spring Scale, Other. You need to use each one at least twice.

Letter	Device used to find mass	Mass g	Divide ÷	Volume ml or cm ³	Density g/cm ³	Float? Y/N
A			÷			
B			÷			
C			÷			
D			÷			
E			÷			
F			÷			
G			÷			
H			÷			
I			÷			
J			÷			
K			÷			
L			÷			
Letter	Device Used to Find Mass	Mass g	÷	Volume ml or cm ³	Density g/cm ³	Float? Y/N

Density is defined as mass per unit Volume. It is how much the mass is confined in a substance. It helps show if atoms are packed closely together or spread far apart. To measure density, measure the mass on a balance, calculate volume and divide the two. This process does not involve a chemical change and is thus a physical property. Another way to measure density is by using its displacement of liquid.

<p>What is the density of an objects whose mass is 500 grams and displaces 250 ml of water?</p> $\text{Density} = \frac{M (500\text{g})}{V (250\text{ml})} = 2 \text{ g/cm}^3$ <p>Will the object float in water? Yes / No</p>	<p>What is the density of an objects whose mass is 200 grams and displaces 250 ml of water?</p> $\text{Density} = \frac{200 \text{ g}}{250\text{ml}} = .8 \text{ g/cm}^3$ <p>Will the object float in water? Yes / No</p>
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Please calculate the density of the student volunteer. **Answers will vary**

Density = Mass (g) divided by volume (cm³)

Example- **45,000g divided by 40,000cm³ = 1.125 g/cm³**

Name of Student _____ Weight in pounds _____ x .453 = _____ kg = _____ g

Name of Student _____ Weight in pounds _____ x .453 = _____ kg = _____ g

To convert lbs to kg, multiply the given lbs value by 0.45359237 kg. For example, to convert 5 lbs to kilogram, multiply the given 5 lbs by 0.45359237 kg.

Name of Student _____ Water Displaced / Volume _____

Name of Student _____ Weight Displaced / Volume _____

Name of Student _____ grams _____ divided by cm³ _____ = _____ g/ cm³

Name of Student _____ grams _____ divided by cm³ _____ = _____ g/ cm³

Name of Student _____ Density _____

Name of Student _____ Density _____

Demo: Magic Ice Cube? (Optional)

- Teacher will place ice cubes into the two different containers filled with fluid.

- Observe what happened and try to explain.

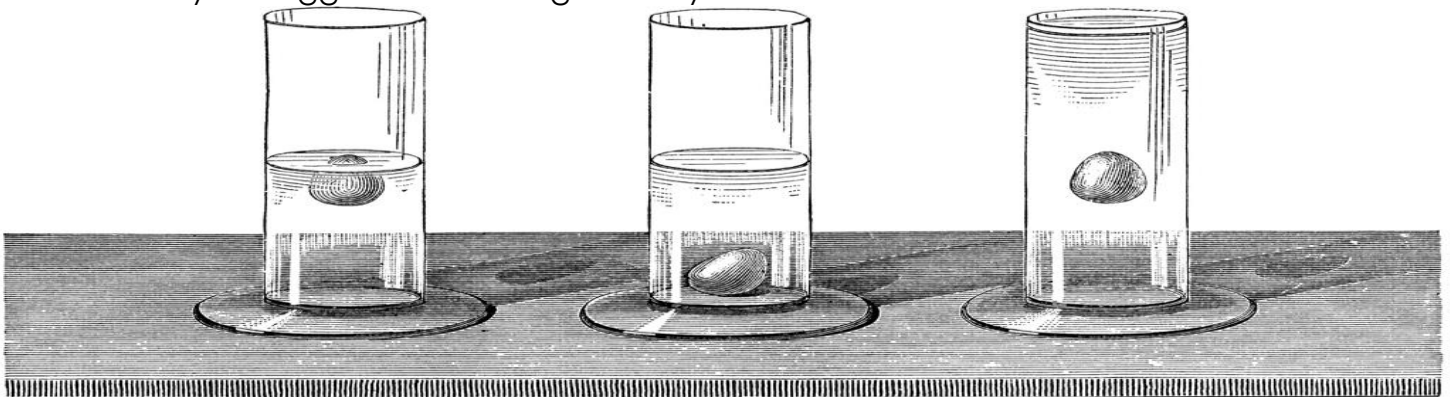
One of the containers was not water, it was alcohol. Ethyl Alcohol has a density of $.79 \text{ g/cm}^3$. Water has a density of 1 g/cm^3 . Therefore, the ice won't float in the alcohol.

Explain the visual below as it pertains to density?



- The word “miscibility” describes how well two substances mix.
- Oil and water are said to be “immiscible,” because they do not mix.
- The oil layer is on top of the water because of the difference in density of the two liquids.
 - The density of a substance is the ratio of its mass (weight) to its volume. The oil is less dense than the water and so it's on top. The corn syrup is the most dense so it's on the bottom.

Describe why the eggs are behaving this way?



The density of the water was increased when salt was added. An egg floats in salt water because the mass of the salt water displaced is equal to the mass of the egg. The egg's density is less than the density of the salt water. When an egg is placed in fresh water it immediately sinks to the bottom of the container it is placed in.

1)

2)

3)

1 gram	1,000 gram or 1kg	53 ml
4) 24cm³	5) 3 Liters or 3,000 ml	6) 4 ml
7) mass D = ----- = grams/cm ³ volume	8) Less than 1 g/cm ³	9) 145 g / 125 cm ³ = 1.16 g/cm ³
10) Edible oil less dense, Honey, dishwashing more dense	*11) bonus Animal Jam	