

The ABC's of Science

Day 2: Intro to Physical Science

Metric System:
 Temperature
 Volume
 Mass



And now....

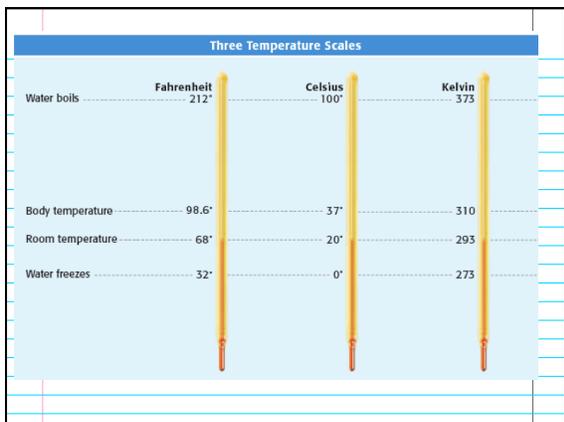
Temperature...

3. Eureka! Temperature



Temperature

- In science, temperature is mainly measured using the **Celsius** temperature scale.
- The temperature scale is based on the freezing and boiling points of water.
- The freezing point of water is **0° C**.
- The boiling point of water is **100° C**.
- Human body temp is about 37° C.

Measuring Temperature: You Try It!

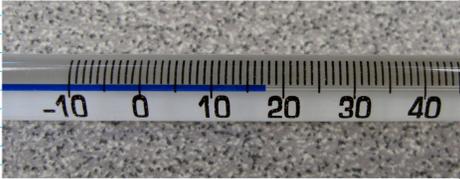
1. What is the temperature recorded by the thermometer?



Answer: 32 °C

Measuring Temperature: You Try It!

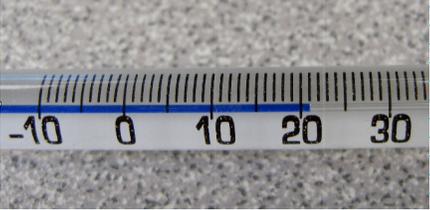
2. What is the temperature recorded by the thermometer?



Answer: 17.5 °C

Measuring Temperature: You Try It!

3. What is the temperature recorded by the thermometer?



Answer: 21 °C

Measuring Temperature

- In the International System (SI), temperature is measured in Kelvin.
- The kelvin scale is based on absolute zero, the coldest possible temperature.
- This temperature corresponds to -273° C
 - 0°C = **273 K**
 - 100°C = **373 K**



And now....

Volume...

4. How to measure Volume

Measuring a volume

Musical Math DVD
 Peter Weatherall
www.kidsinglish.com
info@kidsinglish.com



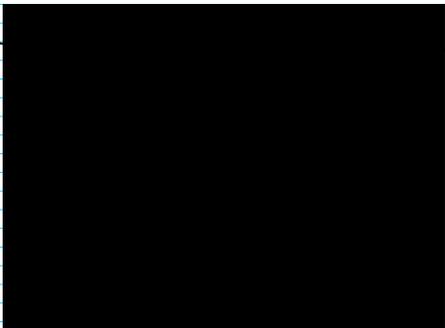
Volume

- Have you ever heard someone say "this shampoo gives my hair a lot of volume!!!"
- What does that mean?
- Volume means to **take up space**.
- Or, volume is the amount of space occupied by an object
- So if someone's hair has a lot of volume, that means it occupies a lot of space.



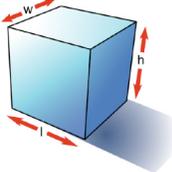
Volume	cubic meter (m ³) cubic centimeter (cm ³) liter (L) milliliter (mL)	1 cm ³ = 0.000001 m ³ 1 L = 1 dm ³ = 0.001 m ³ 1 mL = 0.001 L = 1 cm ³
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5. Volume of Rectangular Objects



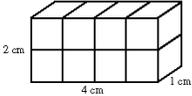
Volume of Solid Rectangular Objects

- For solid rectangular objects, the volume is the length x width x height.
- $V = l \times w \times h$
- A cubic meter (m^3) is a unit of volume.
- A cubic meter is a very large unit - it contains 1,000,000 cubic centimeters.



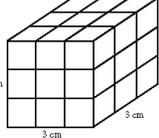
You try it! Volume of Solid Rectangular Objects

4. What is the volume of this solid?



- $V = l \times w \times h$
- $V = 4\text{cm} \times 1\text{cm} \times 2\text{cm}$
- $V = 8\text{ cm}^3$

5. What is the volume of this solid?



- $V = 3\text{cm} \times 3\text{cm} \times 3\text{cm}$
- $V = 27\text{ cm}^3$

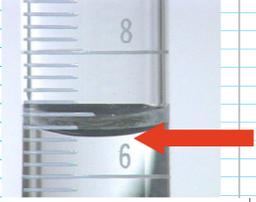
Volume of Liquids

- For liquid objects, we use **graduated cylinders** to measure the volume.
- In cooking, we may also use measuring cups, teaspoons or tablespoons.
- The level of a liquid in a graduated cylinder shows the volume of the liquid.
- A **liter (L)** is that is usually used to express volume
- A soft drink bottle is a 2-liter bottle.
- For smaller volumes, we use:
 - milliliter (ml)
 - cubic centimeter (cm^3).
- 1 liter contains 1000 milliliters or 1000 cubic centimeters.



Accuracy is Everything

- To read the volume of the liquid, note the level at the **bottom** of the curve.
- We call this the **meniscus**.



You try it!

9. What is the volume in ml?



73 ml

10. What is the volume in ml?



21.5 ml

6. Reading the Meniscus

Volume of Liquids

- Do these graduated cylinder have the same volume of liquid in them?
 - ✓ YES! How can that be???
 - ✓ One is a 100-mL cylinder & the other is a 50-mL cylinder.
- Which one is better to use to measure this liquid?
 - The **smaller** one!!!
- Why?
 - ✓ Better Accuracy!
 - ✓ The smaller the cylinder, the smaller the increments on the cylinder, which means a more accurate result.

Volume of Liquids- BUT look at this!

- Both of these cylinders have exactly 50 mL of water.

Volume of Solid Irregular Objects

- So, how would I measure the volume of an irregular object such as a key?
- I can't measure the sides and I can't use a measuring cup.
- But I CAN still use a graduated cylinder.
- Simply submerge the object in the graduated cylinder and record the difference in water level.
- We call this the **displacement** method.
- You will practice it during our lab this week

7. Volume

InteGreat
Science: Volume
Displacement

And now....

Mass...

8. Weight vs Mass



Mass Review

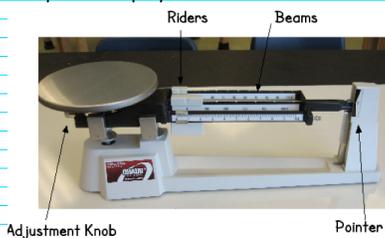


- Mass is the amount of **matter** in an object.
- It's measured on a **balance** (also called a triple beam balance).
- Mass is measured in grams or kilograms.
- A science book is about 1.3 kilograms.
- A large paperclip is about 1 gram.



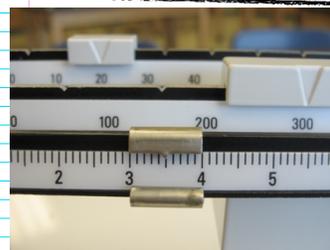
Balance's Parts to Know

- They are very delicate and prone to breakage.
- NEVER pick one up by the balance beams!



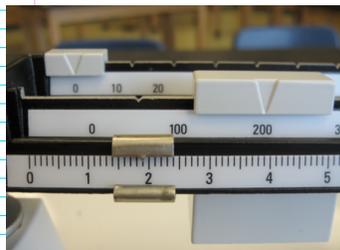
Review:

Reading the Balance: You Try It!



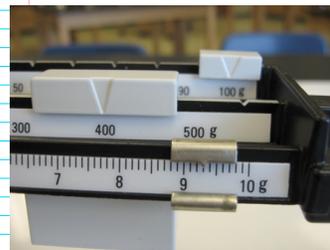
1. What does this balance read?
 ✓323.5 grams

Reading the Balance: You Try It!



2. What does this balance read?
 ✓201.9 grams

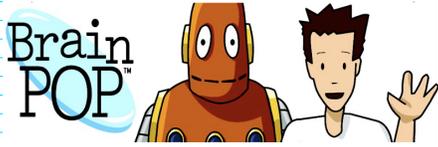
Reading the Balance: You Try It!



3. What does this balance read?
 ✓509.3 grams

Measurement Review

• **Brainpop: Measuring Matter**
 go to <http://www.brainpop.com> BEFORE 5PM log in: WUKS308 password: marshall





MEASURING MATTER

SCORE: 10/10

How did you do??

1. If an object has a large mass and a small volume, what can you conclude about it?
 - A It's very dense.
 - B It will float in water.
 - C It's made out of rock or metal.
 - D It has a low density.
2. What is the difference between weight and mass?
 - A Weight depends on density and mass depends on gravity.
 - B Weight depends on gravity and mass depends on volume.
 - C Mass depends on gravity and weight is constant.
 - D Weight depends on gravity and mass is constant.
3. Which of the following units is rarely, if ever, used to volume mass?
 - A Centimeter
 - B Gram
 - C Ounce
 - D Milliliter
4. If you wanted to measure an irregular object's volume, which of the following devices could you use?
 - A 
 - B 
 - C 
 - D 
5. One side of a cube is 5 cm long. What is the cube's volume?
 - A 5 cubic cm
 - B 15 cubic cm
 - C 25 cubic cm
 - D 125 cubic cm
6. In the context of the movie, what is the best synonym for "properties"?
 - A Possessions
 - B Attributes
 - C Notes
 - D Quantity
7. What is always true of an object with a lot of mass?
 - A It contains a lot of matter.
 - B It has a large volume.
 - C It has a high density.
 - D It cannot be accurately measured.
8. Which of the following is a measurement of an object's weight?
 - A 10 centimeters
 - B 10 kilograms
 - C 10 newtons
 - D 10 grams per cubic cm
9. Which of the following relationships between cubic centimeters and milliliters is true?
 - A They are equivalent.
 - B Cubic centimeters measure length, milliliters measure volume.
 - C They are both dependent on an object's mass.
 - D They are both dependent on an object's density.
10. If an object's mass is 10 g, and its volume is 10 cubic cm, what is its density?
 - A 100 g/cubic cm
 - B 1 g/cubic cm
 - C 60 g/cubic cm
 - D 10 g/cubic cm