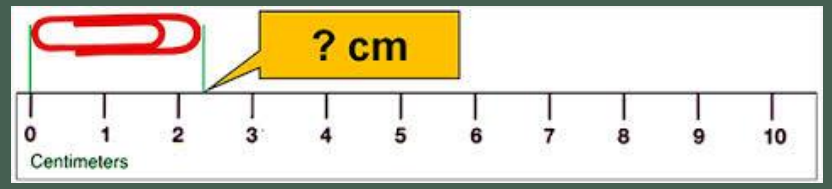
CHAPTER 1A

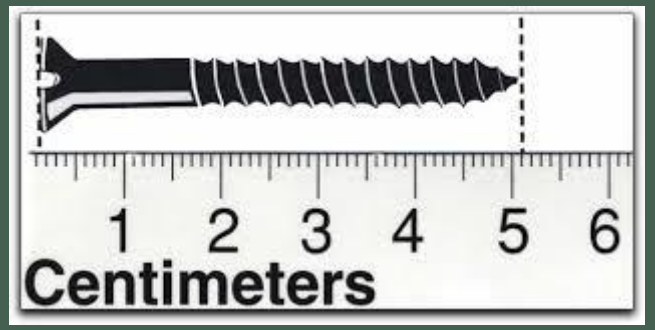
The Quality of Our Water

1A.1 Measurement and the Metric System

- Measurement
  - When we perform experiments, we need to use some form of measurement.
  - Measurements contain numbers and UNITS

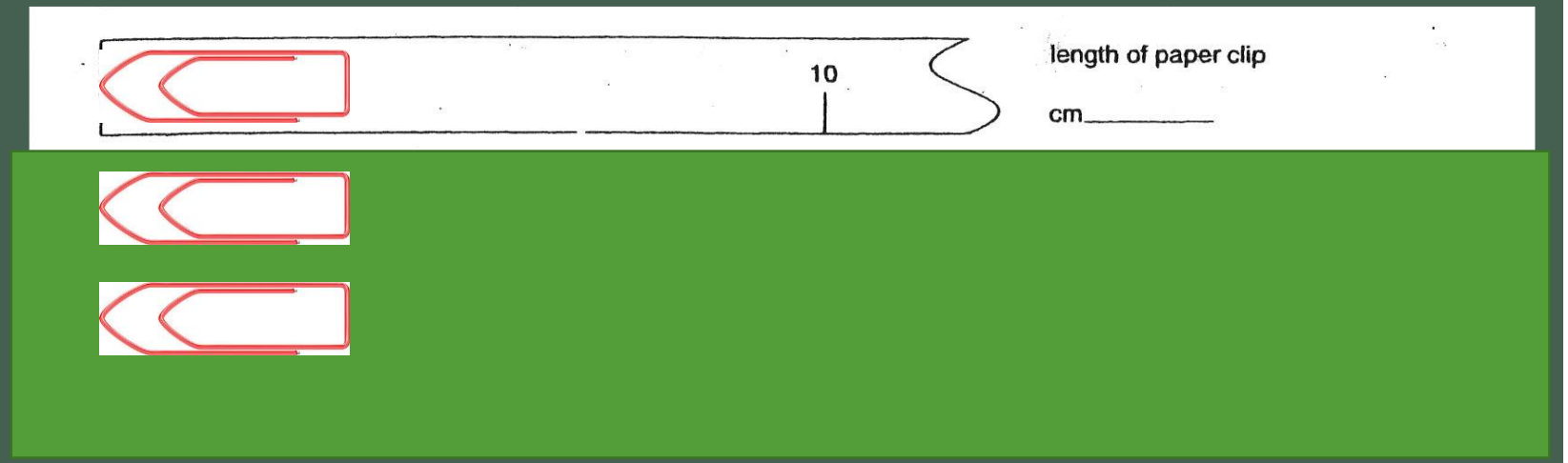
All measurements involve some estimation





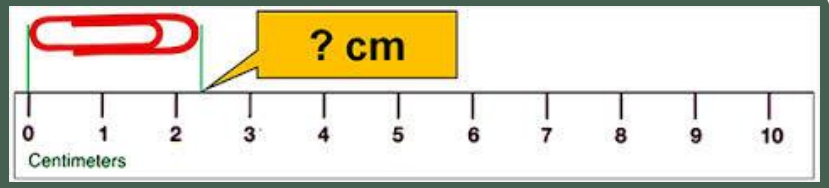
Which ruler requires the most estimating?

Now lets try it…Measuring techniques WS in your packet



Guessing and measuring

- All measurements MUST have a number at the end (ONLY ONE) that is your guess between the lines!



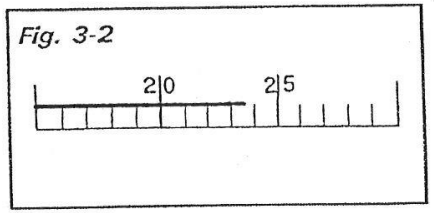
what we know

guess between the lines

2.2 cm

Back to the WS…

1



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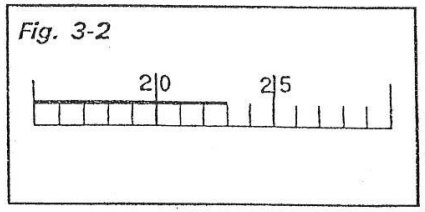

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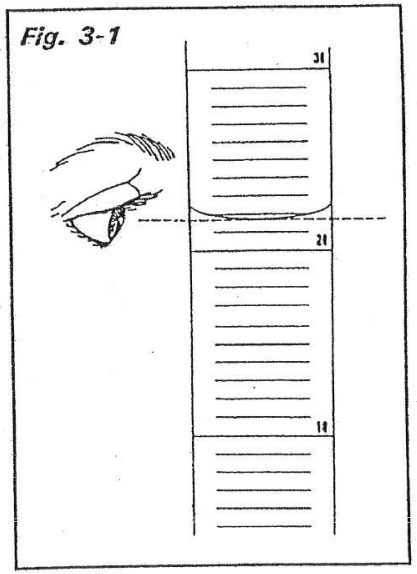

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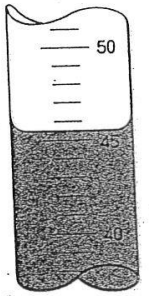

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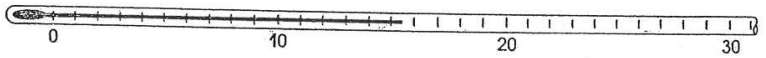


Metric Base Units

- **Mass = gram (g)**
- **Length = meter (m)**
- **Volume = (L)**
- **Time = seconds (s)**
- **Count, quantity = mole (mol)**

Prefixes

- …can make the base unit smaller or LARGER

Smaller		LARGER	
Deci (d)	1/10th smaller	Kilo (k)	1000 x LARGER
Centi (c)	1/100th smaller	Hecto (h)	100 x LARGER
Milli (m)	1/1000th smaller	Deca (dk)	10 x LARGER

Worksheet: The Metric System

Metric conversions - To convert from one unit to another set up a proportional relationship between two equations.

$$\frac{\qquad}{\qquad} = \frac{\qquad}{\qquad}$$

1. Start with set up above
2. Add units from the problem so that the top units on each side match and the bottom units on each side match.
3. Look at the two units and decide which the larger unit. Put a 1 in front of that unit on the left side of the set up. Use the cheat sheet to put a 10, 100, or 100 in front of the smaller unit on the left side.
4. Use the problem to fill in the right side.
5. Cross multiply and solve for X

Example

- Convert 15 m to cm

1. 15 m = $\frac{X}{}$ cm AND 1 m = 100 cm

2. $\frac{15\ m}{X\ cm} = \frac{1\ m}{100\ cm}$

3. (X)(1) = (15)(100)

   X = 1500 cm

Now you try it…

- Metric Conversion Worksheet (in your packet)

Now converting with a twist

- Convert 123 cg to mg…so what's the twist???
- Both measurements have prefixes … there are **TWO** prefixes … so you need to do **TWO** proportions
- First proportions to get to the **BASE** unit, the second to get to the **GOAL** unit!

- Convert 123 cg to mg
- **First conversion…**
  1. $\frac{123\ cg}{X\ g} = \frac{100\ cg}{1\ g}$
  2. $\frac{(100)(X)}{100} = \frac{(123)(1)}{100}$ X = 1.23 g
- **Second conversion…**
  1. $\frac{1.23\ g}{X\ mg} = \frac{1\ g}{1000\ mg}$
  2. (1.23)(1000) = (X)(1) X = 1230 mg

A.4 Water and Health

- Living things require a continual supply of water
- Humans must drink at least 2 liters (2 quarts) per day
- You can only live 5-10 days without water

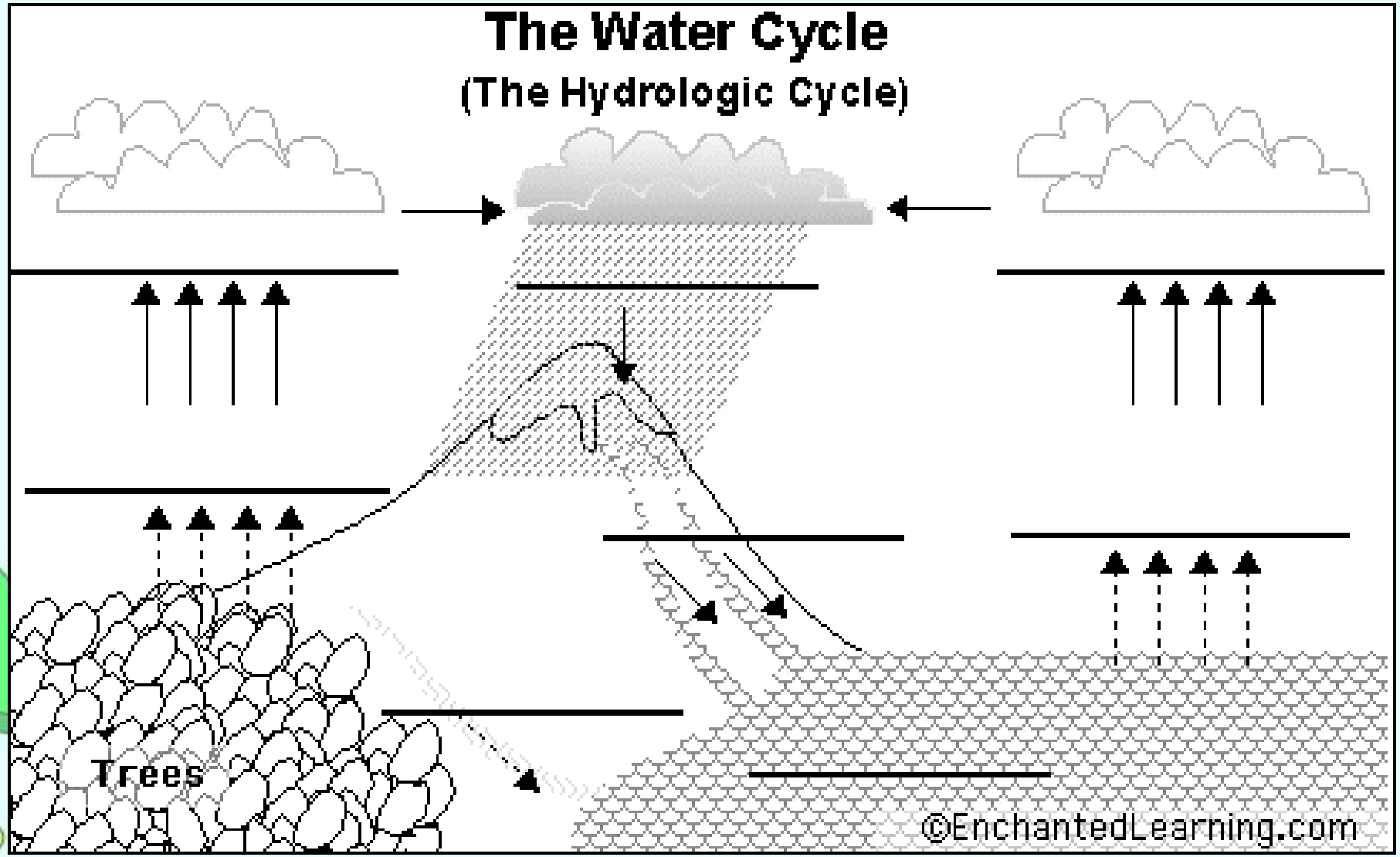
- Throughout history clean water has been a necessity
- As populations increase clean water becomes everyone's concern

A.5 Water Uses

- Each day 15 trillion (15,000,000,000,000,000) liters of water fall on the US
- 10% is used by humans and the rest flows, evaporates and falls again
- The perpetual falling, flowing, evaporating, and falling (again) of water is called the **water cycle** or the **hydrologic cycle**.
- Water usage in the United States varies by region
- The average family of four uses about 1360 liters daily. This is about 360 gallons daily. This is considered direct usage.
- There are many more indirect uses of water.

http://www.waterfootprint.org/?page=cal/WaterFootprintCalculator

http://www.youtube.com/watch?v=yfLTBJKnEQA&feature=related



A.6 Back Through the Water Pipes

- There are two sources of water for consumption: surface water and ground water

- Ground water collects in aquifers.

A.7 Where is the Earth's Water?

- It exists in the solid state (ice and snow), the liquid state (rivers, streams, groundwater) and the gaseous state (water vapor in the clouds and atmosphere)
- 97 % is in the oceans
- 2.11 % is in glaciers and ice caps
- 0.62 % is in groundwater
- 0.009 % is in lakes,
- 0.001 % is in the atmosphere
- 0.0001 % is in rivers, streams, ponds, etc.