Section 1.4 pg.20-25 (Tools, Measurement, and Safety) Objectives

- **Give** three examples of how life scientists use computers and technology.
- **Describe** three tools life scientists use or observe organisms.
- **Explain** the importance of the International System of Units, and give four examples of SI units.

Computers and Technology

- **Technology** is the application of sciences for practical purposes. It is the use of tools, machines, materials, and processes to meet human needs.
- Computers are used to create graphs, solve complex equations, and analyze and communicate data.

I. Tools for Seeing

A. **Compound Light Microscope** is an instrument that uses two or more lenses to magnify small organisms.

B. **Electron Microscopes** focuses a beam of electrons to magnify objects.

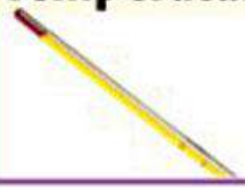
- Although electron microscopes produce clearer and more detailed images than light microscope, they cannot be used to observe living things.

II. Units of Measurement

A. **The International System of Units** Began by the French Academy of Sciences in the late 1700s, the SI is used by almost all countries in the world.

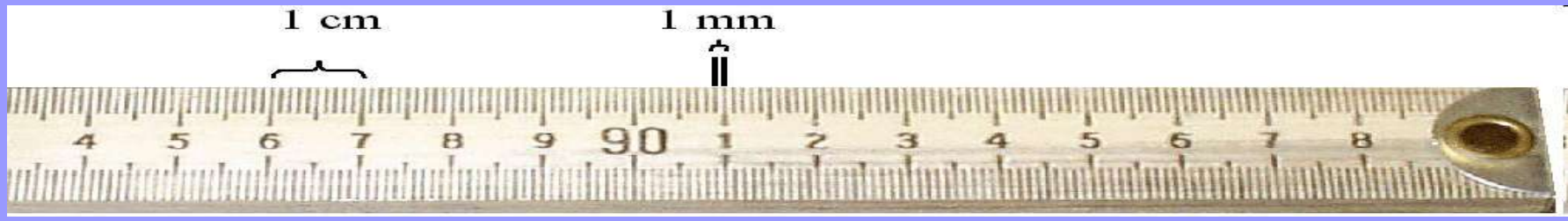
B. All SI units are based on the number 10, which makes conversion from one unit to another easy.

Common SI Units

Length 	**meter (m)**	
	kilometer (km)	1 km = 1,000 m
	decimeter (dm)	1 dm = 0.1 m
	centimeter (cm)	1 cm = 0.01 m
	millimeter (mm)	1 mm = 0.001 m
	micrometer (μm)	1 μm = 0.000001 m
	nanometer (nm)	1 nm = 0.000000001 m
Volume 	**cubic meter (m^3)**	
	cubic centimeter (cm^3)	1 cm^3 = 0.000001 m^3
	liter (L)	1 L = 1 dm^3 = 0.001 m^3
	milliliter (mL)	1 mL = 0.001 L = 1 cm^3
Mass 	**kilogram (kg)**	
	gram (g)	1 g = 0.001 kg
	milligram (mg)	1 mg = 0.000 001 kg
Temperature 	**kelvin (K)**	
	Celsius (°C)	0°C = 273 K
		100°C = 373 K

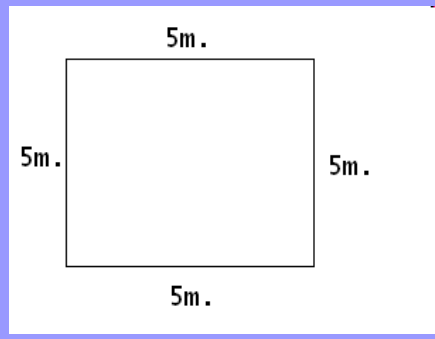
III. Measurement

A. Length The basic unit of length in the SI is the meter.



B. Area The measure of how much surface an object has. Use the following equation:

- $area = length \times width$



C. Volume The measure of the size of a body in three-dimensional space.

- volume= length x width x height

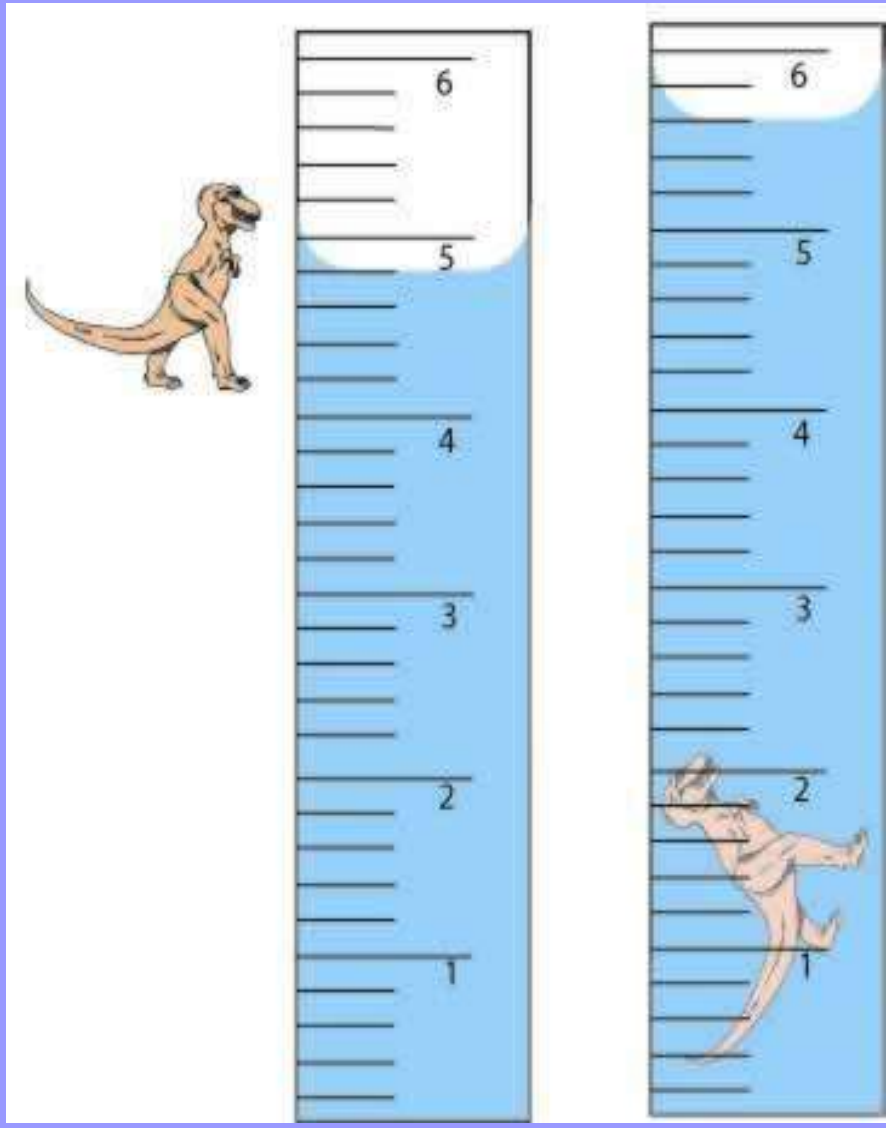
Critical Thinking Time!

- What kind of measurement is being taken?

  A. Area B. Length

  C. Mass D. Volume

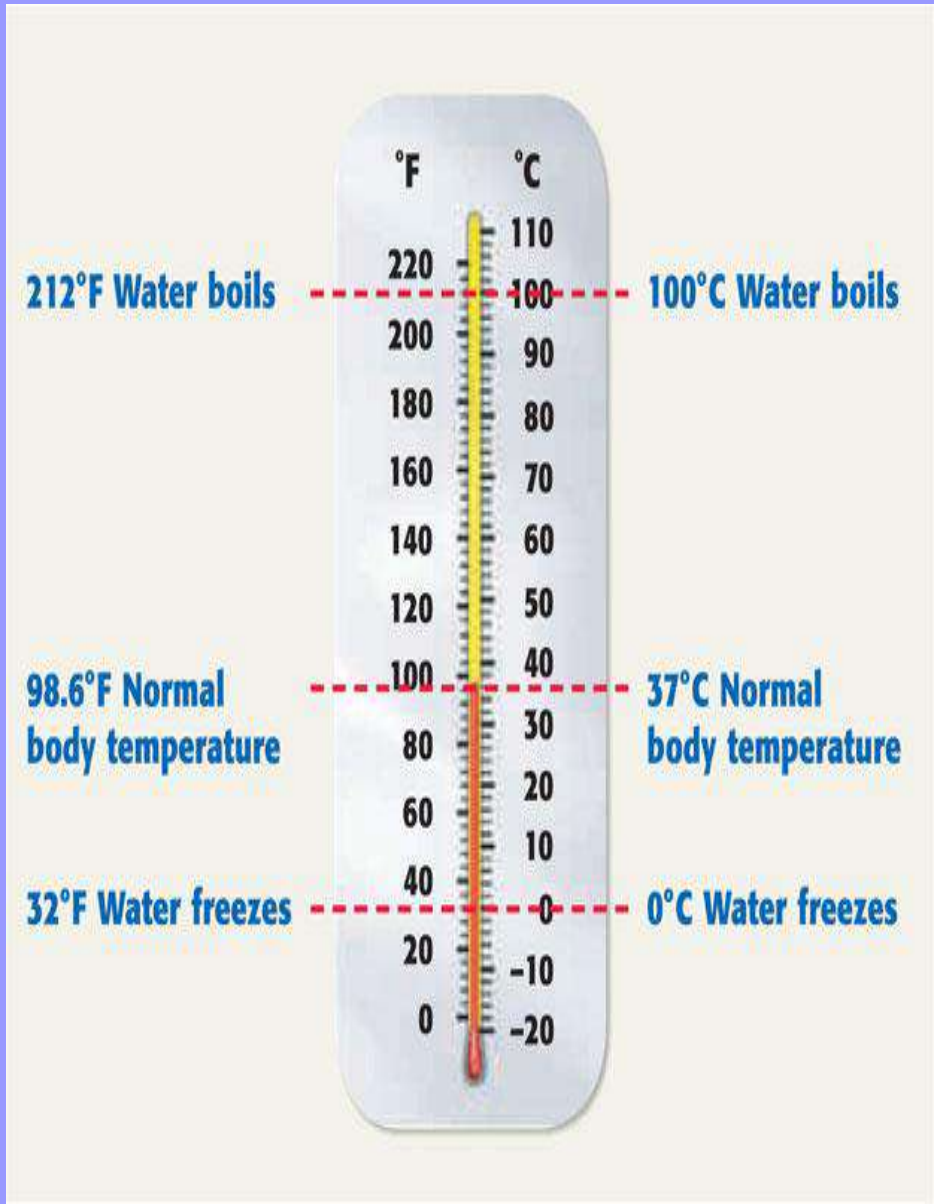
- What is an accurate measurement of the dinosaur?



Measurement, *continued*

D. Mass A measure of the amount of matter in an object.

E. Temperature The measure of how hot (or cold) something is.



Safety Rules!

Follow your teacher's instructions.

Read lab procedures carefully.

Pay special attention to safety information.

scientific methods
observations
controlled experiments
drawing conclusions
scientists
questions