

# Ch.1 Notes

March-30-16

9:58 AM

**1.1: SI Measurement**

SI units: ← "Metric" System (in French)

- SI stands for systeme internationale and is the system of measurement units used in most countries around the world. Some examples of units are:

**VOLUME:** Litres (L)      **MASS:** Kilograms (Kg)      **DISTANCE:** Metres (m)

Conversions between SI units:

- Throughout this unit we will perform our unit conversions the exact same way. The **DATA BOOKLET** contains many useful conversions that you will need to use.
- We will set up a **UNIT CONVERSION** multiplication. Here is how we will set it up:

$$563\cancel{cm} \times \frac{1m}{100\cancel{cm}} = 5.63m$$

Example 1: Perform each of the following unit conversions using the data booklet.

a) 176.2 m to km      b) 0.0045 cm to mm

$$176.2\cancel{m} \times \frac{1\text{ km}}{1000\cancel{m}} = 0.1762\text{ km}$$

$$0.0045\cancel{cm} \times \frac{10\text{ mm}}{1\cancel{cm}} = 0.045\text{ mm}$$

c) 88.3 g to kg      d) 1.2 km to cm

$$88.3\cancel{g} \times \frac{1\text{ kg}}{1000\cancel{g}} = 0.0883\text{ kg}$$

$$1.2\cancel{km} \times \frac{1000\cancel{m}}{1\cancel{km}} \times \frac{100\text{ cm}}{1\cancel{m}} = 120\,000\text{ cm}$$

Using Ratios to Solve Problems:

A magazine editor needs to assess whether the photograph can be reduced proportionately to fill the rectangle below. Can it be? Explain, using measurements and ratios.

Ratio:  $\frac{7.5\cancel{cm}}{4.8\cancel{cm}} = 1.56$

Ratio:  $\frac{4.8\cancel{cm}}{2.4\cancel{cm}} = 2$

Not the same ratio!

**Measurement Tools:**

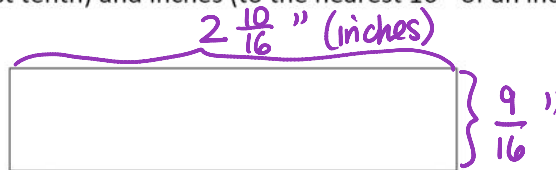
1. **Referent:** A referent is a non-standard measuring unit used as a personal reference. Referents give an approximate measurement only.

Some examples of referents:

width of pinky finger  $\approx 1$  cm  
 your foot  $\approx 1$  foot

\* never exact measures!

2. **Ruler:** You've used rulers before. Let's practice. Measure the following rectangle in both cm (to the nearest tenth) and inches (to the nearest  $16^{\text{th}}$  of an inch). ← Inches are in fractions!



(Vernier)

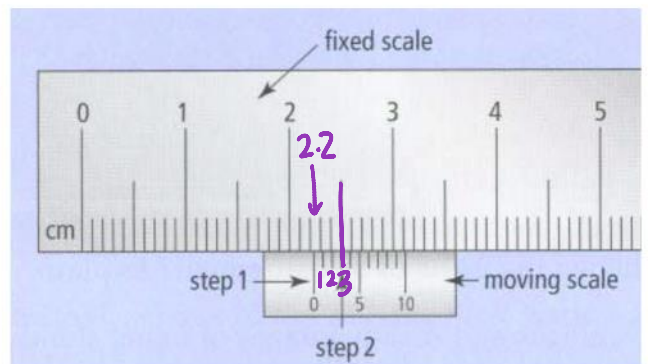
3. **Caliper:** Calipers are very precise measurement tools. It usually measures to the nearest tenth of a millimeter, 0.01 cm.

A caliper is made up of two parts:

- **Fixed Scale:** Works similar to a ruler. The zero on the moving scale is the marker of the reading.

Fixed Reading: 2.2 cm

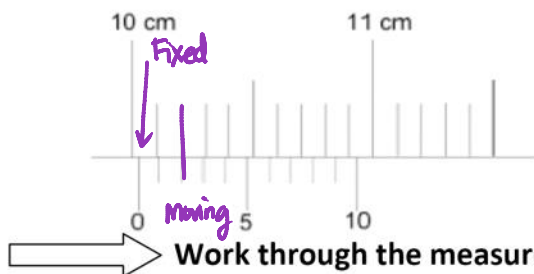
- **Moving Scale:** We will look for the part of the moving scale that forms a *straight line* with the fixed scale.



Moving Reading: 0.03 cm

All together: 2.23 cm

Example: What is the following reading on the Vernier Caliper?



Fixed Scale: 10.0 cm  
 Moving Scale: 0.02 cm

Total: 10.02 cm

Work through the measurement activity with a partner (to hand in!)

## 1.2: Imperial Measurement

What are examples of Imperial Measures?

Feet (ft = ')      Pounds (lb)  
 Miles (mi)        Gallons  
 Yards (yd)        Inches (in. = ")

Where are they used?

U.S.A.  
 Liberia (Africa)  
 Myanmar

Why is it important to be able to use Imperial Measurements?

- Travel
- Trade
- Renovations/ Houses
- Purchases
- Cooking/Baking

Examples (unit conversions! set up like in 1.1)

a. How many inches are in 5 yards?

$$5 \cancel{\text{yards}} \times \frac{36 \cancel{\text{in}}}{1 \cancel{\text{yd}}} = \boxed{180 \text{ inches}}$$

b. How many miles are in 3750 feet?

$$3750 \cancel{\text{ft}} \times \frac{1 \cancel{\text{mi}}}{5280 \cancel{\text{ft}}} = \boxed{0.71 \text{ mi}}$$

c. How many feet are in 460 miles?

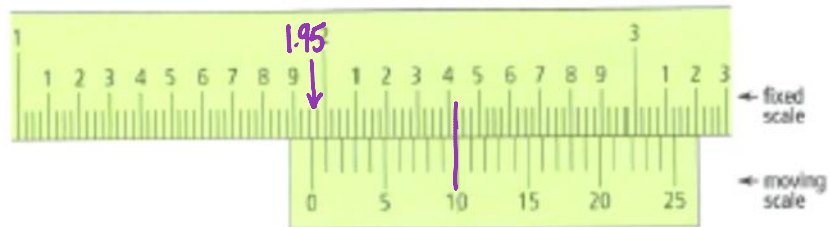
$$460 \cancel{\text{mi}} \times \frac{5280 \cancel{\text{ft}}}{1 \cancel{\text{mi}}} = \boxed{2\,428\,800 \text{ ft}}$$

**Imperial Accuracy:**

- Rulers or Measuring tape are accurate to  $\frac{1}{16}$  of an inch.
- Calipers are accurate to 0.05 of an inch.

**Imperial Calipers** are read exactly the same way as Metric Calipers, except the units are different. The readings along the fixed scale are accurate to 0.05 of an inch (your fixed scale reading will always be to 2 decimal places, even if the last decimal is zero). The moving scale adds 1 extra decimal point of accuracy.

Follow these steps to read an imperial caliper.



1. Read the whole number and tenth values on the fixed scale.  
This reading is 1.9 in.
2. Determine where zero on the moving scale lies relative to, in this case, the 9 on the fixed scale.  
It is 2 small divisions beyond the 9.  
 $\frac{2}{4}$  of  $\frac{1}{10} = \frac{1}{20}$  or 0.05.  
This reading is 0.05 in.
3. Identify the next line on the moving scale that aligns with a line on the fixed scale. In this example, it is 10.  
This reading is 0.010 in.
4. Add the measurement readings from steps 1 to 3.  
The final reading is 1.960 in. ( $1.9 + 0.05 + 0.010 = 1.960$ )

$1.95 + 0.010 = 1.960 \text{ in.}$

Ex. The photograph shows a polar bear. The scale of the photograph is 1:22. Calculate the height of the bear to the nearest inch.



Polar Bear is 22-times picture!

$1 \frac{14}{16}$  " (approximately)  
or  $1 \frac{7}{8}$  "

$1 \frac{7}{8} \times 22 = \frac{15}{8} \times \frac{22}{1} = \frac{330}{8} \text{ in.} = 41 \frac{1}{4} \text{ in.}$

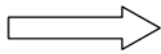
**1.3: Converting Between SI and Imperial Systems**

How do you convert between SI and Imperial?

Conversions can be exact or approximate. When would we want:

exact?

approximate?



As before, we will use **unit conversions** and our **data sheet** to help us:

Ex. 1: Perform the following unit conversions. Show all of your work:

a) 53 feet to meters

b) 10.1 cm to inches

a) 6'2" to cm

d) 2.41 miles to meters

Ex. 2: To run the school health fair the peer counselors need to lay floor coverings on the gym floor. The gym is 84' by 50'. The floor coverings measure 245 cm by 120 cm. How many floor mats are required?