

Name: \_\_\_\_\_

Group: \_\_\_\_\_

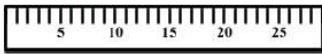
# Measuring with Metrics

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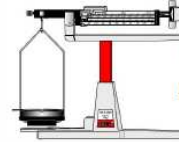
## Basic Units

All measurements in the metric system are based upon the basic units of meters, liters, and grams.

Meters measure length.



Seconds  
measure  
time



Grams  
measure  
mass.

## Prefixes

The ease of the metric system comes in its use of prefixes. The British system uses completely different units when changing between small and large measurements. The metric system simply uses prefixes.

*Hard to remember*

**British lengths:**

12 inches = 1 foot

3 feet = 1 yard

5,280 ft = 1 mile

*Easy to remember*

**Metric lengths:**

10 millimeters = 1 centimeter

100 centimeters = 1 meter

1,000 meters = 1 kilometer

Kilo =  
Hecto =  
Deca =  
Base =  
deci =  
centi =  
milli =

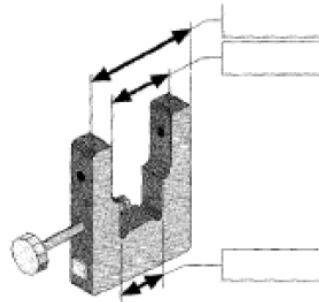
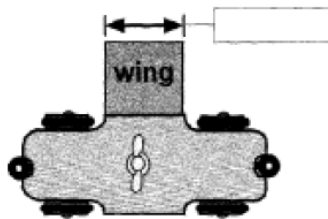
1. What do we know?
2. Make your "t" chart
3. What is your cancel unit(s)?
4. What is your answer unit?
5. Make each unit equal.
6. Do the **MATH!!!**

## Dimensional Analysis

How many feet in 4.5 meters?

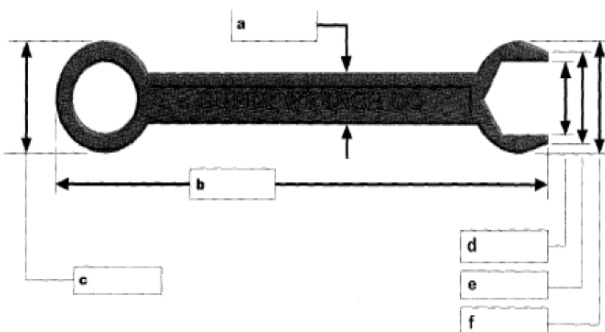
## Dimensions and diagrams

Measure the dimensions of the car and the photogate as shown on the diagram. Write the dimensions in the appropriate boxes.



## Measuring metric lengths

- a. Use the metric ruler to make measurements of each of the following dimensions. Write the measurement in centimeters in the appropriate box. You should be accurate to the nearest millimeter (0.1 centimeters).



- b. The word **precision** describes how close repeated measurements of the same quantity are. For example, saying measurements are precise to 0.5 cm means the measurements were within +/- 0.5 cm of the average of all the measurements. Compare your results for measurement **b** with the results from four other students. Fill in the blanks:

The average measurement for **b** is \_\_\_\_\_ centimeters.

This measurement is precise to \_\_\_\_\_ centimeters.

This means the measurements are within +/- \_\_\_\_\_ centimeters of the average.

Conversions Factors			
1 hr = 60 min	1 min = 60 sec	1 ton = 2000 lbs	7 days = 1 week
24 hrs = 1 day	1 kg = 2.2 lbs	1 gal = 3.79 L	264.2 gal = 1 cubic meter
1 mi = 5,280 ft	1 kg = 1000 g	1 lb = 16 oz	20 drops = 1 mL
365 days = 1 yr	52 weeks = 1 yr	2.54 cm = 1 in	1 L = 1000 mL
0.621 mi = 1.00 km	1 yd = 36 inches	1 cc is 1 cm <sup>3</sup>	1 mL = 1 cm <sup>3</sup>

**DIRECTIONS:** Solve each problem using dimensional analysis. Every number must have a unit. Work must be shown. Conversion factors are given below

1.) How many miles will a person run during a 10 kilometer race?

2.) The moon is 250,000 miles away. How many feet is it from earth?

3.) A family pool holds 10,000 gallons of water. How many cubic meters is this?

4.) The average American student is in class 330 minutes/day. How many hours/day is this?

How many seconds is this?

5) How many seconds are there in 1 year?

6) Lake Michigan holds  $1.3 \times 10^{15}$  gallons of water. How many liters is this?

7) Pepsi puts 355 ml of pop in a can. How many drops is this?

How many cubic meters is this?

### Challenge Problem

8) Chicago uses  $1.2 \times 10^9$  gallons of water /day. How many gallons per second must be pumped from the lake every second to supply the city?