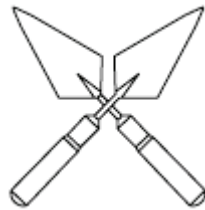
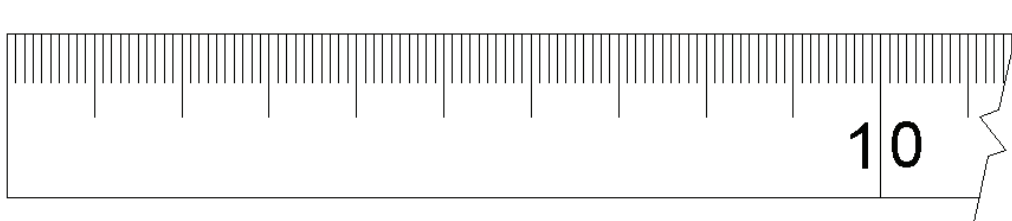


Arky for Kidz Program[©]



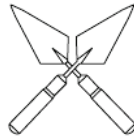
Tutorial - Metric System



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Introduction

Unless an individual is trained to work with measuring equipment for a living or for a hobby, they simply forget how to use the imprinted scale on a common tool. It is a fact that the average person seldom needs to use a ruler or a tape-reel in everyday life. They may in fact have not used one since attending school—if they have at all. This tutorial centers on how to read and use survey tools displayed in the Metric measurement system.

Metric (International System or SI) – meters, decimeters, centimeters, and millimeters

The Metric system is broken down into basic units of ten.

- Prime unit: *meter* (m).
- Each meter contains 10 *decimeters* (dm).
- Each meter contains 100 *centimeters* (cm).
- Each meter contains 1000 *millimeters* (mm).

The Meter (m)

The beginning of the Metric System can be traced back to France in the late 1700's. According to historical records, the length of a meter was determined by taking the distance from the north pole to the equator (using a meridian passing through Paris) and dividing it into one hundred million equal parts. The individual segment was referred to as a *meter*. Today, the modern standard used for the meter's length has been determined by measuring the speed of light in a vacuum vs. time.

A meter is slightly longer than the standard *yard* measurement of 3 feet as shown in Fig. 1. A meter is approximately equal to 3 feet and 3-3/8 inches (39.37 decimal inches).

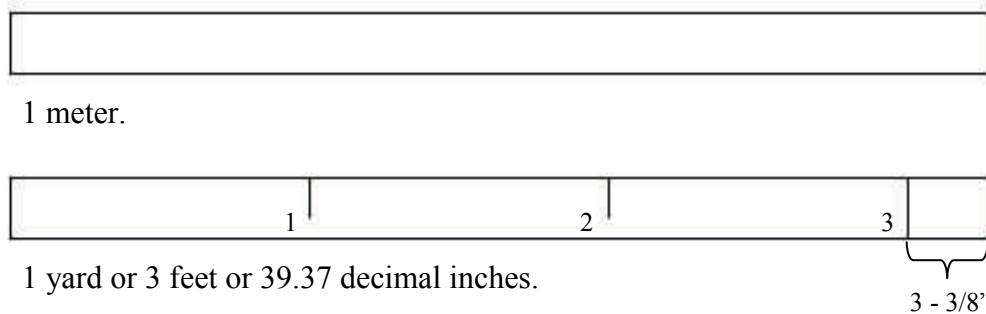
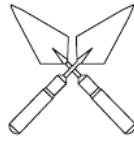


Figure 1.



Decimeters (dm)

Each meter can be broken down into ten equal units called *decimeters* as shown in Fig. 2. A decimeter (dm) is equal to 1/10th of a meter (*deci* means “ten”).

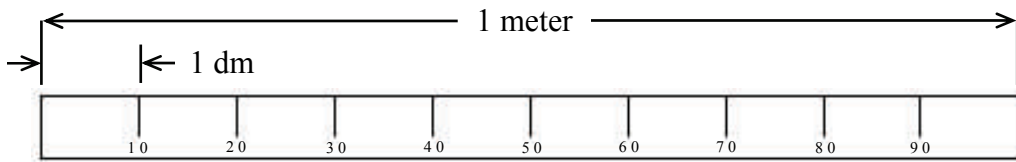


Figure2.

Fig. 3 displays the breakdown of the first *decimeter* of a meter. Each small line represents one millimeter (mm). Each half line represents one centimeter (cm). The number 10 represents ten centimeters or 100 millimeters.

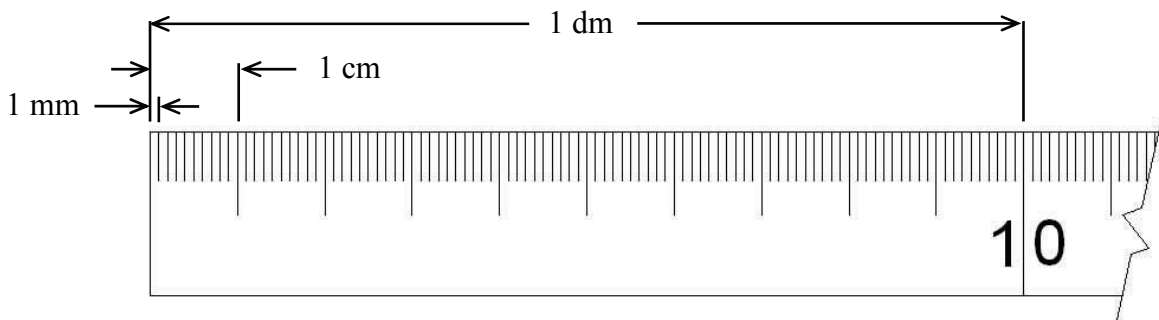
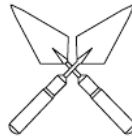


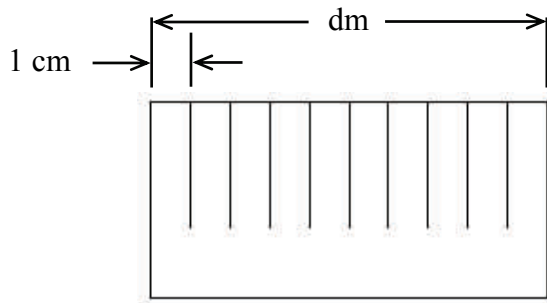
Figure 3.



Centimeters (cm)

Each decimeter can be broken down into ten equal units called *centimeters* (cm) as shown in Fig. 4. Each centimeter is equal to 1/100th of a meter (*centi* means “hundred”).

- There are 100 centimeters in a meter.
- There are 10 centimeters in a decimeter.



Centimeters (cm)	
100 cm	= 1 meter
10 cm	= 1 dm
1 cm	= 10 mm
1 cm	= 1/100th of a meter.

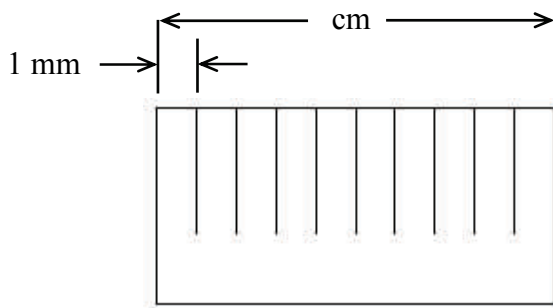
Figure 4. 10 centimeters per decimeter.

Millimeters (mm)

Each centimeter can be broken down into ten equal units called *millimeters* (mm) as shown in Fig. 5. Each millimeter is equal to 1/1000th of a meter (*milli* means “thousand”).

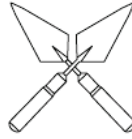
- There are 1000 millimeters in a meter.
- There are 100 millimeters in a decimeter.
- There are 10 millimeters in a centimeter.

The millimeter is the smallest unit of Metric measurement you will use in this course.



Millimeters (mm)	
1000 mm	= 1 meter
100 mm	= 1 dm
10 mm	= 1 cm
1 mm	= 1/1000th of a meter

Figure 5. 10 millimeters per centimeter.



Metric System Conversion

To convert measurements between millimeters, centimeters, decimeters, and the meter is simple. By moving the decimal point to the left or right you can change the value of a dimension as shown in the two charts below.

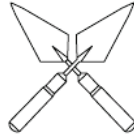
Conversion

A value of a number can be changed at any time by simply moving the decimal point over the appropriate number of times to the left or to the right and adding the correct metric unit symbol:

- m (meters).
- dm (decimeters).
- cm (centimeters).
- mm (millimeters).

← Moving the decimal point to the left.	
745 mm	Measurement shown in millimeters . No decimal point is displayed.
74.5 cm	To convert from mm to cm move the decimal point <i>one</i> place to the left and add cm .
7.45 dm	To convert from mm to dm move the decimal point <i>two</i> places to the left and add dm .
.745 m	To convert from mm to meters move the decimal point three places to the left and add m .

→ Moving the decimal point to the right.	
.412 m	Measurement shown in meters .
4.12 dm	To convert from meters to dm move the decimal point <i>one</i> place to the right and add dm .
41.2 cm	To convert from meters to cm move the decimal point <i>two</i> places to the right and add cm .
412 mm	To convert from meters to mm move the decimal point three places to the right and add mm . (do not include the decimal point in the notation).



Taking Metric Measurements

The simplest way to read and write metric notation for this program is to avoid using decimeters and centimeters altogether. If needed, they can always be converted at a later date.

Example:

The task is to measure the *total length* of the two objects shown in Fig. 6. The objects are 1 meter long and 260 mm in length, respectively.



Figure 6.

Step 1.

Convert the 260 mm to meters. Move the decimal point three places to the left and change the millimeters (*mm*) to meters (*m*).

- $260 \text{ mm} = .260 \text{ m}$

Step 2.

Add the length of the 1 meter dimension to Step 1.

- $1 \text{ m} + .260 \text{ m} = 1.260 \text{ m}$

Rules for Writing Metric Unit Names and Symbols

Unit names and their unit symbols should always be displayed in lowercase letters.

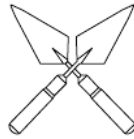
- meters, decimeters, centimeters, and millimeters.
- m, dm, cm, mm.

Always use one space between the number and unit symbol.

- 43 m
- 125 mm
- 87.575 m

Do not use unit symbols in the plural form.

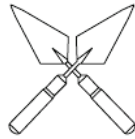
- 43 ms
- 125 mms
- 87.575 ms



Dimension Short Hand Chart

To reduce the amount of time spent writing notation when surveying, use the *letters* or *symbols* listed on the chart below.

Notation Short Hand Chart			
Name	Letters or Symbol	Example	System Used
length	L	$L = 4' - 4 \frac{5}{8}''$	Imperial
width	W	$W = 8'$	Imperial
height	H	$H = 3 \frac{1}{4}''$	Imperial
diameter	\varnothing or D	$\varnothing = 112 \text{ mm}$	Metric
circumference	C	$C = 475 \text{ mm}$	Metric
radius	r	$r = 3.216 \text{ m}$	Metric
angle	\sphericalangle	$\sphericalangle = 37^\circ$	Metric or Imperial
pi	π	$\pi = 3.14$	Metric or Imperial
meter	m	105 m	Metric
decimeter	dm	4.8 dm	Metric
centimeter	cm	32.6 cm	Metric
millimeter	mm	275 mm	Metric
feet	'	12'	Imperial
inch	''	9''	Imperial



Notes:



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