

4.1 - Systems of Measurement

Make Connections

In 1976, Canada adopted SI units to measure length. However, construction and manufacturing industries continue to use **imperial units**. Many Canadians use imperial units to measure their height.



What is your height?

Look around the classroom.

Which object has a length of about one foot?

Which object has a length of about one inch?

Which object has a length of about one yard?



The **SI system of measures** is an abbreviation for *Le Système International d'Unités*. Since 1960, this form of the metric system has been adopted by many countries, including Canada.

Some **imperial units** of measure are the inch, the foot, the yard, and the mile.

Activate Prior Learning: SI Units



Common SI units of length are the metre, centimetre, and millimetre.

What are referents for these SI units?



Unit	Referent
millimetre	thickness of a dime
centimetre	width of little finger
metre	width of classroom door

Referent

the thing that a word or phrase denotes or stands for.

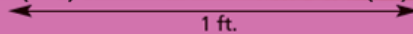
The imperial unit for measuring long distances is the mile. The length of one mile was first established as the distance a Roman soldier could walk in 1000 paces. One pace is 2 steps.



Imperial Unit	Abbreviation	Referent	Relationship between Units
Inch	in.	Thumb length	
Foot	ft.	Foot length	1 ft. = 12 in.
Yard	yd.	Arm span	1 yd. = 3 ft. 1 yd. = 36 in.
Mile	mi.	Distance walked in 20 min	1 mi. = 1760 yd. 1 mi. = 5280 ft.

On maps and scale diagrams, you may see symbols for imperial units instead of abbreviations. One inch is 1" and one foot is 1'.

Base Unit: a unit of measurement on which other units are based.
ex: length - meter (m); volume - litre (L); mass - gram (g)



Volume: the amount of space a solid occupies.

Measurements using Imperial Units

What units would you use if you were to tell me your height and weight?

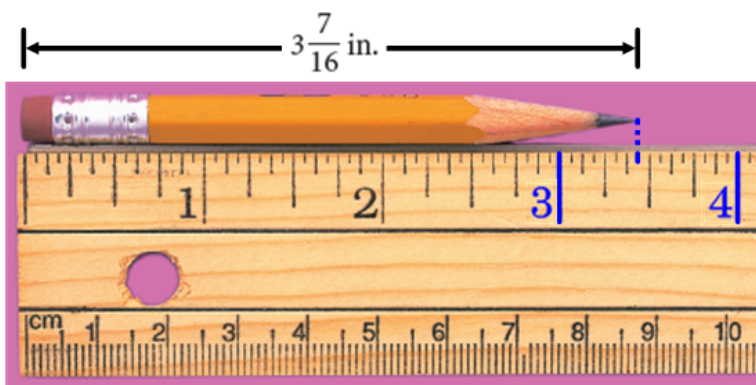
Imperial units are still used in many industries in Canada even though we have adopted SI units, also known as the metric system. The **imperial system is not a decimal system** as the measurements were all developed at different times to meet certain needs. Therefore, you must use a **conversion factor** to convert one imperial unit to another.

FIGURE 4.1

Some Common Imperial Units

Length	
<i>Unit</i>	<i>Abbreviation</i>
inch	in or "
foot	ft or '
yard	yd
mile	mi

To measure the length of an object, first determine the smallest indicated unit by counting the number of divisions between two adjacent inch marks. The ruler below has 16 divisions between two adjacent inch marks, so the smallest indicated unit is $\frac{1}{16}$ of an inch, which is written as $\frac{1}{16}$ in.



The pencil point is closest to the 7th division mark between 3 in. and 4 in., so its length is $3\frac{7}{16}$ in.

A fraction of an imperial measure of length is usually written in fraction form, not decimal form.

Imperial Conversions

We will be working with units for length. The smallest unit we will use is the inch, followed by a foot, followed by a yard, and finally a mile. Read the top of page 143 and then copy and complete the table below.

IMPERIAL CONVERSION TABLE

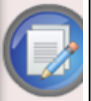
$$1 \text{ foot} = \underline{12} \text{ inches}$$

$$1 \text{ yard} = \underline{3} \text{ feet} = \underline{36} \text{ inches}$$

$$1 \text{ mile} = 1760 \text{ yards} = \underline{5280} \text{ feet}$$

1

What is the length of the paper clip?



A

1 in.

B

$1\frac{1}{8}$ in.

C

$1\frac{1}{2}$ in.



Worksheet Examples

1. Convert to inches

$$6 \text{ feet } 8 \frac{1}{2} \text{ inches} = \rightarrow (72 + 8) + \frac{1}{2}$$
$$6 \times 12 = 72 \dots = 80 \frac{1}{2}''$$

2. Convert to Feet and inches

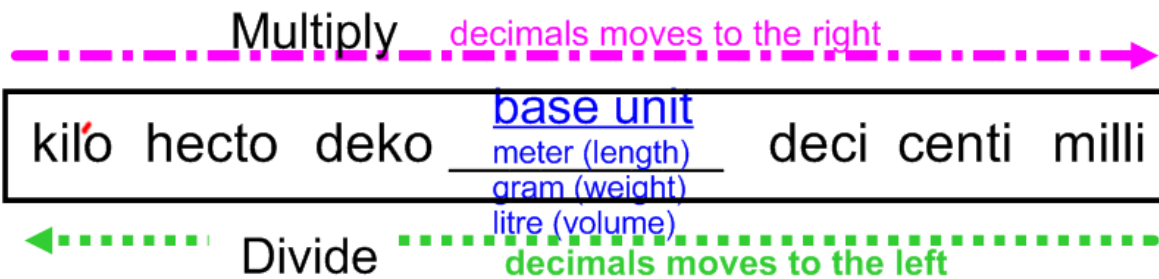
$$69 \frac{1}{2} \text{ inches}$$

$$69 \div 12 = 5 \text{ R } 9$$

$$5 \times 12 = 60$$

$$\begin{array}{r} 69 \\ -60 \\ \hline 9 \text{ R} \end{array}$$

$$5' 9 \frac{1}{2}''$$



Try these rounded to the nearest hundredth...

$$25.4 \text{ mm} = \underline{2.54} \text{ cm}$$

$$32.0 \text{ kg} = \underline{3200.00} \text{ dekograms}$$

$$10.5 \text{ hm} = \underline{1050.00} \text{ m}$$

$$5 \text{ litres} = \underline{0.005} \text{ kiloliters}$$

$$= 0.01$$

HOMework...

- **Worksheets**

1. **Reading a ruler and a measuring tape**
2. **Conversion: feet to inches & metric**