

Relationships between Metric and Imperial Measurements

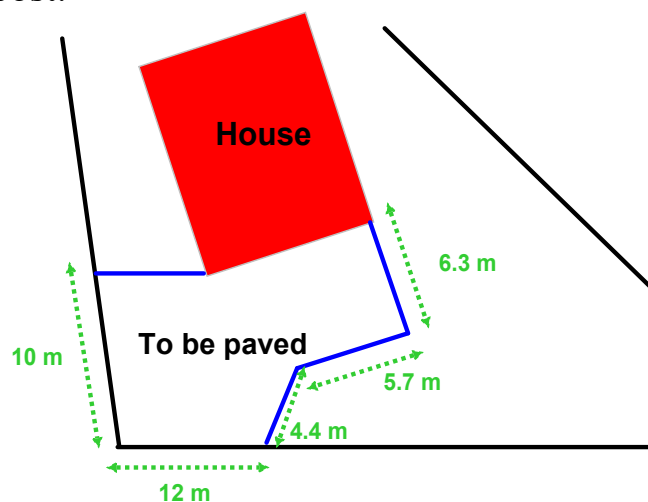
Learning Goals

- convert between different units of measurements

This is a picture of my backyard. I want to have paving stones in the blue region. Measurements are given on the diagram. Paving stones are \$5.50/sq ft. How much will it cost me to buy the stones?

DO NOT calculate anything.

Make a list of things / steps I need to do to figure out how much the stones will cost.



What happens if you are a tool and die maker?

Measurements for an order are in metric, but your machine that you are working with is imperial.

What happens when you are a nurse?

Doctor says "Give 5 ml/kg of medicine"
Patient says "I am 140 pounds."

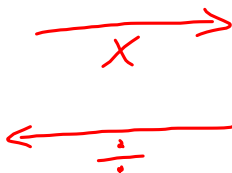
What happens when you buy salami?

You want 2 pounds of salami, but the scale is in grams or kg.

Conversion

Length

1 in = 25.4 mm
1 in = 2.54 cm
1 foot = 30.48 cm
1 yard = 0.9144 m
1 mile = 1.609 km



Area

1 acre (ac) = 0.405 hectare (ha)
1 ha = 2.47 ac

Volume

1 ounce = 29.574 mL
1 pint = 0.473 L
1 gallon = 3.785 L
1 L = 1000 cm³

Mass

1 ounce = 28.35 g
1 pound = 0.454 kg
1 imperial ton = 0.907 metric ton

Handout

MAP 4C WS 4.1

Measurement Conversions

1. Show your knowledge of metric prefixes to convert the following quantities.

a) 10 kg = 10 000 g b) 500 mm = 0.5 m c) 1 kL = 1 000 000 mL

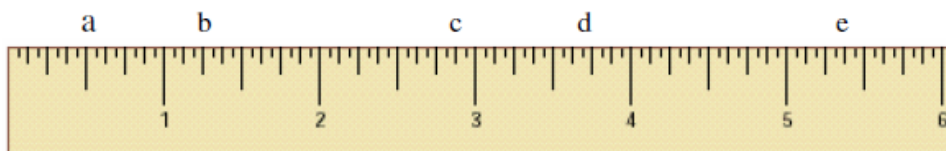
d) 2.5 km = 250000 m e)

g) 3.68 kg = 3680 g h) 5250 cm = 52.5 m i) 8700 mL = 8.7 L

k) 25 mg = 0.025 g l) 60000 g = 60 kg

Handwritten note: A green squiggle is under "25", a green arrow points left from the squiggle, and the number "3" is written below the arrow.

2. What fractional measure is indicated at each letter on this **imperial** ruler?



a = $\frac{1}{2}$ b = $1\frac{1}{4}$ c = $2\frac{7}{8}$ d = $3\frac{11}{16}$ e = $5\frac{3}{8}$

3. Consider the following examples of objects that could be measured. Connect (with a straight line) the examples with the most appropriate unit of measurement.

Column A	Column B
Volume of a cooler	$\frac{1}{2}$ in. (inches)
Mass of an average person	5'10" (5 feet, 10 inches)
Temperature inside a room	5 gal (gallons)
Thickness of a magazine	170 lb. (pounds)
Height of an average male	400 yd. (yards)
Distance around a running track	72° F

4. Insert the appropriate value in the blank below.

a) 750 cm = 7.5 m

b) 15 000 mL = 15 L

c) 6800 mg = 6.8 g

d) 150 000 cm = 1.5 km

e) 7000 g = 7 kg

g) 500 mg = 0.5 g

Remember, if you are converting from a smaller unit to a larger unit (moving upward in the table above), move the decimal place to the left in the number you are converting. If you are converting from a larger unit to a smaller unit (moving down in the table above), move the decimal place to the right in the number you are converting.

5. Complete the table below.

GIVEN UNITS	CONVERT TO	GIVEN UNITS	CONVERT TO
34 inches	<u>863.6</u> mm	20 feet	<u>6.096</u> metres
5 yards	<u>4.572</u> m	5 pints	<u>2365.88</u> mL
4.9 L	<u>10.359</u> pints	4.5 pounds	<u>72</u> ounces
* 6500 m	<u>4.04</u> miles	460 mL	<u>0.486</u> quarts
38 ounces	<u>1.08</u> kg	5454 g	<u>12.01</u> pounds
18 gal	<u>68.14</u> L	1000 miles	<u>1609</u> km
88 °F	<u>31.1</u> °C	20 fl oz	<u>591.47</u> mL

$6500 \text{ m} \xrightarrow{\div 0.9144} 7108 \text{ yds}$
 $\downarrow \div 1000$
 $6.5 \text{ km} \xrightarrow{\div 1.609} \underline{4.04} \text{ miles}$

$$F = \frac{9}{5} C + 32$$

$$F - 32 = \frac{9}{5} C$$

$$5(F - 32) = 9C$$

$$\frac{5}{9}(F - 32) = C$$

6. One of the earliest sci-fi novels was Jule Verne's *20 000 Leagues Under the Sea*. A league is an archaic unit that meant approximately 3 miles. Suggest a metric title.

$$20\,000 \times 3 \text{ mi}$$

$$= 60\,000 \text{ miles}$$

$$= 96\,560.6 \text{ km}$$

\therefore metric title

100 000 km under the sea

6. Use the provided charts to **convert** the following amounts into the indicated quantities. (Round to 1 decimal place if necessary).

Meters	Centimeters	Inches	Feet	Yards
1.905	190.5	75	6	2
4	400	157.5	13.1	4.4
10.06	1005.84	396	33	11

7. Use the provided **charts** to convert the following amounts into the indicated quantities.

a) 18 gal = 81.8 L

b) 7 lbs 6 oz = 3.35 kg

c) 42 cm² = 6.51 inches²

d) 15 inches² = 96.77 cm²

e) $7 \frac{3}{8}$ inches = 18.7 cm

f) 20 fl oz = 568.262 mL

g) 88 °F = 31.1 °C

h) 14 m 33 cm = 15.67 yards

→ 1 in = 2.54 cm

1² in² = 2.54² cm²

1 in² = 6.45 cm²

8. Immigrants at the turn of the century were granted 160 acres of free farmland if they agreed to settle in Western Canada. How many hectares would they own?

$$\begin{aligned} & \times 160 \quad 1 \text{ ac} = 0.405 \text{ ha} \quad \times 160 \\ & \quad \quad \quad \rightarrow 160 \text{ ac} = \underline{64.8} \text{ ha} \quad \leftarrow \end{aligned}$$

9. A body temperature of 43°C or higher may cause heat stroke, leading to membrane damage or denaturing of proteins. What reading on a **Fahrenheit** thermometer is equivalent to this?

$$\begin{aligned} F &= \frac{9}{5} C + 32 \\ &= \frac{9}{5} (43) + 32 \\ &= 109.4 \end{aligned}$$