

Dimensional Analysis Review

Chem Worksheet 11-1

Name ANSWER KEY

There are a variety of units that can be used when measuring. For example, the length of an object can be measured in millimeters, centimeters, meters, and even inches. A measurement made in inches can be converted to other units, such as centimeters using a conversion factor. A **conversion factor** is a ratio of two equivalent values expressed with different units.

Conversion Factors

1 L = 1000 mL	1 km = 1000 m
1 m = 100 cm	1 mm = 1000 μ m
1 gal = 3.785 L	1 in = 2.54 cm
1 km = 0.6214 mi	1 kg = 2.20 lb
1 yek = 18 mem	1 mem = 180 tezl

To solve conversion problems we use a strategy known as **dimensional analysis**. This technique focuses on canceling units by placing them on the top and bottom of the fractions used to set up a problem. For example, when converting 18 inches to centimeters we place the inches on the bottom of the conversion factor so that they cancel with the inches in the 'given'.

$$\frac{18 \cancel{\text{in}}}{1} \times \frac{2.54 \text{ cm}}{1 \cancel{\text{in}}} = 45.72 \text{ cm}$$

Example

Convert 25 gallons to liters.

- Write the 'given' over 1.

$$\frac{25 \text{ gal}}{1} \times =$$

- Write the units of the unknown.

$$\frac{25 \text{ gal}}{1} \times = \text{ L}$$

- Insert the conversion factor so that units cancel. Solve.

$$\frac{25 \text{ gal}}{1} \times \frac{3.785 \text{ L}}{1 \text{ gal}} = 95 \text{ L (rounded)}$$

Convert the following measurements using dimensional analysis. Set up problem using fractions. Cross out the units that cancel. You must show work for credit.

1. Convert 42.3 cm to m.

$$42.3 \text{ cm} \frac{1 \text{ m}}{100 \text{ cm}} = 0.423 \text{ m}$$

2. Convert the measurement 5.0 km to mi.

$$5.0 \text{ km} \frac{0.6214 \text{ mi}}{1 \text{ km}} = 3.107 \text{ mi}$$

3. Convert the measurement 150 lb to kg.

$$150 \text{ lb} \frac{1 \text{ kg}}{2.20 \text{ lb}} = 68 \text{ kg}$$

4. Convert 1.5 tezl to mem.

$$1.5 \text{ tezl} \frac{1 \text{ mem}}{180 \text{ tezl}} = 0.0083 \text{ mem}$$

5. Convert 2.00 liters to gal.

$$2.00 \text{ L} \frac{1 \text{ gal}}{3.785 \text{ L}} = 0.528 \text{ gal}$$

6. Convert 4.2 L to mL.

$$4.2 \text{ L} \frac{1000 \text{ mL}}{1 \text{ L}} = 4200 \text{ mL}$$

7. Convert the measurement 1.8 yek to mem.

$$1.8 \text{ yek} \frac{18 \text{ mem}}{1 \text{ yek}} = 32.4 \text{ mem}$$

8. Convert the measurement 325 mi to km.

$$325 \text{ mi} \frac{1.609 \text{ km}}{1 \text{ mi}} = 523 \text{ km}$$

9. Convert 180 cm to in.

$$180 \text{ cm} \left(\frac{1 \text{ inch}}{2.54 \text{ cm}} \right) = 70.9 \text{ in}$$

10. Convert 42 mem to yek.

$$42 \text{ mem} \frac{1 \text{ yek}}{18 \text{ mem}} = 2.3 \text{ yek}$$