

Dimensional Analysis Worksheet 2

Fill in the boxes with the correct missing information.

Use dimensional analysis (the “factor-label” method) to solve the following problems. **Show all steps** needed to convert from starting units to ending units. **Indicate all relationships needed** before setting up and solving the problem. Use any of the following relationships if needed:

1 mile = 1760 yds	16 oz = 1 lb	1 L = 1.06 qts	1 day = 24 hours
1 yd = 3 ft	2000 lbs = 1 ton	4 qts = 1 gal	1 hour = 60 mins
1 ft = 12 in	1 oz = 28.35 g	32 oz = 1 qt	1 min = 60 secs
1 mile = 1.61 km	1 kg = 2.2 lbs	1 qt = 2 pts	

1. A runner competed in a 5-mile run. How many yards did she run?

Relationship: 1 mile = 1760 yds

$$5 \cancel{\text{ miles}} ! \frac{1760 \cancel{\text{ yds}}}{1 \cancel{\text{ mile}}} = \quad \text{yds}$$

2. In the Tour de France, cyclists ride 3,653.6 km over 20 days. How many miles do they go? [Hint: watch for unimportant information!]

Relationship: 1 mile = 1.61 km

$$3653.6 \cancel{\text{ km}} ! \frac{1}{1.61 \cancel{\text{ km}}} = \quad \text{mi}$$

3. After a nice meal, perhaps you’d finish it off with a pound cake for dessert. What would the name of this cake be in grams?

Relationships: 1 lb = 16 oz; 1 oz = 28.35 g

$$1 \cancel{\text{ lb}} ! \frac{16 \cancel{\text{ oz}}}{1 \cancel{\text{ lb}}} ! \frac{28.35 \text{ g}}{1 \cancel{\text{ oz}}} = \quad \text{g (A “453.6-g cake”)}$$

4. In the US milk is sold by the gallon, while in Italy it is sold by the liter. How many liters of milk would you need to equal one gallon?

Relationships: 1 L = 1.06 qts; 4 qts = 1 gal

$$1 \cancel{\text{ gal}} ! \frac{4 \cancel{\text{ qts}}}{1 \cancel{\text{ gal}}} ! \frac{1 \text{ L}}{1.06 \cancel{\text{ qt}}} = \quad \text{L}$$

5. If you go to school for 180 days each year and each day is 7 hours long, how many hours are spent in school in one year?

Information: day = hours (only for school)

$$\frac{180 \cancel{\text{ days}}}{1 \text{ (school) year}} ! \frac{7 \cancel{\text{ hrs}}}{1 \cancel{\text{ day}}} = \frac{\quad \text{hrs}}{1 \text{ (school) year}}$$

Metric Measurement Conversion

Instructions:

Complete the following metric equalities.

$$\begin{array}{|l} \frac{1}{1} \text{ kg} = \frac{1000}{1000} \text{ g} \\ \frac{1}{1} \text{ km} = \frac{1000}{1000} \text{ m} \\ \frac{1}{1} \text{ kL} = \frac{1000}{1000} \text{ L} \end{array} \quad \begin{array}{|l} \frac{100}{1000} \text{ cm} = \frac{1}{1000} \text{ m} \\ \frac{1000}{1000} \text{ mL} = \frac{1}{1000} \text{ L} \end{array} \quad \begin{array}{|l} \frac{1000}{1000} \text{ mm} = \frac{1}{1000} \text{ m} \\ \frac{1000}{1000} \text{ mg} = \frac{1}{1000} \text{ g} \end{array} \quad \begin{array}{|l} \frac{1000}{1} \text{ ms} = \frac{1}{1000} \text{ s} \\ 1 \text{ Mg} = 10^6 \text{ g} \end{array}$$

Convert the measurements below as indicated. You can use scientific notation for very large or small numbers.

- 1) 40 mL to L

$$\frac{40 \cancel{\text{mL}}}{1} \cdot \frac{1 \text{ L}}{1000 \cancel{\text{mL}}} = \frac{40}{1000} \text{ L}$$

- 2) 5400 L to kL

$$\frac{5400 \cancel{\text{L}}}{1} \cdot \frac{1 \text{ kL}}{1000 \cancel{\text{L}}} = 5.4 \text{ kL}$$

- 3) 85 g to kg

$$\frac{85 \cancel{\text{g}}}{1} \cdot \frac{1 \text{ kg}}{1000 \cancel{\text{g}}} = 0.085 \text{ kg}$$

- 4) 52 mg to g

$$\frac{52 \cancel{\text{mg}}}{1} \cdot \frac{1 \text{ g}}{1000 \cancel{\text{mg}}} = 0.052 \text{ g}$$

- 5) 6300 m to km

$$\frac{6300 \cancel{\text{m}}}{1} \cdot \frac{1 \text{ km}}{1000 \cancel{\text{m}}} = 6.3 \text{ km}$$

- 6) 2.50 kg to g

$$\frac{2.50 \cancel{\text{kg}}}{1} \cdot \frac{1000 \text{ g}}{1 \cancel{\text{kg}}} = 2500 \text{ g}$$

- 7) 18,600 g to kg

$$\frac{18600 \cancel{\text{g}}}{1} \cdot \frac{1 \text{ kg}}{1000 \cancel{\text{g}}} = 18.6 \text{ kg}$$

- 8) 544 mL to L

$$\frac{544 \cancel{\text{mL}}}{1} \cdot \frac{1 \text{ L}}{1000 \cancel{\text{mL}}} = 0.544 \text{ L}$$

- 9) 1.92 L to mL

$$\frac{1.92 \cancel{\text{L}}}{1} \cdot \frac{1000 \text{ mL}}{1 \cancel{\text{L}}} = 1920 \text{ mL}$$

- 10) 425 cm to m

$$\frac{425 \cancel{\text{cm}}}{1} \cdot \frac{1 \text{ m}}{100 \cancel{\text{cm}}} = 4.25 \text{ m}$$

- 11) 7870 mL to L

$$\frac{7870 \cancel{\text{mL}}}{1} \cdot \frac{1 \text{ L}}{1000 \cancel{\text{mL}}} = 7.87 \text{ L}$$

- 12) 6.42 m to mm

$$\frac{6.42 \cancel{\text{m}}}{1} \cdot \frac{1000 \text{ mm}}{1 \cancel{\text{m}}} = 6420 \text{ mm}$$

- 13) 1850 cm to m

$$\frac{1850 \cancel{\text{cm}}}{1} \cdot \frac{1 \text{ m}}{100 \cancel{\text{cm}}} = 18.5 \text{ m}$$

- 14) 11.4 km to m

$$\frac{11.4 \cancel{\text{km}}}{1} \cdot \frac{1000 \text{ m}}{1 \cancel{\text{km}}} = 11,400 \text{ m}$$

- 15) 3 m to mm

$$\frac{3 \cancel{\text{m}}}{1} \cdot \frac{1000 \text{ mm}}{1 \cancel{\text{m}}} = 3000 \text{ mm}$$

- 16) 25 Mg to g

$$\frac{25 \cancel{\text{Mg}}}{1} \cdot \frac{10^6 \text{ g}}{1 \cancel{\text{Mg}}} = 2.5 \times 10^7 \text{ g}$$

- 17) 74 cm to mm*

$$\frac{74 \cancel{\text{cm}}}{1} \cdot \frac{1 \cancel{\text{m}}}{100 \cancel{\text{cm}}} \cdot \frac{1000 \text{ mm}}{1 \cancel{\text{m}}} = 740 \text{ mm}$$

- 18) 835 mg to kg*

$$\frac{835 \cancel{\text{mg}}}{1} \cdot \frac{1 \cancel{\text{g}}}{1000 \cancel{\text{mg}}} \cdot \frac{1 \text{ kg}}{1000 \cancel{\text{g}}} = 8.35 \times 10^{-4} \text{ kg}$$