

* Remember, exact conversions are not considered when looking at sig figs.

Dimensional Analysis Practice I

Use Dimensional analysis to solve the following problems. Make sure to include units!

1. How many feet are there in 12 miles? (1 mi. = 5280 ft.) $ft \rightarrow mi$

$$\left(\frac{12 \cancel{mi}}{1}\right) \times \left(\frac{5280 \cancel{ft}}{1 \cancel{mi}}\right) = 63360 \text{ ft} \xrightarrow{2SF} \boxed{63,000 \text{ ft} \text{ or } 6.3 \times 10^4 \text{ ft}}$$

2. How many inches are there in 6.33 feet? $in \rightarrow ft$

$$\left(\frac{6.33 \cancel{ft}}{1}\right) \times \left(\frac{12 \cancel{in}}{1 \cancel{ft}}\right) = 75.96 \text{ in} \xrightarrow{2SF} \boxed{76.0 \text{ in}}$$

3. How many yards are there in 398.7 feet? $yards \rightarrow ft$ 3 feet = 1 yard

$$\left(\frac{398.7 \cancel{ft}}{1}\right) \times \left(\frac{1 \cancel{yard}}{3 \cancel{feet}}\right) = \boxed{132.9 \text{ yards}}$$

4. How many hours are there in 1090 minutes? $min \rightarrow hrs$

$$\left(\frac{1090 \cancel{min}}{1}\right) \times \left(\frac{1 \cancel{hr}}{60 \cancel{min}}\right) = 18.1667 \text{ hrs} \xrightarrow{3SF} \boxed{18.2 \text{ hrs}}$$

5. How many minutes are there in 0.00198 hours? $hrs \rightarrow mins$

$$\left(\frac{0.00198 \cancel{hrs}}{1}\right) \times \left(\frac{60 \cancel{mins}}{1 \cancel{hr}}\right) = 0.1188 \text{ mins} \xrightarrow{3SF} \boxed{0.119 \text{ mins}}$$

6. How many minutes are there in 5 days? $days \rightarrow hrs \rightarrow mins$

$$\left(\frac{5 \cancel{days}}{1}\right) \times \left(\frac{24 \cancel{hrs}}{1 \cancel{day}}\right) \times \left(\frac{60 \cancel{mins}}{1 \cancel{hr}}\right) = 7200 \text{ mins} \xrightarrow{1SF} \boxed{7000 \text{ mins}}$$

7. How many days are there in 7,090,722 minutes? $mins \rightarrow hrs \rightarrow days$

$$\left(\frac{7,090,722 \cancel{mins}}{1}\right) \times \left(\frac{1 \cancel{hr}}{60 \cancel{mins}}\right) \times \left(\frac{1 \cancel{day}}{24 \cancel{hrs}}\right) = 4924.1125 \text{ days} \xrightarrow{7SF} \boxed{4924.113 \text{ days}}$$

8. How many centimeters are there in 5.9 feet? (2.54 cm = 1 in.) $ft \rightarrow in \rightarrow cm$

$$\left(\frac{5.9 \cancel{ft}}{1}\right) \times \left(\frac{12 \cancel{in}}{1 \cancel{ft}}\right) \times \left(\frac{2.54 \cancel{cm}}{1 \cancel{in}}\right) = 179.832 \text{ cm} \xrightarrow{2SF} \boxed{180 \text{ cm}}$$

9. A movie is 7920 seconds long. How many hours is this? $sec \rightarrow min \rightarrow hrs$

$$\left(\frac{7920 \cancel{secs}}{1}\right) \times \left(\frac{1 \cancel{min}}{60 \cancel{sec}}\right) \times \left(\frac{1 \cancel{hr}}{60 \cancel{min}}\right) = 2.2 \text{ hrs} \xrightarrow{3SF} \boxed{2.20 \text{ hrs}}$$

Dimensional Analysis Practice I

10. How many km are there in 33 mm?

$$\left(\frac{33 \text{ mm}}{1}\right) \times \left(\frac{1.0 \times 10^{-6} \text{ km}}{1 \text{ mm}}\right) = 3.3 \times 10^{-5} \text{ km}$$

11. A movie is 2.2 hours long. How many seconds is this? hrs \rightarrow min \rightarrow sec

$$\left(\frac{2.2 \text{ hrs}}{1}\right) \times \left(\frac{60 \text{ min}}{1 \text{ hrs}}\right) \times \left(\frac{60 \text{ sec}}{1 \text{ min}}\right) = 7920 \text{ sec} \xrightarrow{2\text{SF}} \boxed{7.9 \times 10^3 \text{ sec}}$$

12. How many cubic centimeters are there in 2.2 L? L \rightarrow mL \rightarrow cm³

$$\left(\frac{2.2 \text{ L}}{1}\right) \times \left(\frac{1000 \text{ mL}}{1 \text{ L}}\right) \times \left(\frac{1 \text{ cm}^3}{1 \text{ mL}}\right) = \boxed{2200 \text{ cm}^3}$$

13. Your car gets 36 miles per gallon. If you are traveling at a speed of 65 miles per hour, how many gallons of gas will it take to travel for 3 hours?

$$\left(\frac{3 \text{ hrs}}{1}\right) \times \left(\frac{65 \text{ mi}}{1 \text{ hr}}\right) \times \left(\frac{1 \text{ gallon}}{36 \text{ mi}}\right) = 5.41667 \text{ gallons} \xrightarrow{1\text{SF}} \boxed{5 \text{ gallons}}$$

14. The density of mercury is 13.6 g/mL. What is its density in kg/L?

$$\left(\frac{13.6 \text{ g}}{1 \text{ mL}}\right) \times \left(\frac{1 \text{ kg}}{1000 \text{ g}}\right) = \left(\frac{0.0136 \text{ kg}}{\text{mL}}\right) \times \left(\frac{1000 \text{ mL}}{1 \text{ L}}\right) = \boxed{13.6 \text{ kg/L}}$$

15. In a serving of Pepsi, there are 25 mg of sodium per 240 mL. What is this value in g/L?

$$\left(\frac{25 \text{ mg}}{240 \text{ mL}}\right) \times \left(\frac{1 \text{ g}}{1000 \text{ mg}}\right) \times \left(\frac{1000 \text{ mL}}{1 \text{ L}}\right) = 0.104167 \text{ g/L} \xrightarrow{2\text{SF}} \boxed{0.10 \text{ g/L}}$$

16. How many seconds has a person who is exactly 17 years old lived? (Assume 365 days per year).

$$\left(17 \text{ years}\right) \times \left(\frac{365 \text{ days}}{1 \text{ yr}}\right) \times \left(\frac{24 \text{ hrs}}{1 \text{ day}}\right) \times \left(\frac{60 \text{ min}}{1 \text{ hr}}\right) \times \left(\frac{60 \text{ sec}}{1 \text{ min}}\right)$$

536,112,000

$$\boxed{5.4 \times 10^8 \text{ seconds}}$$