

Exercises

KEEP IN MIND WHEN PRACTICING:

- Do these exercises on a separate piece of paper, showing all of your work. **This will NOT be graded** but showing your work is good practice.
- You **need to know** how to use the metric prefix table.
- You **do not** need to know English to metric conversions by memory. They will be provided on exams.

I. Jabberwocky

This exercise is to reinforce the concept that problems are set up based on UNITS. Nonsense words taken from the poem *Jabberwocky* (from Lewis Carroll's *Through the Looking Glass*)

There are 20 tumtum trees in the tulgey wood. (20 tt = 1 tw)

In each tulgey wood is one frumious Bandersnatch. (1 tw = 1 fB)

There are 5 slithy toves in 2 borogoves. (5 st = 2 bg)

There are 2 mome raths per Jabberwock. (2 mr = 1 Jw)

There are 2 Jubjub birds in 200 tumtum trees. (2 Jb = 200 tt)

There are 200 mome raths in each borogove. (200 mr = 1 bg)

There are 5 Jubjub birds per slithy tove. (5Jb = 1 st)

The question is: If there are 5 frumious Bandersnatches, how many Jabberwocks are there? You should use a dimensional analysis setup to show your work! HINT: What information above is a conversion factor and what information is not?

$$? \text{ Jw} = 5 \text{ fB} \times \frac{1 \text{ tw}}{1 \text{ fB}} \times \frac{20 \text{ tt}}{1 \text{ tw}} \times \frac{2 \text{ Jb}}{200 \text{ tt}} \times \frac{1 \text{ st}}{5 \text{ Jb}} \times \frac{2 \text{ bg}}{5 \text{ st}} \times \frac{200 \text{ mr}}{1 \text{ bg}} \times \frac{1 \text{ Jw}}{2 \text{ mr}} = \boxed{8 \text{ Jw}}$$

II. If you have done the previous problem correctly, you have just done a “multi-step conversion” problem (a problem that involves more than one conversion factor). Here is some practice with multi-step conversions. If needed, use conversion factors from the previous worksheet.

1. Calculate the cost of gasoline for a 420 mile trip if your car averages 20 miles/gal of gas, and the gas costs \$0.95/gallon. (*your gas mileage is dependent on a lot of factors, so think about how impossible it is to know to the penny how much you will end up spending!*)

$$? \$ = 420 \text{ mi} \times \frac{1 \text{ gal}}{20 \text{ mi}} \times \frac{\$0.95}{1 \text{ gal}} = \$19.95 = \boxed{\$20.}$$

2. Harold's car has a fuel efficiency of 35 miles per gallon. Kumar's car has a fuel efficiency of 12 kilometers per liter. Who gets better gas mileage, Harold or Kumar?

$$\text{Harold: } \frac{? \text{ km}}{1 \text{ L}} = \frac{35 \text{ mi}}{1 \text{ gal}} \times \frac{1.6093 \text{ km}}{1 \text{ mi}} \times \frac{1 \text{ gal}}{4 \text{ qts}} \times \frac{1.057 \text{ qt}}{1 \text{ L}} = 14.884 \text{ km/L} = \boxed{15 \text{ km/L}}$$

or

$$\text{Kumar: } \frac{? \text{ mi}}{1 \text{ gal}} = \frac{12 \text{ km}}{1 \text{ L}} \times \frac{1 \text{ mi}}{1.6093 \text{ km}} \times \frac{1 \text{ L}}{1.057 \text{ qt}} \times \frac{4 \text{ qts}}{1 \text{ gal}} = 28.22 \text{ mi/gal} = \boxed{28 \text{ mi/gal}}$$

Harold gets better “mileage”

3. A unit of length called the “furlong” is used in horse racing. The units of length called the

“chain” and the “link” are used in surveying. There are 8 furlongs in 1 mile (mi), 10 chains in 1 furlong, and 100 links in 1 chain. To three significant figures, what is the length of 1 link in inches?

$$? \text{ in} = 1 \text{ link} \times \frac{1 \text{ chain}}{100 \text{ link}} \times \frac{1 \text{ furlong}}{10 \text{ chains}} \times \frac{1 \text{ mi}}{8 \text{ furlongs}} \times \frac{1760 \text{ yd}}{1 \text{ mi}} \times \frac{3 \text{ ft}}{1 \text{ yd}} \times \frac{12 \text{ in}}{1 \text{ ft}} = \boxed{7.92 \text{ in}}$$