Focus Area—Topic D

Measurement Conversions through multiplication

Knowing the unit conversions
1 foot = 12 inches  
1 yard = 3 feet = 36 inches
1 mile = 5,280 feet  
1 mile = 1,760 yards
1 centimeter = 10 millimeter
1 meter = 100 centimeters = 1,000 millimeters
1 kilometer = 1,000 meters
1 pound = 16 pound  
1 ton = 2,000 pounds
1 gram = 1,000 milligrams  
1 kilogram = 1,000 grams
1 cup = 8 fluid ounces  
1 pint = 2 cups
1 quart = 2 pints  
1 gallon = 4 quarts
1 liter = 1,000 milliliters  
1 kiloliter = 1,000 liters

Convert.

a.  15 yd = _______ ft
   yards to feet: big unit to small unit - multiply
   3 ft = 1 yd  
   15 yd x 3 ft per yd = 45 ft

b. ______ g = 18 kg
   kilograms to grams: big unit to small unit - multiply
   1,000 g = 1 kg  
   18 kg x 1,000 g per kg = 18,000 g

c. 16 gal = ______ qt = ______ pt
   gallons to quarts to pints: big unit to small unit
   to smaller unit - multiply twice
   4 qt = 1 gal  
   1 gal = 2 pt
   16 gal x 4 qt per gal = 64 qt
   64 qt x 2 pt per qt = 128 pt

d. ________fl oz = 6.32 c
   cups to fluid ounces: big unit to small unit - multiply
   8 fl oz = 1 cup
   6.32 c x 8 fl oz per c
   = 632 hundredths c x 8 fl oz per c
   = 5056 hundredths fl oz
   = 50.56 fl oz

e. 9.54 g = _________mg
   grams to milligrams: big unit to small unit - multiply
   1,000 mg = 1 g
   9.54 g x 1000 mg per g
   = 954 hundredths g x 1000 mg per g
   = 954,000 hundredths mg
   = 9540.00 or 9540 mg
John’s dog had 5 puppies! When John and his sister Peggy weigh all the puppies together, they weigh 4 pounds 1 ounce. Since all the puppies are about the same size, how many ounces does each puppy weigh?

Answer: First, we need to put all of the puppies’ weight in the same units. We are looking for a final answer of ounces. So, we are converting from pounds to ounces: big unit to small unit - multiply. 16 ounces = 1 pound

\[
\begin{align*}
4 \text{ pounds} & \times 16 \text{ ounces per pound} = 64 \text{ ounces} \\
64 \text{ ounces} & + 1 \text{ ounce} = 65 \text{ ounces}
\end{align*}
\]

\[
65 \text{ ounces} \div 5 \text{ puppies weight in ounces}
\]

\[
\begin{array}{c}
\frac{65 \text{ ounces}}{5 \text{ puppies}} = 13 \text{ ounces}
\end{array}
\]

Each puppy weighs 13 ounces.

Susan is training to be in the Mrs. Fitness contest. She ran 3.75 km, swam 0.76 km, and biked for 23.2 km. Susan completed this routine three times a week. How far did Susan travel in one week while training? Express your answer in meters.

Answer: First, we will convert from km to m: big unit to small unit - multiply. 1,000 m = 1 km

\[
\begin{align*}
3.75 \text{ km} & \times 1000 \text{ m per km} = 3750 \text{ m} \\
0.76 \text{ km} & \times 1000 \text{ m per km} = 760 \text{ m} \\
23.2 \text{ km} & \times 1000 \text{ m per km} = 23200 \text{ m}
\end{align*}
\]

(Susan ran) (Susan swam) (Susan biked)

\[
\begin{align*}
3750 \text{ m} & \\
760 \text{ m} & \\
+ 23200 \text{ m} & \Rightarrow 27710 \text{ m}
\end{align*}
\]

(Susan’s travel for 1 time) (total distance in one week of training)

Susan traveled a total of 83,130 meters in one week of training.

Another Approach: 3.75 km

\[
\begin{align*}
0.76 \text{ km} & \times 1000 \text{ m per km} = 760 \text{ m} \\
23.20 \text{ km} & \times 1000 \text{ m per km} = 23200 \text{ m}
\end{align*}
\]

(Susan swam) (Susan biked)

\[
\begin{align*}
27710 \text{ m} & \times \frac{3 \text{ (trainings in a week)}}{83130 \text{ m}}
\end{align*}
\]

Fast Mail charges $5.35 to ship a 2 lb-package. For each ounce over 2 lb, they charge an additional $0.18 per ounce. How much would it cost to ship a package weighing 3 lb 8 oz?

Answer: First we need to see how many 2 pounds can be taken out of the total weight of the package. 

\[
\begin{align*}
3 \text{ lb 8 oz} & \text{ (weight of package)} \\
- 2 \text{ lb 0 oz} & (\$5.35 \text{ - cost for shipping 2 lb})
\end{align*}
\]

Now we need to convert our packages left over weight into the same unit of ounces.

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\begin{align*}
16 \text{ oz} & = 1 \text{ lb} \\
+ 8 \text{ oz} & \Rightarrow 24 \text{ oz (8 oz)}
\end{align*}
\]

\[
\begin{align*}
24 \text{ oz} & \times \frac{18 \text{ (ounces)}}{100 \text{ oz}} = 0.432 \\
+ 24 \text{ oz} & \Rightarrow 43.2 \text{ (ounces)}
\end{align*}
\]

It will cost $9.67 to ship a package weighing 3 lb 8 oz.