

Dimensional Analysis

(Fancy way of saying conversion from 1 unit to another like inches to centimeters)

Get a chrome book and go to:

<http://www.visionlearning.com/en/library/Math-in-Science/62/Unit-Conversion/144/reading>

Scroll down and read the story about the Mars Climate Rover. **All questions should be answered in complete sentences or complete equations.**

1. What was the outcome of using 2 different units of measurement and not converting the units?

A conversion factor is simply is a math statement making 2 different units equal like:

1dozen eggs = 12 eggs or in ratio form $\frac{1 \text{ dozen eggs}}{12 \text{ eggs}}$ or $\frac{12 \text{ eggs}}{1 \text{ dozen eggs}}$

Each ratio (a ratio is comparing 1 number over another) is equal to 1.

So to find how many dozen would equal 144 eggs you need to set up an equation to solve the problem. Remember: 1 dozen eggs = 12 eggs (This is your conversion factor)

??? dozen eggs = 144 eggs X $\frac{1 \text{ dozen eggs}}{12 \text{ eggs}}$ = $\frac{144}{12}$ dozen eggs = 12 dozen eggs

2. Scroll down and read about getting gas and going on a trip to Mexico. Write an equation showing the conversion from kilometers to miles to find out the miles per hour (MPH) when traveling 100 kilometers per hour. The conversion factor is 1 mile=1.61 kilometers and the speed is 100 km/hr.

3. Keep reading and try to figure out which gas would be cheaper to get, the gas in pesos/liter in Mexico or the \$2.87dollars/gallon at home, write the conversion given to you. Here's a hint:

$\frac{6.50 \text{ pesos}}{? \text{ Liter}} \times \frac{? \text{ cents}}{1 \text{ peso}} \times \frac{1 \text{ dollar}}{? \text{ cents}} \times \frac{? \text{ Liters}}{1 \text{ gallon}} =$ Remember each ratio = 1 and are set up to cancel out units.

4. Which gas is cheaper? How much cheaper?

5. Read further. What are some other reasons we would use dimensional analysis?

Answer the following questions using the conversion factors on the back

6. What is the area of a rectangle in square meters if the length is 14 feet and the width is 16 feet?

7. What is the volume of a rectangular cube in cubic meters if the length is 14 feet and the width is 16 feet and the height is 10 feet?

8. We are going to the next closest star to the Sun called Alpha Centauri. Alpha Centauri is 4.3 light years away. How many miles is that? Use the conversion factor given on this paper.

9. The weight of our rocket is 1,600,000 kilograms. How many pounds does our rocket weigh?

10. During this rocket flight to Alpha Centauri we will be traveling at 25 mi/s. How many years would it take us to get there? (hint: make an equation with the conversion factors like in question #3)

Formulas:

Area= Length X Width

Volume (Cube)= Length X Width X Height

Volume (Cylinder)= $\pi r^2 h$

Metric System:

1 kilogram (kg) = 1000 grams (g)

1 kilometer (km) = 1000 meters (m)

1 meter (m) = 100 centimeters (cm)

1 meter (m) = 1000 millimeters (mm)

Conversion Factors:

1 meter (m) = 3.28 feet (ft)

1 centimeter (cm) = .393 inches (in)

1 gram (g) = .035 ounces (oz)

1 pound (lb) = 16 (oz)

1 kilogram (kg) = 2.205 pounds (lb)

1 gallon = 3.79 Liters

1 kilometer (km) = .62 miles (mi)

$^{\circ}\text{F}=(9/5^{\circ}\text{C})+32$

1 light year = $\frac{5.9 \times 10^{12} \text{ (mi)}}{9.5 \times 10^{12} \text{ (km)}}$ $\frac{5,900,000,000,000 \text{ (mi)}}{9,500,000,000,000 \text{ (km)}}$