Physics 11: Operations with Units

In physics the system of units used is known as the MKS system. This is because the standard units used for measurement are:

 **M**eters (m) for length.

 **K**ilograms (kg) for mass.

 **S**econds (s) for time.

When physical quantities are put together the units act exactly like variables in mathematics. For example, as you know from math 3a+4a=7a and (3a)(4a)=12a2 and (3a)/(4a)=0.75. Well with units the exact same rules are followed. Imagine we have two length measurements; 3m and 4m. We can find their sum as 3m+4m=7m, we could find the area of a rectangle with those sides, (3m)(4m)=12m2 or we could find the ratio of the two lengths as (3m)/(4m)=0.75. Too often in science classes the units are treated as an afterthought, they shouldn’t be. It is important for us to understand the units and how they interact as we build up more complex concepts like force and energy. All standard compound units in physics are made from these units. For example the standard unit for energy is the Joule(J) and 1J =$ \frac{1kgm^{2}}{s^{2}}$ , the standard unit for speed is $\frac{m}{s}$ , the standard unit for acceleration is $\frac{^{m}/\_{s}}{s} = \frac{m}{s^{2}} , $the standard unit for mass density is $\frac{kg}{m^{3}}$ and there are countless others. In order to perform calculations it is important to ensure the units match properly.

**1. Convert the following measurements to PROPER PHYSICS UNITS.**

 a. 26km/h b. 1.65h c. 2.3g/mL \* (1mL=1cm3)

 d. 127000 km/h2 e. 0.256L/h f. 365g/m2

**2. Complete the following with proper units if possible. If not possible explain why.**

 a. A car travels at an average 14m/s for 2.5h. How far does the car travel.

 b. A child has four pieces of string. They measure 35cm, 1.2m, 659mm and 0.2256988m.

 What is the total length of the string?

 c. Find the following sum: 25kg + 290g + 4.79s + 1.7m.

 d. A beaker of water contains 290g of salt dissolved in 625mL of water. How many kg of

 salt are there per cubic meter of water?

 e. A plane increases its speed from 75km/h to 275km/h in 2.2 minutes. What is the

 acceleration of the plane in m/s2?