

Conversions of Multiple Units at the Same Time

- This is the most challenging situation, but the ratio work and cancelling of the units works exactly the same

Example:

How fast in *meters/second* is a car travelling at: **70km/hr**

Solution:

$$\frac{70\cancel{km}}{1\cancel{hr}} * \frac{1000\cancel{m}}{1\cancel{km}} * \frac{1\cancel{hr}}{60\cancel{mins}} * \frac{1\cancel{min}}{60\cancel{sec}} = \frac{70 * 1000\cancel{m}}{60 * 60\cancel{sec}} = \frac{70\,000\cancel{m}}{3600\cancel{sec}} = 19.4 \frac{\mathbf{m}}{\mathbf{s}}$$

Kilometers cancelled top and bottom

Hours cancelled top and bottom

Minutes cancelled top and bottom

Example:

The speed of light is 299 792 458 *meters/second*

A **light year** is a measurement of how far light travels in **kilometers** in a **year**. Knowing how fast light travels we can use our ratios to figure this out!

Solution:

$$\frac{299\,792\,458\cancel{m}}{1\cancel{sec}} * \frac{1\cancel{km}}{1000\cancel{m}} * \frac{60\cancel{sec}}{1\cancel{min}} * \frac{60\cancel{min}}{1\cancel{hr}} * \frac{24\cancel{hr}}{1\cancel{day}} * \frac{365\cancel{day}}{1\cancel{yr}} = 9.45 * 10^{12} \mathbf{km/yr}$$

Meters cancelled top and bottom

Seconds cancelled top and bottom

Minutes cancelled top and bottom

Hours cancelled top and bottom

Days cancelled top and bottom

Practice

- Set up all your ratios so that we can see the units cancelling top and bottom!
1. If I can run at 8km/hr how fast am I going in m/s ?
 2. You watch an ant move 8cm in 3seconds , how fast is it travelling in km/hr ?
 3. If a tank fills at 600mL/second how fast does it fill in L/minute ?
 4. If you are strong enough to push an object, with constant acceleration at 2 meters/sec , how far in kilometers can you push it in 2 weeks ?