SPH3U UNIVERSITY PHYSICS

REVIEW: MATH SKILLS

- ☞ International System of Units (SI) (P.660-661)

SI

*Over hundreds of years, physicists (and other scientists) have developed traditional ways (or rules) of expressing their measurements. If we can't trust the measurements, we can put no faith in reports of scientific research. As such, the International System of Units (**SI**) is used for scientific work throughout the world – everyone accepts and uses the same rules, and understands that there are limitations to the rules.*

SI

SI RULES

- *In the SI system all physical quantities can be expressed as some combination of fundamental units, called **base units**. (i.e., mol, m, kg, °C, s, ...). For example:*

  1 N = 1 kg·m/s² ☞ *unit for force*

  1 J = 1 kg·m²/s² ☞ *unit for energy*

SI

SI RULES

- *The SI convention includes both quantity and **unit symbols**. Note that these are symbols (e.g., 60 km/h) and are not abbreviations (e.g., 40 mi./hr.).*

SI

SI RULES

- *When converting units the method most commonly used is multiplying by conversion factors (equalities), which are memorized or referenced (e.g., 1 m = 100 cm, 1 h = 60 min = 3600 s).*

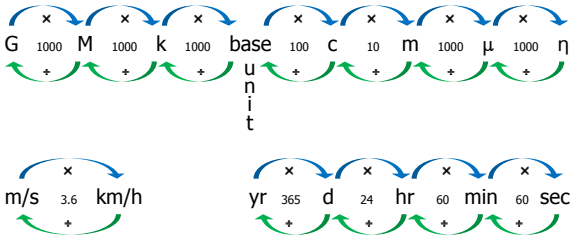
SI

SI RULES

- *It is also important to pay close attention to the units, which are converted by multiplying by a conversion factor (e.g., 1 m/s = 3.6 km/h).*

SI

USEFUL CONVERSIONS FACTORS!



SI

PRACTICE

1. Use the chart to convert each of the following measurements to their base unit.
   - (a) 5.7 GW — 5.7 x 10^{9} W
   - (b) 72 cm — 72 x 10^{-2} m
   - (c) 6 μC — 6 x 10^{-6} C
   - (d) 0.50 MJ — 0.50 x 10^{6} J
   - (e) 6.8 mL — 6.8 x 10^{-3} L
   - (f) 548 ηm — 548 x 10^{-9} m
   - (g) 0.75 kg — 0.75 x 10^{3} g

Power	Prefix	Symbol
10^{9}	giga	G
10^{6}	mega	M
10^{3}	kilo	k
10^{0}	-----	-----
10^{-2}	centi	c
10^{-3}	milli	m
10^{-6}	micro	μ
10^{-9}	nano	η

NOTE!

This is only a partial list - refer to P.661 for a complete list.

SI

PRACTICE

2. An athlete completed a 5-km race in 19.5 min. Convert this time into hours.

$$19.5 \text{ min} \times \frac{1 \text{ hour}}{60 \text{ min}}$$

$$= 0.325 \text{ hours}$$

3. A train is travelling at 95 km/h. Convert 95 km/h into metres per second (m/s).

$$95 \text{ km/h} \times \frac{1000 \text{ m}}{1 \text{ km}} \times \frac{1 \text{ hour}}{3600 \text{ s}}$$

$$= 26.4 \text{ m/s}$$