

# Physics 11: OPERATIONS with UNITS

1. a.  $26 \frac{\text{km}}{\text{h}} \times \left(\frac{1000\text{m}}{\text{km}}\right) \times \left(\frac{1\text{h}}{60\text{min}}\right) \times \left(\frac{1\text{min}}{60\text{s}}\right) = 7.2 \frac{\text{m}}{\text{s}}$

b.  $1.65\text{h} \times \left(\frac{60\text{min}}{\text{h}}\right) \times \left(\frac{60\text{s}}{\text{min}}\right) = 5940\text{s}$

c.  $2.3 \frac{\text{g}}{\text{mL}} = 2.3 \frac{\text{g}}{\text{cm}^3} \times \left(\frac{1\text{kg}}{1000\text{g}}\right) \times \left(\frac{100\text{cm}}{\text{m}}\right) \times \left(\frac{100\text{cm}}{\text{m}}\right) \times \left(\frac{100\text{cm}}{\text{m}}\right) = 2300 \frac{\text{kg}}{\text{m}^3}$

d.  $127000 \frac{\text{km}}{\text{h}^2} \times \left(\frac{1000\text{m}}{\text{km}}\right) \times \left[\frac{1\text{h}}{60\text{min}}\right]^2 \times \left[\frac{1\text{min}}{60\text{s}}\right]^2 = 9.80 \frac{\text{m}}{\text{s}^2}$

e.  $0.256 \frac{\text{L}}{\text{h}} \times \left(\frac{1000\text{mL}}{\text{L}}\right) \times \left(\frac{1\text{h}}{60\text{min}}\right) \times \left(\frac{1\text{min}}{60\text{s}}\right) = 0.071 \frac{\text{mL}}{\text{s}} = 0.071 \frac{\text{cm}^3}{\text{s}}$

\*NOT DONE YET!

$0.071 \frac{\text{cm}^3}{\text{s}} \times \left(\frac{1\text{m}}{100\text{cm}}\right)^3 = 7.1 \times 10^{-6} \frac{\text{m}^3}{\text{s}}$

f.  $365 \frac{\text{g}}{\text{m}^2} \times \left(\frac{1\text{kg}}{1000\text{g}}\right) = 0.365 \frac{\text{kg}}{\text{m}^2}$

2.  $d = \bar{v}t$        $t = 2.5\text{h} \times \left(\frac{60\text{min}}{1\text{h}}\right) \times \left(\frac{60\text{s}}{1\text{min}}\right) = 9000\text{s}$

$d = 14 \frac{\text{m}}{\text{s}} \times 9000\text{s} = \boxed{126000\text{m}}$

b.  $35\text{cm} \times \left(\frac{1\text{m}}{100\text{cm}}\right) + 1.2\text{m} + 659\text{mm} \times \left(\frac{1\text{m}}{1000\text{mm}}\right) + 0.2256988\text{m}$

$0.35\text{m} + 1.2\text{m} + 0.659\text{m} + 0.2256988\text{m} = 2.4346988\text{m} \Rightarrow \boxed{2.4\text{m}}$

c. CANNOT ADD mass, time and length

d.  $290\text{g} \times \left(\frac{1\text{kg}}{1000\text{g}}\right) = 0.29\text{kg}$  ;  $625\text{mL} = 625\text{cm}^3 \times \left(\frac{1\text{m}}{100\text{cm}}\right)^3 = 6.25 \times 10^{-4} \text{m}^3$

$\frac{0.29\text{kg}}{6.25 \times 10^{-4} \text{m}^3} = 464 \frac{\text{kg}}{\text{m}^3} \Rightarrow \boxed{460 \frac{\text{kg}}{\text{m}^3}}$

e.  $\vec{v}_0 = 75 \frac{\text{km}}{\text{h}} \times \left(\frac{1000\text{m}}{\text{km}}\right) \times \left(\frac{1\text{h}}{3600\text{s}}\right) = 20.8\bar{3} \frac{\text{m}}{\text{s}}$        $\vec{v} = 275 \frac{\text{km}}{\text{h}} \times \left(\frac{1000\text{m}}{\text{km}}\right) \times \left(\frac{1\text{h}}{3600\text{s}}\right) = 76.38 \frac{\text{m}}{\text{s}}$

$\Delta \vec{v} = \vec{v} - \vec{v}_0 = 55.5\bar{5} \frac{\text{m}}{\text{s}}$

$\Delta t = 2.2\text{min} \times \frac{60\text{s}}{\text{min}} = 132\text{s}$

$\vec{a} = \frac{\Delta \vec{v}}{t} = 0.42 \frac{\text{m}}{\text{s}^2}$