

# Worked out Answers - Velocity Problems 2

50-11

5) G:  $d = 3 \times 10'' \text{ ft}$        $t = 12.12 \text{ s}$

U:  $v = ?$  (note: it doesn't specify units  $\therefore$  I'm using  $\text{ft/s}$ )

E:  $v = d/t$

S:  $v = \frac{3 \times 10''}{12.12}$

S:  $v = 2.48 \times 10^{10} \text{ ft/s}$

If you wanted it in  $\text{m/s}$ ,  
then ...

$d = 3 \times 10'' \text{ ft} = 9.14 \times 10^{10} \text{ m}$        $1 \text{ cm} = 0.394 \text{ in}$

$$\frac{3 \times 10'' \cancel{\text{ft}} \times 12 \cancel{\text{in}} \times 1 \cancel{\text{cm}} \times 1 \text{ m}}{1 \cancel{\text{ft}} \times 0.394 \cancel{\text{in}} \times 100 \cancel{\text{cm}}} =$$

$v = \frac{9.14 \times 10^{10}}{12.12} = 7.54 \times 10^9 \text{ m/s}$

6) G:  $v = 60 \text{ mph}$   
 $t = 4 \text{ min} = 0.0667 \text{ hr}$

U:  $d = ?$

E:  $v = d/t$

S:  $60 = \frac{d}{0.0667}$

S:  $d = 4 \text{ miles}$

your units have to agree -  
you can't use  $\frac{\text{mile}}{\text{hr}}$  and  $\text{min}$   
So you can change  $\frac{\text{mile}}{\text{hr}} \rightarrow \frac{\text{mile}}{\text{min}}$   
or  $\text{min.} \rightarrow \text{hr.}$

$$\frac{4 \cancel{\text{min}} \times 1 \text{ hr}}{60 \cancel{\text{min}}} =$$

$= 0.0667$

going from a small unit  $\rightarrow$  big one can cause problems round too early.  
↑ should keep in calculator

7) G:  $d = 500 \text{ km} = 500 \times 10^3 \text{ m}$  } ( $k = 1000 \text{ or } 10^3$ )  
 $v = 700 \text{ m/s}$  } the units must agree

U:  $t = ?$

E:  $v = d/t$

S:  $700 = \frac{500 \times 10^3}{t}$  } Frequent Algebra mistake!!  
 $t(700) = \left( \frac{500 \times 10^3}{t} \right) t$  ← correct way

S:  $t = 714.29 \text{ s}$

or  $t = 11.90 \text{ min.}$

$\frac{700 t}{700} = \frac{500 \times 10^3}{700}$

8) G:  $t = 10 \text{ hr}$

$d = 816 \text{ km} = 507.42 \text{ mile}$

U:  $v = ? \text{ (in mph)}$  ← units are specified  
 $t$  is already in hours,  
 need to change  $\text{km} \rightarrow \text{mile}$

E:  $v = d/t$

S:  $v = \frac{507.42}{10}$

S:  $v = 50.74 \text{ mph}$

816 km	1000 m	100 cm	0.394 in	1 ft	1 mile
	1 km	1 m	1 cm	12 in	5280 ft

9) G:  $d = 735 \text{ km} = 735 \times 10^3 \text{ m}$  ← in km  
 $v = 3 \times 10^8 \text{ m/s}$  ← in m

U:  $t = ?$

E:  $v = d/t$

S:  $3 \times 10^8 = \frac{735 \times 10^3}{t}$

S:  $t = 0.0025 \text{ s}$ , or  $2.45 \times 10^{-3} \text{ s}$

10) G:  $v = 3 \times 10^8 \text{ m/s}$  ← from prob. 9  
 radius =  $4.3 \text{ km} = 4.3 \times 10^3 \text{ m}$

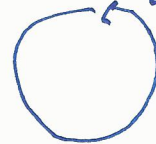
U:  $t$  to travel around = ?

E:  $v = d/t$

S:  $3 \times 10^8 = \frac{2.7 \times 10^4}{t}$

S:  $t = 9.01 \times 10^{-5} \text{ s}$

need to visualize: if you have a radius ... it travels in a circle



$\therefore d = 2\pi r$   
 ↓ circumference

$d = 2(\pi)(4.3 \times 10^3)$

$d = 2.70 \times 10^4 \text{ m}$

11) ath....

we'll talk about this  
in class.

(hint  $\rightarrow$  one is a vector, one a scalar).