# Worked-Out Velocity Problems!

Tuesday, August 19, 2014
1:47 PM

1) $v = 4\ m/s$ $\quad v = d/t$

$t = 5\ s$

$d = ?$

$s \cdot s \left(4\ \frac{m}{s}\right) = \left(\frac{d}{s}\right) s \cdot s$ (this time I rearranged the equation after substituting in the numbers and units)

$d = 4(5)\ m$

$\boxed{d = 20\ m}$

2) $t = 8.3\ min = 498\ s$

$$\frac{8.3\ min \mid 60\ s}{1 \mid 1\ min} = 498\ s$$

$v = 3 \times 10^8\ m/s$

$d = ?$

$v = d/t$ (this time I'm going to rearrange the equation before substituting in)

$t(v) = \left(\frac{d}{t}\right)t$

$d = t\,v$

$d = (498\ s)\left(3 \times 10^8\ m/s\right) = 1494 \times 10^8\ m$

$\boxed{d = 1.49 \times 10^{11}\ m}$

3) $d = 2.7$ miles

$v = 4\ m/s$

$t = ?$ (in minutes)

convert miles to meters

$$\frac{2.7\ miles \mid 5280\ ft \mid 12\ in \mid 1\ cm \mid 1\ m}{1\ miles \mid 1\ ft \mid 0.394\ in \mid 100\ cm} = 4341.93\ m$$

(conversion factors - looked at Bell Ringer from today)

1 cm = 0.394 in

1 mile = 5280 ft

$t(v) = \left(\frac{d}{t}\right)t$

$\frac{t\,v}{v} = \frac{d}{v}$

$t = d/v$

$t = \frac{4341.93\ m}{4\ m/s} = 1085.48\ s$

$$1085.48\,s \times \frac{1\ min}{60\ s} = 18.09\ min$$

$t = 18.09$ min

4) $d_{you} = 50$ km $\quad d_{friend} = 50$ km

$v_{you} = 90$ km/hr $\quad v_{friend} = 95$ km/hr

note: I use the subscript friend & you to keep the information seperate and clear

unknown: how long will your friend wait (in minutes)

or $t_{you} - t_{friend} = ?$

$t_{you}$

$t = d/v$

$t = \frac{50\ km}{90\ km/hr}$

$t = 0.56$ hr

$t_{friend}$

$t = d/v$

$t = \frac{50\ km}{95\ km/hr}$

$t = 0.53$ hr

(keep full hour number in calculator to convert to minutes)

$$0.56\ hr \times \frac{60\ min}{1\ hr} = 33.33\ min$$

$$0.53\ hr \times \frac{60\ min}{1\ hr} = 31.58\ min$$

wait time is 1.75 minutes

$t = 1.75$ min

5)

| Jon | Gabby |
|---|---|
| leaves Lockport @ 2pm<br>$v = 55$ mph<br>$d = 44$ miles | leaves Lockport at 2:08 pm<br>$d = 44$ miles<br>$v = ?$ ← unknown |

I've numbered and written out my reasoning so you'll understand how and why I got the answer I did.

① → to solve, you need to know time.

② → To find the time she travels, you need to know when she gets to Morris

③ → She gets to morris when Jon does, so you need to know when Jon gets to morris

④ → $t_{jon} = \frac{d}{v}$

$t_{jon} = \frac{44 \text{ miles}}{55 \text{ mph}}$

$t_{jon} = 0.8$ hours

Jon travels for 0.8 hours, or 48 minutes. If he left Lockport @ 2pm, he arrives at Morris at 2:48 pm

⑤ → Gabby leaves Lockport at 2:08 pm, and arrives at Morris when Jon does, which is 2:48 pm.

⑥ → Therefore, the time Gabby spent traveling is 40 minutes (2:48 - 2:08).

$\frac{40 \text{ min}}{1} \left| \frac{1 \text{ hr}}{60 \text{ min}} \right. = 0.67$ hours

(leave complete number in calculator to find v)

d /

7) → $v_{Gabby} = d/t$

$$v = \frac{44 \text{ miles}}{.67 \text{ hours}}$$

$v_{Gabby} = 66$ mph

(If you use .67 hr instead of the complete number you get 65.67 mph)