

Pre-Test Solutions

Note Title

20/11/2009

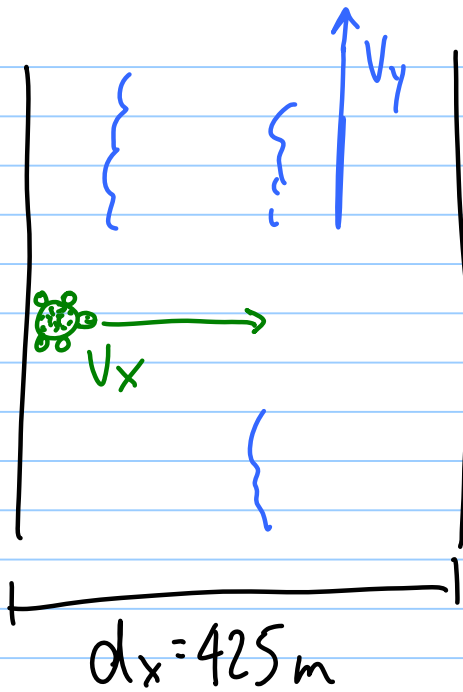
1.)

a. $V_{\text{total}} = 20.0 \text{ mL}$ $\xrightarrow{\hspace{1.5cm}}$ 20.0 mL E
 $V_{\text{train}} = 12.0 \text{ mL}$ $\xrightarrow{\hspace{1.5cm}}$ $V_{\text{wash}} = 8.0 \text{ mL}$

b. $V_{\text{total}} = 8.0 \text{ mL}$ $\xrightarrow{\hspace{1.5cm}}$ $V_{\text{wash}} = -4.0 \text{ mL}$ 8.0 mL E
 $V_{\text{train}} = 12.0 \text{ mL}$ $\xrightarrow{\hspace{1.5cm}}$

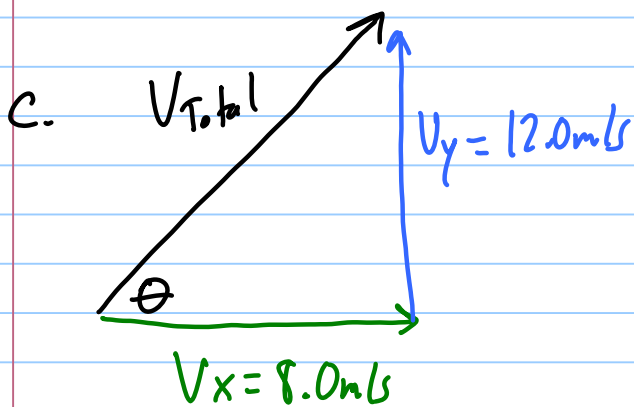
c. $V_{\text{wash}} = -14.0 \text{ mL}$ 2.0 mL W
 $V_{\text{total}} = -2.0 \text{ mL}$ $V_{\text{train}} = 12.0 \text{ mL}$ or -2.0 mL

2.)



a. $V_x = \frac{dx}{t}$
 $t = \frac{dx}{V_x}$
 $= \frac{425\text{m}}{8.0\text{m/s}} = 53.13$
 $= \boxed{53.5}$

b. $V_y = \frac{dy}{t}$
 $dy = V_y \cdot t$
 $= (12.0\text{m/s})(53.13\text{s})$
 $= 637.5$
 $= \boxed{640\text{m}}$



$$V_{\text{Total}}^2 = V_x^2 + V_y^2$$

$$V_{\text{Total}} = \sqrt{V_x^2 + V_y^2}$$

$$= \sqrt{(8.0)^2 + (12.0)^2}$$

$$= 14.42\text{m/s}$$

$$\tan\theta = \frac{V_y}{V_x}$$

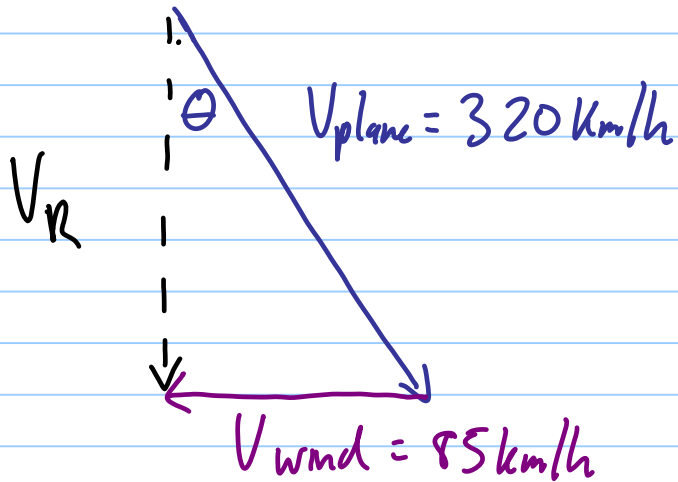
$$\theta = \tan^{-1}\left(\frac{V_y}{V_x}\right)$$

$$= \tan^{-1}\left(\frac{12.0}{8.0}\right)$$

$$= 56^\circ$$

$\boxed{14\text{m/s } 56^\circ \text{ N of E}}$

3.) a



$$\sin \theta = \frac{V_{wind}}{V_{plane}}$$

$$\theta = \sin^{-1}\left(\frac{85}{320}\right)$$

$$= 15.4^\circ$$

$$= \boxed{15^\circ \text{ E of S}}$$

b.

$$V_{plane}^2 = V_R^2 + V_{wind}^2$$

$$V_R^2 = V_{plane}^2 - V_{wind}^2$$

$$V_R = \sqrt{V_{plane}^2 - V_{wind}^2}$$

$$= \sqrt{(320)^2 - (85)^2}$$

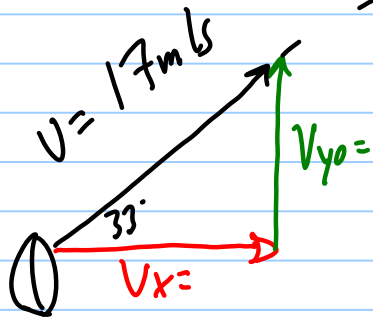
$$= 308.5 \text{ km/h}$$

$$V = \frac{d}{t}$$

$$t = \frac{d}{V} = \frac{1200 \text{ km}}{308.5 \text{ km/h}}$$

$$= \boxed{3.9 \text{ hr}}$$

4)



$$a. \quad \cos 33 = \frac{V_x}{17}$$

$$\begin{aligned} V_x &= 17 \cdot \cos 33 \\ &= 14.26 \\ &= \boxed{14 \text{ m/s}} \end{aligned}$$

$$\sin 33 = \frac{V_{y0}}{17}$$

$$\begin{aligned} V_{y0} &= 17 \sin 33 \\ &= 9.26 \text{ m/s} \\ &= \boxed{9.3 \text{ m/s}} \end{aligned}$$

$$c). \quad \begin{aligned} V_x &= 14.26 \\ dx &= ? \\ t &= 1.89 \end{aligned}$$

$$\begin{aligned} dx &= V_x \cdot t \\ &= \boxed{27 \text{ m}} \end{aligned}$$

x	y @ $t_{\frac{1}{2}}$
	$V_y = 0$
	$V_{y0} = 9.26$
	$a_y = -9.80$
	$dy =$
	$t_{\frac{1}{2}} =$

$$b). \quad \begin{aligned} V_y &= V_{y0} + a_y t_{\frac{1}{2}} \\ t_{\frac{1}{2}} &= \frac{-V_{y0}}{a} = \frac{-9.26}{-9.80} \\ &= 0.945 \text{ s} \end{aligned}$$

$$\begin{aligned} t_{\text{total}} &= t_{\frac{1}{2}} \times 2 = 1.89 \\ &= \boxed{1.9 \text{ s}} \end{aligned}$$

