

P. 29 #25.  $\vec{v}_1 = 25 \text{ m/s [E]}$

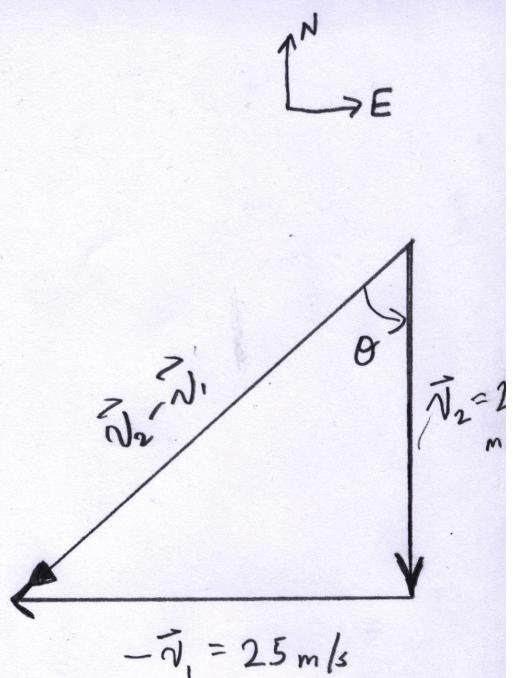
$\vec{v}_2 = 25 \text{ m/s [S]}$

(4u)

$$\Delta t = 15 \text{ s}$$

$$\vec{a}_{av} = ?$$

$$\vec{a} = \frac{\vec{v}_2 - \vec{v}_1}{\Delta t}$$



$$\Delta v_x = -25 \text{ m/s}$$

$$\Delta v_y = -25 \text{ m/s.}$$

$$\begin{aligned}\Delta v &= \sqrt{(25)^2 + (25)^2} \\ &= 35.4 \text{ m/s}\end{aligned}$$

$$\tan \theta = \frac{25}{25}$$

$$\theta = 45^\circ$$

∴ The acceleration

$$\vec{a} = \frac{\vec{\Delta v}}{\Delta t}$$

$$= \frac{35.4}{15}$$

$$= 2.36 \text{ m/s}^2$$

of the car is

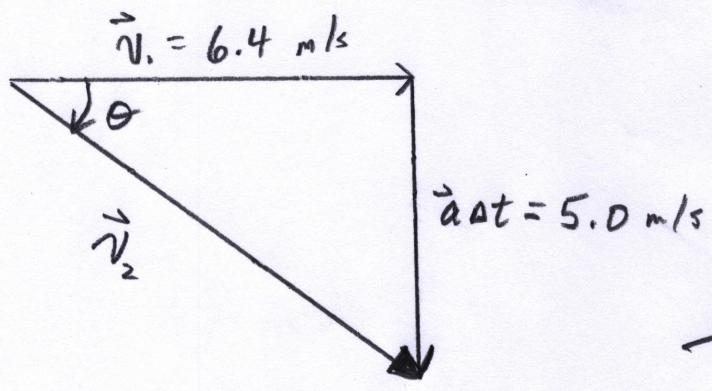
$$\boxed{2.36 \text{ m/s}^2 [\text{S } 45^\circ \text{ W}]}$$

P. 29 # 26.  $\vec{v}_1 = 6.4 \text{ m/s [E]}$

$$\vec{v}_2 = ?$$

$$\left. \begin{array}{l} \vec{a} = 2.0 \text{ m/s}^2 [\text{s}] \\ \Delta t = 2.5 \text{ s} \end{array} \right\} \vec{a}\Delta t = (2.0)(2.5) = 5.0 \text{ m/s [s]}$$

$$\vec{a} = \frac{\vec{v}_2 - \vec{v}_1}{\Delta t} \longrightarrow \vec{v}_2 = \vec{v}_1 + \vec{a}\Delta t$$



$$\tan \theta = \frac{5.0}{6.4}$$

$$\begin{aligned} v_2 &= \sqrt{(6.4)^2 + (5.0)^2} \\ &= 8.1 \text{ m/s} \end{aligned}$$

$$\theta = 38^\circ$$

$\therefore \boxed{v_2 = 8.1 \text{ m/s [E } 38^\circ \text{ S]}}$

$$P. 29 \# 27. \quad \vec{v}_1 = 26 \text{ m/s} [E 22^\circ S]$$

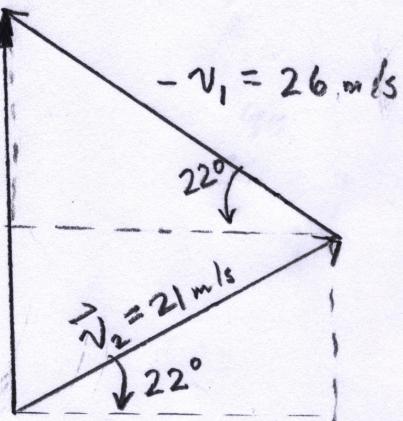
$$\vec{v}_2 = 21 \text{ m/s} [E 22^\circ N]$$

$$\Delta t = 2.5 \times 10^{-3} \text{ s}$$

$$\vec{a} = ?$$

$$\vec{a} = \frac{\vec{v}_2 - \vec{v}_1}{\Delta t}$$

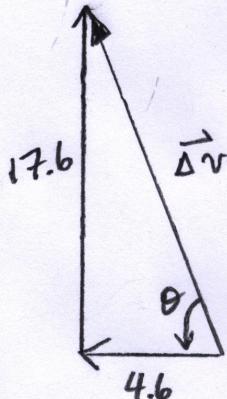
$$\vec{v}_2 - \vec{v}_1$$



$$\begin{aligned}\Delta v_x &= 21 \cos 22^\circ - 26 \cos 22^\circ \\ &= 19.5 - 24.1 \\ &= -4.6\end{aligned}$$

$$\begin{aligned}\Delta v_y &= 21 \sin 22^\circ + 26 \sin 22^\circ \\ &= 7.9 + 9.7 \\ &= 17.6\end{aligned}$$

$$\begin{aligned}\Delta v &= \sqrt{(4.6)^2 + (17.6)^2} \\ &= 18.2 \text{ m/s}\end{aligned}$$



$$\tan \theta = \frac{17.6}{4.6}$$

$$\theta = 75.3^\circ$$

$$\vec{a} = \frac{\vec{\Delta v}}{\Delta t}$$

$$= \frac{18.2}{2.5 \times 10^{-3}} = 7280 \text{ m/s}^2$$

$$\therefore \boxed{\vec{a} = 7280 \text{ m/s}^2 [W 75^\circ N]}$$

$$P.29 \#28. \quad \vec{v}_1 = ?$$

$$\vec{a} = -9.8 \text{ m/s}^2$$

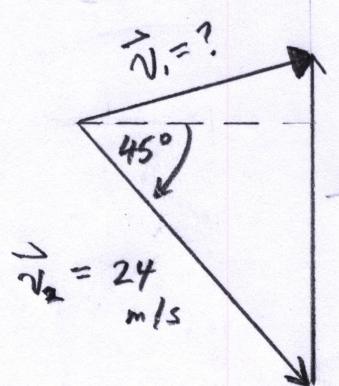
$$\Delta t = 2.0 \text{ s}$$

$$\vec{v}_2 = 24 \text{ m/s} [45^\circ \text{ below horizontal}]$$

$$\left\{ \begin{array}{l} \vec{a}_{\Delta t} = (-9.8)(2.0) \\ \quad \quad \quad = -19.6 \text{ m/s} \end{array} \right.$$

$$\vec{a} = \frac{\vec{v}_2 - \vec{v}_1}{\Delta t} \rightarrow -\vec{v}_1 = \vec{a}_{\Delta t} - \vec{v}_2,$$

$$\text{so } \vec{v}_1 = \vec{v}_2 - \vec{a}_{\Delta t}$$

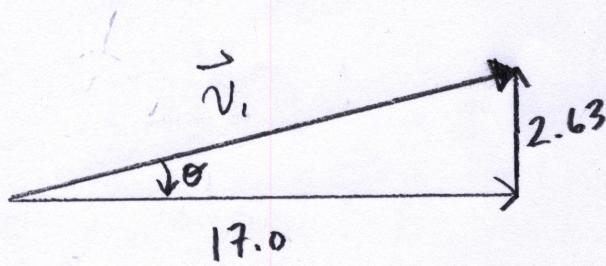


$$\vec{v}_{x_1} = 24 \cos 45^\circ + 0$$

$$= 17.0$$

$$\vec{v}_{y_1} = -24 \sin 45^\circ + 19.6$$

$$= 2.63$$



$$v_1 = \sqrt{(17.0)^2 + (2.63)^2}$$

$$= 17.2 \text{ m/s}$$

$$\tan \theta = \frac{2.63}{17.0}$$

$$\theta = 8.8^\circ$$

$$\therefore \vec{v}_1 = 17.2 \text{ m/s}$$

[ $8.8^\circ$  above horizontal]

$$P.29 \#29. \vec{v}_1 = 82 \text{ km/h} [N 38.2^\circ E] = 22.8 \text{ m/s}$$

$$\vec{v}_2 = 82 \text{ km/h} [E 12.7^\circ S] = 22.8 \text{ m/s}$$

$$\vec{a}_x = ? \quad \Delta t = 15 \text{ min.}$$

$$\vec{a}_y = ? \quad = 0.25 \text{ h}$$

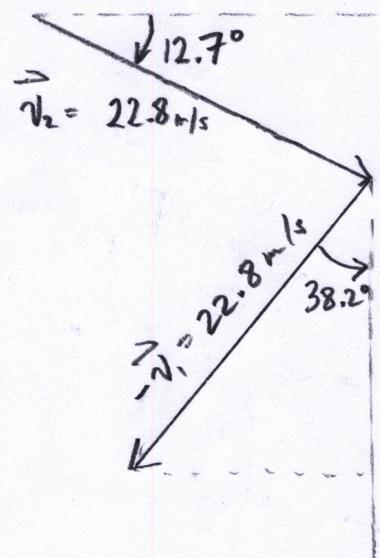
$$= 900 \text{ s}$$

$$\vec{a} = \frac{\vec{v}_2 - \vec{v}_1}{\Delta t}$$

$$\vec{\Delta v}_x = 22.8 \cos 12.7^\circ - 22.8 \sin \frac{38.2^\circ}{38.2^\circ}$$

$$= 22.2 - 14.1$$

$$= 8.1 \text{ m/s}$$



$$a_x = \frac{\Delta v_x}{\Delta t} \rightarrow a_x = \frac{8.1}{900}$$

$$\boxed{\vec{a}_x = 0.009 \text{ m/s}^2 [E]}$$

$$\vec{\Delta v}_y = -22.8 \sin 12.7^\circ - 22.8 \cos 38.2^\circ$$

$$= -5.0 - 17.9$$

$$= -22.9$$

$$\vec{a}_y = -\frac{22.9}{900}$$

$$\boxed{\vec{a}_y = 2.5 \times 10^{-2} \text{ m/s}^2 [S]}$$