

Solutions

Problem 1

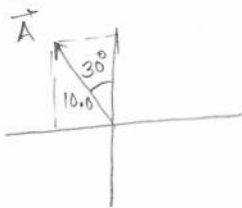
$$[B] = [A] \\ = ML^2T^{-2}$$

Problem 2

velocity at highest point = 0 m/s.

acceleration at highest point = 9.8 m/s² (pointing downwards)

Problem 3

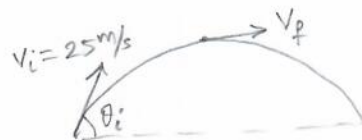


$$A_x = -10.0 \sin 30.0 = -5.00 \text{ m} \\ A_y = +10.0 \cos 30.0 = +8.66 \text{ m}$$

Problem 4

$$v_f = v_i \cos \theta_i \\ = 25 \cos 30 \\ = 22 \text{ m/s}$$

(horizontal velocity remains the same)



Problem 5

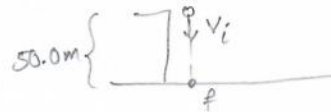
$$\Delta t = ?$$

$$v_i = -15 \text{ m/s}$$

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

$$\Delta y = -50.0 \text{ m}$$

$$v_f = \text{missing}$$



$$\Delta y = v_i \Delta t + \frac{1}{2} a \Delta t^2$$

$$-50.0 = -15 \Delta t + \frac{1}{2} (-9.8) \Delta t^2$$

$$4.9 \Delta t^2 + 15 \Delta t - 50.0 = 0$$

$$\Delta t = \frac{-15 \pm \sqrt{15^2 - 4(4.9)(-50.0)}}{2(4.9)}$$

$$= \frac{-15 \pm \sqrt{1200}}{9.8} = +2.0 \text{ s} \quad \text{or} \quad -5.1 \text{ s}$$

↪ answer.

Problem 6

$$\vec{A} = -5.0 \sin 60 \hat{i} - 5.0 \cos 60 \hat{j}$$

$$= -4.3 \hat{i} - 2.5 \hat{j}$$

$$\vec{B} = -6.0 \cos 30 \hat{i} + 6.0 \sin 30 \hat{j}$$

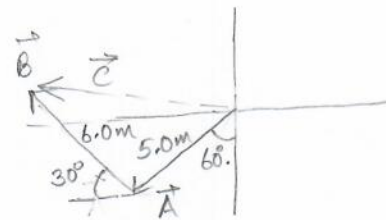
$$= -5.2 \hat{i} + 3.0 \hat{j}$$

$$\vec{C} = \vec{A} + \vec{B} = -9.5 \hat{i} + 0.5 \hat{j}$$

$$|\vec{C}| = \sqrt{9.5^2 + 0.5^2}$$

$$= 9.5 \text{ m}$$

↪ magnitude.



$$\theta_c = \tan^{-1} \left(\frac{0.5}{9.5} \right)$$

$$= 3.0^\circ \text{ North of West.}$$

↪ direction.

Problem 7

$$\Delta x = ?$$

$$\Delta t =$$

$$v_{ix} = 3.5 \text{ m/s}$$

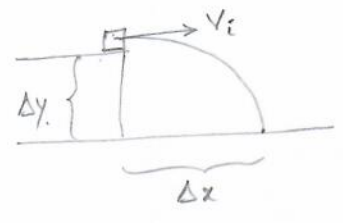
$$\Delta y = -1.3 \text{ m}$$

$$\Delta t =$$

$$v_{iy} = 0 \text{ m/s}$$

$$v_{fy} =$$

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



$$\Delta y = v_{iy} \Delta t + \frac{1}{2} a_y \Delta t^2$$

$$-1.3 = 0 \Delta t + \frac{1}{2} (-9.8) \Delta t^2$$

$$\Delta t = 0.52 \text{ s}$$

$$\frac{\Delta x}{\Delta t} = v_{ix}$$

$$\frac{\Delta x}{0.52} = 3.5$$

$$\Delta x = 1.8 \text{ m}$$