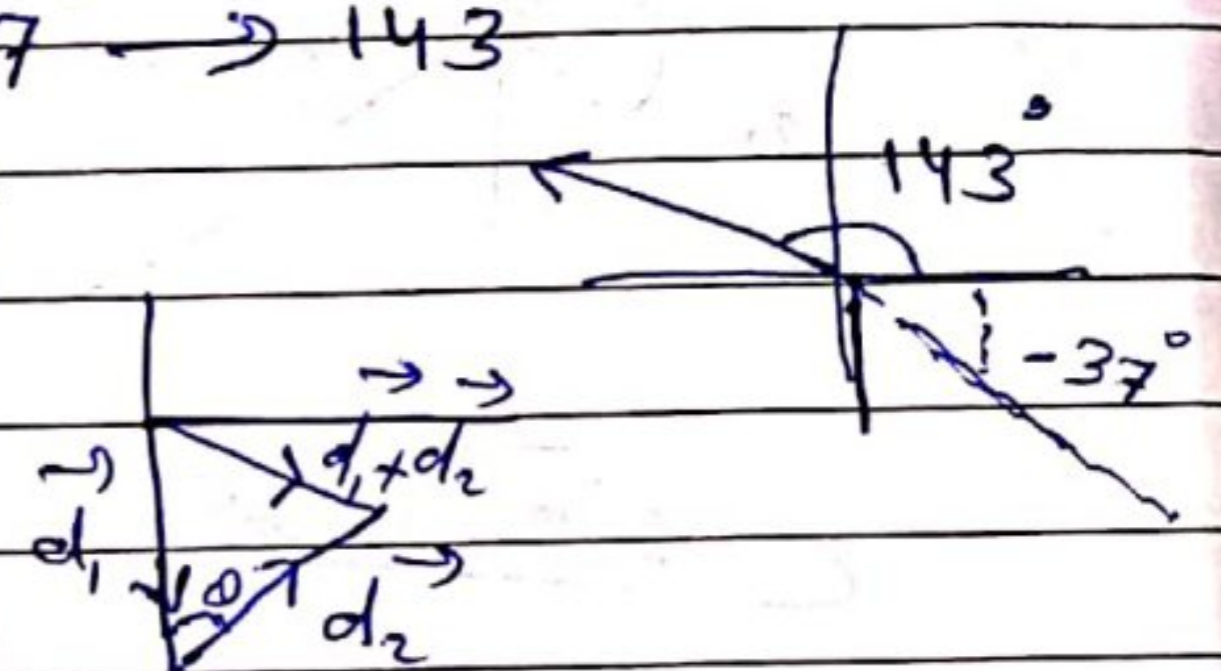


حلول الامتحان التجريبي

① $[v] = L$

② $-\vec{A} - \vec{B} + \vec{C} = -3\hat{i} + 4\hat{j} - 2\hat{i} - 3\hat{j} + \hat{i} + 2\hat{j} = -4\hat{i} + 3\hat{j}$
 $\theta = \tan^{-1} \frac{3}{-4} = -37^\circ \rightarrow 143$

③ $|\vec{d}_1 + \vec{d}_2| = \sqrt{d_1^2 + d_2^2 - 2d_1d_2 \cos \theta}$
 $= \sqrt{100 + 25 - 2(10)(5) \frac{1}{2}}$
 $= 7.37$



④ $v = \frac{dx}{dt} = -2t + 3, v(2) = -1 \text{ m/s}$

speed = $|v| = 1 \text{ m/s}$

⑤ $v_2 = v_1 + at = 4 + 2(5) = 14 \text{ m/s}$

$\bar{v} = \frac{1}{2}(v_1 + v_2) = \frac{1}{2}(4 + 14) = 9 \text{ m/s}$

⑥ $v_2^2 = v_1^2 + 2a \Delta x \Rightarrow 0 = (4)^2 + 2a(40) \Rightarrow a = -0.2 \text{ m/s}^2$
 $v_2 = v_1 + at \Rightarrow t = \frac{v_2 - v_1}{a} = \frac{0 - 4}{-0.2} = 20 \text{ s.}$

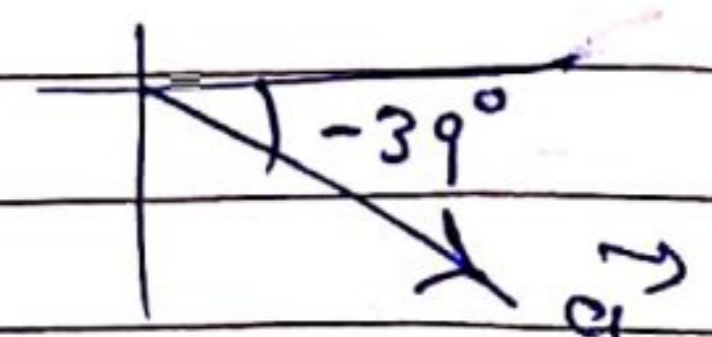
⑦ $v_2 = v_1 - gt \Rightarrow 0 = 3 - 10t \Rightarrow t = 0.3 \text{ s.}$

⑧ $\sum F = ma \Rightarrow F + F \cos \theta = ma$
 $10 + 10(\frac{1}{2}) = 5a \Rightarrow a = 3 \text{ m/s}^2$

⑨ $\sum \vec{F} = m\vec{a} \Rightarrow 5\hat{x} - 4\hat{y} = 1.5\vec{a} \Rightarrow \vec{a} = \frac{10}{3}\hat{x} - \frac{8}{3}\hat{y}$

$|\vec{a}| = \sqrt{\frac{100}{9} + \frac{64}{9}} = \frac{1}{3} \sqrt{164} = 4.3 \text{ m/s}^2$

$\theta = \tan^{-1} \frac{-8}{10} = -39^\circ$



⑩ $W = \Delta K = \frac{1}{2} m [v_2^2 - v_1^2]$

$= \frac{1}{2} (2) [(49 + 9) - (25 + 16)] = 17 \text{ J}$

$$(11) \quad a = \frac{F}{m} = \frac{T}{m} = \frac{60}{4} = 15 \text{ m/s}^2$$

$$v_2^2 = v_1^2 + 2a\Delta x \Rightarrow v_2^2 = 0 + 2(15)(10) = 300$$

$$v_2 = 17.3 \text{ m/s}$$

$$(12) \quad E_1 = E_2 \Rightarrow mgh_1 = mgh_2 + K_2$$

$$K_2 = mg(h_1 - h_2) = 3(10)[80 - 20] = 1800 \text{ J}$$

$$(13) \quad \sum F = ma \Rightarrow mg \sin \theta - f = ma$$

$$3(10)\left(\frac{1}{2}\right) - 5 = 3a \Rightarrow a = \frac{10}{3} \text{ m/s}^2$$

$$v_2^2 = v_1^2 + 2a\Delta x \Rightarrow v_2^2 = 0 + 2\left(\frac{10}{3}\right)(1) = \frac{20}{3}$$

$$v_2 = 2.6 \text{ m/s}$$

$$(14) \quad W = \vec{F} \cdot \vec{s} = (12\hat{x}) \cdot (6\hat{x} - 8\hat{y}) = 72 \text{ J}$$

$$(15) \quad \sum F_y = 0 \Rightarrow F \sin 30 + F \sin 30 = mg$$

$$2F \sin 30 = mg \Rightarrow F = \frac{mg}{2 \sin 30} = mg = 30 \text{ N}$$

