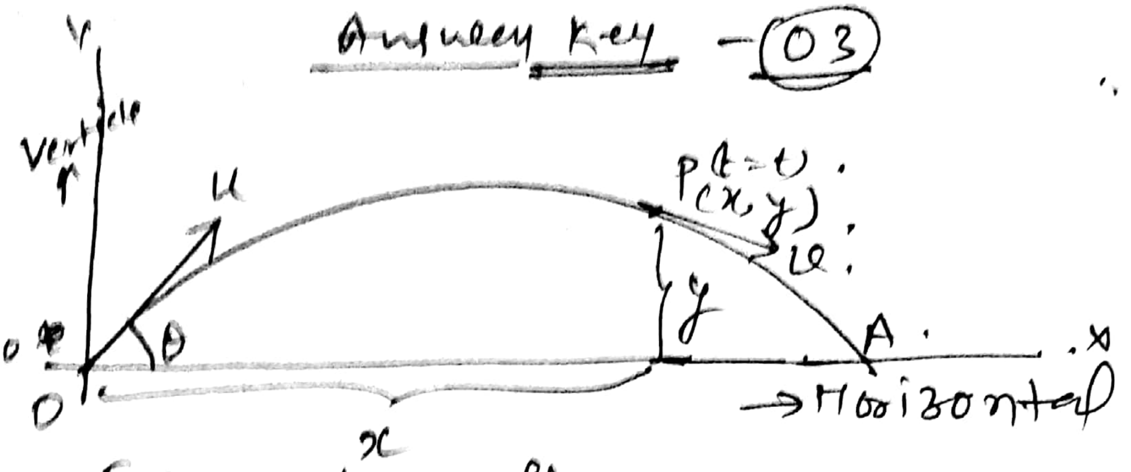
Answer Key - 03

(1)



From above figure.–

$y = u \sin\theta t - \frac{1}{2} g t^2$ —— (1)

$x = u \cos\theta \, t$ —— (2)

From (1) & (2)

$$\boxed{y = x\tan\theta - \frac{1}{2}\frac{g x^2}{u^2 \cos^2\theta}} \text{ —— (3)}$$

Equation (3) is the equation of trajectory.

(2.) For 1st

$-h = u t_1 - \frac{1}{2} g t_1^2$

For 2nd.

$-h = -u t_2 - \frac{1}{2} g t_2^2$. $\Rightarrow \frac{t_1}{t_2} = -?$

(3.) With x – axis –

$(3\hat{i} + 2\hat{j} - \hat{k}) \cdot \hat{i} = |3\hat{i} + 2\hat{j} - \hat{k}| \cdot |\hat{i}| \cdot \cos\alpha$.

$$\frac{3}{(\sqrt{3^2 + 2^2 + (-1)^2}) \cdot 1} = \cos\alpha.$$

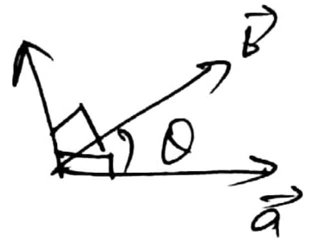
$$\cos\alpha = \frac{3}{\sqrt{9+4+1}} = \frac{3}{\sqrt{14}}$$

Similarly other two can be finded.

(4.) $\vec{a}\cdot\vec{b} = a\cdot b\cdot \cos\theta$.

With it's use we can find angle.

$\vec{a}\times\vec{b} = |\vec{a}|\,|\vec{b}|\,\sin\theta\,\hat{n}$.



From use of vector product we can find area.

(5.)

Ans (a) $V=\sqrt{3^2+4^2} = 5\ m/s$

(b.) $3 = 4\cos\theta \Rightarrow \boxed{\cos\theta = \frac{3}{4}}$

(c) $\frac{d}{5}$, $\frac{d}{4\sin\theta} =$

$= \frac{d}{4\times\frac{\sqrt{4^2-3^2}}{4}} = \frac{d}{\sqrt{7}}$

(7.) $\boxed{\frac{v}{v_0}+\frac{x}{x_0}=1}$

$\frac{1}{v_0}\left(\frac{dv}{dt}\right)+\frac{v}{v_0}=0$

$\Rightarrow \frac{a}{v_0}+\frac{x}{x_0}=0$

$\Rightarrow \frac{a}{V_0}+\frac{v_0}{x_0}\left(1-\frac{x}{x_0}\right)=0$