

Will reach target when $x = 40$

$$\tan A = \frac{3}{4}$$

$$\Rightarrow \cos A = \frac{4}{5}$$

$$\Rightarrow x = 35t\left(\frac{4}{5}\right)$$

$$\Rightarrow = 40$$

$$\Rightarrow 28t = 40$$

$$\Rightarrow t = \frac{10}{7} \text{ s}$$

$$\tan A = \frac{11}{2}$$

$$\Rightarrow \cos A = \frac{2}{\sqrt{125}} = \frac{2}{5\sqrt{5}}$$

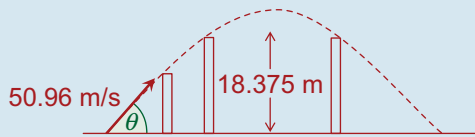
$$\Rightarrow x = 35t\frac{2}{5\sqrt{5}}$$

$$= 40$$

$$\Rightarrow \frac{14t}{\sqrt{5}} = 40$$

$$\Rightarrow t = \frac{20\sqrt{5}}{7} \text{ s}$$

Q. 9.



$$\tan \theta = \frac{5}{12} \Rightarrow \cos \theta = \frac{12}{13} \text{ and } \sin \theta = \frac{5}{13}$$

$$u_x = 50.96 \cos \theta = 50.96\left(\frac{12}{13}\right) = 47.04$$

$$u_y = 50.96 \sin \theta = 50.96\left(\frac{5}{13}\right) = 19.6$$

$$vc_x = 47.04$$

$$v_y = 19.6 - 9.8t$$

$$s_x = 47.04t$$

$$s_y = 19.6t - 4.9t^2$$

Passes over a wall 14.7 m high on its upward path.

Find s_x when $s_y = 14.7$ to find the horizontal displacement of the first wall.

$$s_y = 14.7$$

$$\Rightarrow 19.6t - 4.9t^2 = 14.7 \quad \dots \text{ divide by } 4.9$$

$$\Rightarrow 4t - t^2 = 3$$

$$\Rightarrow t^2 - 4t + 3 = 0$$

$$\Rightarrow (t - 1)(t - 3) = 0$$

$$\Rightarrow t = 1 \quad \text{OR} \quad t = 3$$

\Rightarrow Passes over wall after 1 second.

$$s_x = 47 - 04t \quad \dots \text{ let } t = 1$$

$$\Rightarrow s_x = 47.04 \text{ m}$$

Now find s_x when $s_y = 18.375$ to find horizontal displacements of the two possible walls of height 18.375 m.

$$s_y = 18.375$$

$$\Rightarrow 19.6t - 4.9t^2 = 18.375 \quad \dots \text{ divide by } 4.9$$

$$\Rightarrow 4t - t^2 = 3.75$$

$$\Rightarrow t^2 - 4t + 3.75 = 0 \quad \dots \text{ multiply by } 4$$

$$\Rightarrow 4t^2 - 16t + 15 = 0$$

$$\Rightarrow (2t - 3)(2t - 5) = 0$$

$$\Rightarrow t = \frac{3}{2} \quad \text{OR} \quad t = \frac{5}{2}$$

$$s_x = 47.04t \quad \dots \text{ let } t = \frac{3}{2}$$

$$\Rightarrow s_x = 70.56$$

$$70.56 - 47.04 = 23.52$$

\Rightarrow Second wall must not be less than 23.52 m from first wall.

$$s_x = 47.04t \quad \dots \text{ let } t = \frac{5}{2}$$

$$s_x = 117.6$$

$$117.6 - 47.04 = 70.56$$

\Rightarrow Second wall must not be more than 70.56 m from first wall.