Physics 101- Chapter 4
Quiz No. 2

Name: Key	ID:	Sec: 28

A stone was thrown with initial speed 17.5 m/s form original point O. The stone has passed through constant point A, which has horizontal distance 10 m, and vertical 5 m form O.

1- Find out the two possible values of throw angles.

2- Calculate the horizontal ranges for the two throw angles.

1- $v_o = 17.5\ m/s,\ x = 10\ m,\ y = 5\ m,\ \theta_o = ?$

$$y = x\tan\theta_o - \frac{g x^2}{2v_o^2\cos^2\theta_o}$$

$$5 = 10\tan\theta_o - \frac{9.8\times(10)^2}{2\times(17.5)^2\cos^2\theta_o}$$

$$5 = 10\tan\theta_o - \frac{100\times 9.8}{2\times(17.5)^2}\sec^2\theta_o$$

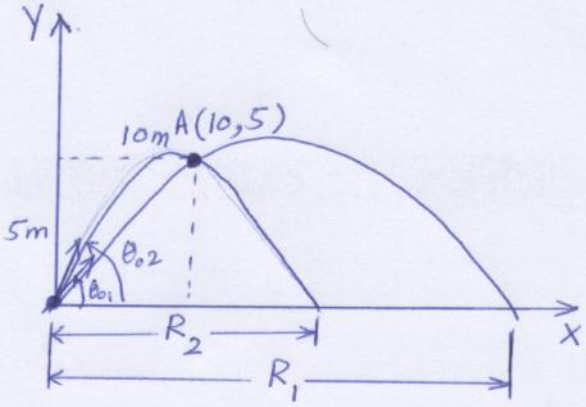
$$50 = 100\tan\theta_o - 16\tan^2\theta_o - 16$$

$$16\tan^2\theta_o - 100\tan\theta_o + 66 = 0$$

$$8\tan^2\theta_o - 50\tan\theta_o + 33 = 0$$

$$(4\tan\theta_o - 3)(2\tan\theta_o - 11) = 0$$

$$\therefore \tan\theta_{o1} = \frac{3}{4},\quad \tan\theta_{o2} = \frac{11}{2}$$



2- Horizontal ranges:

$$R = \frac{v_o^2\sin 2\theta_o}{g} \Rightarrow R = \frac{v_o^2 2\sin\theta_o\cos\theta_o}{g}$$

$$\therefore R_1 = \left[2\times(17.5)^2\times\frac{11}{\sqrt{125}}\times\frac{2}{\sqrt{125}}\right]/g = 11\ m$$

$$\therefore R_2 = \left[2\times(17.5)^2\times\frac{3}{5}\times\frac{4}{5}\right]/g = 30\ m$$