

A projectile is given an initial velocity of $(\hat{i} + 2\hat{j})m/s$, where \hat{i} is along the ground and \hat{j} is along the vertical. If $g = 10 m/s^2$, the equation of its trajectory is:

(1) $y = x - 5x^2$

(2) $y = 2x - 5x^2$

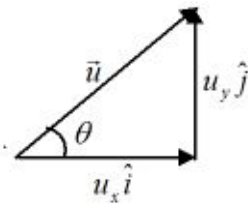
(3) $4y = 2x - 5x^2$

(4) $4y = 2x - 25x^2$

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Solution

The equation of projectile is given by, $y = x \tan \theta - \frac{1}{2} \frac{gx^2}{u^2 \cos^2 \theta}$



$$\tan \theta = \frac{u_y}{u_x} = \frac{2}{1} = 2$$

$$\therefore y = 2x - \frac{1}{2} \frac{10x^2}{(1^2 + 2^2) \times \frac{1}{1 + \tan^2 \theta}} = 2x - \frac{1}{2} \frac{10x^2}{(1^2 + 2^2) \times \frac{1}{5}} = 2x - 5x^2$$

Hence, (2).