

Answer on Question #77915, Physics Mechanics

When a marble is projected vertically upwards with a velocity u from a point O reaches its maximum height from O , another particle B is projected vertically upwards from O with the same velocity u . Show that the marbles will collide with each other after the time $3u/2g$ from the moment that A is thrown.

Solution.

A marble is projected vertically upwards with a velocity u from a point O reaches its maximum height with velocity equal 0:

$$v = v_0 - g \cdot t_1$$

$$0 = v_0 - g \cdot t_1$$

$$v_0 = u$$

$$t_1 = \frac{u}{g}$$

Take the point O of the origin and direct the axis OY up

$$\left\{ \begin{array}{l} -y = -h_{max} + \frac{gt'_1}{2} \\ y = u \cdot t_2 - \frac{gt_2}{2} \end{array} \right\}$$

$$t'_1 = t_2$$

Therefore $h_{max} = u \cdot t_2$

$$h_{max} = \frac{u^2}{2g}$$

$$u \cdot t_2 = \frac{u^2}{2g}$$

$$t_2 = t'_1 = \frac{u}{2g}$$

$$t = t_1 + t'_1 = \frac{u}{g} + \frac{u}{2g} = \frac{3u}{2g}$$

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