

Answer on Question #48618, Physics, Mechanics | Kinematics | Dynamics

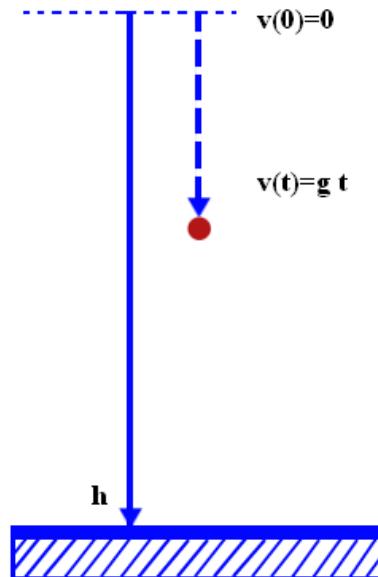
Water drops are coming down at regular time interval from a tap 1.8m high such that when first drop is about to hit the ground the fourth drop is starting off. The position of the third drop from the ground is....

A) 1m. B).6m. C).8m. D) 1.6m

Solution:

Free fall as the word states is body falling freely due to the gravitational pull of the earth.

Consider a body falling freely from height h with velocity v for time t seconds due to gravity g .



Free Fall Formula is

$$y = y_0 - \frac{1}{2}gt^2$$

where $y_0 = 1.8$ m and $g = -9.81$ m/s^2 is acceleration.

Free fall is independent of the mass of the body. It only depends on height and time period for which body is thrown.

Thus, time of fall of the first drop is

$$t = \sqrt{\frac{2(y_0 - y)}{g}} = \sqrt{\frac{2h}{g}} = \sqrt{\frac{2 \cdot 1.8}{9.81}} = 0.606 \text{ s}$$

The time of the third drop falling is

$$t_3 = \frac{t}{3} = \frac{0.606}{3} = 0.202 \text{ s}$$

At time $t_3 = 0.202$ s, the position of the third drop is

$$y_3 = 1.8 - \frac{1}{2} \cdot 9.81 \cdot 0.202^2 = 1.6 \text{ m}$$

Answer: D) 1.6m