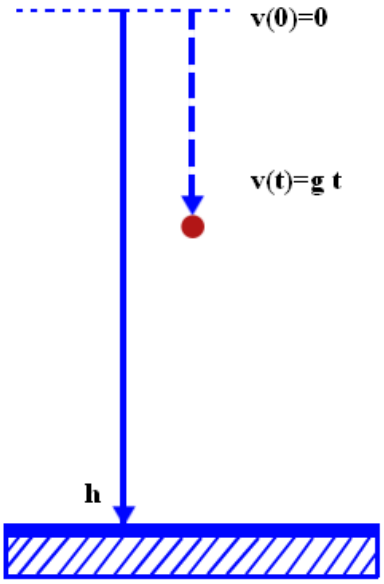
## Answer on Question #45533, Physics, Mechanics | Kinematics | Dynamics

Water is dropping on ground drop wise. If 1st drop is dropped on ground while 3rd drop is near to fall, the distance between 3rd and 1st drop is 5 meters. Find distance between 2nd and 1st drop.

**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 $y_0 = 5$ 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

$$t = \sqrt{\frac{2(y_0 - y)}{g}} = \sqrt{\frac{2h}{g}} = \sqrt{\frac{2 \cdot 5}{9.81}} = 1.0 \text{ s}$$

The time of the second drop falling is

$$t_2 = \frac{t}{2} = 0.5 \text{ s}$$

At time $t_2$ = 0.5 s, the position of the second drop is

$$y_2 = 5 - \frac{1}{2} \cdot 9.81 \cdot 0.5^2 = 3.77 \text{ m}$$

Thus, the distance between 2nd and 1st drop is $3.77$ m

**Answer:** $d = 3.77$ m.