

## Answer on Question 70436, Physics, Other

### Question:

A student drops a ball from the top of a tall building. The ball takes 2.8 s to reach the ground.

- (a) What was the ball's speed just before hitting the ground?
- (b) What is the height of the building?

### Solution:

(a) We can find the ball's speed just before hitting the ground from the kinematic equation:

$$v = v_0 + gt,$$

here,  $v$  is the ball's speed just before hitting the ground,  $v_0$  is the initial velocity of the ball (since initially the ball starts falling from rest it will be equal to zero),  $g = 9.8 \text{ m/s}^2$  is the acceleration due to gravity (we take the downwards as the positive direction, so the acceleration due to gravity will be with sign plus) and  $t$  is the time that needs the ball to reach the ground.

Then, we get:

$$v = gt = 9.8 \frac{\text{m}}{\text{s}^2} \cdot 2.8 \text{ s} = 27.44 \frac{\text{m}}{\text{s}}.$$

(b) We can find the height of the building from another kinematic equation:

$$h = v_0 t + \frac{1}{2} gt^2,$$

$$h = \frac{1}{2} gt^2 = \frac{1}{2} \cdot 9.8 \frac{\text{m}}{\text{s}^2} \cdot (2.8 \text{ s})^2 = 38.42 \text{ m}.$$

### Answer:

(a)  $v = 27.44 \frac{\text{m}}{\text{s}}$ .

(b)  $h = 38.42 \text{ m}$ .