Answer on Question #54923, Physics / Mechanics | Kinematics | Dynamics

If a ball is thrown vertically upwards with speed u, the distance covered during the last t sec of its ascent is

(1) ut

(2) $\frac{1}{2}\mathrm{gt}^2$

(3) $\mathrm{ut}-\frac{1}{2}\mathrm{gt}^2$

(4) $(\mathrm{u}+\mathrm{gt})\mathrm{t}$

Solution:

In order to study the motion under the gravity, the following equations are used:

$$\mathrm{v}=\mathrm{u}+\mathrm{gt} \text{ and } \mathrm{h}=\mathrm{ut}+\frac{\mathrm{gt}^2}{2}$$

We need to determine the distance covered by the ball during the last t sec of its upward motion. This means that if an object is moving upwards with some initial velocity in the vertical direction, the magnitude of the velocity in the vertical direction decreases until it stops (u=0) for an instant. The point at which the velocity is reduced to zero corresponds with the maximum height, $\mathrm{h}_{\mathrm{max}}$, that the object reaches.

Thus, based on the noted above information, we can write the following:

The distance (covered by the ball during the last t sec of its upward motion) = the distance (covered by it in first t sec of its downward motion).

$$\mathrm{h}=\frac{\mathrm{gt}^2}{2}$$

Since we consider the beginning observation from the highest point, we put u equal to 0. The initial velocity, with which the ball was thrown, has no influence on its travelled distance.

Thus, the answer is 2) $\frac{1}{2}\mathrm{gt}^2$.