Answer on Question #44882, Physics, Mechanics | Kinematics | Dynamics

Question:

A student drops a ball form a window 3.5 meters above the sidewalk. How fast is it moving when it hits the sidewalk

Answer:

The law of conservation of energy:

$$T + U = const$$

where $T = \frac{mv^2}{2}$ is kinetic energy, m - mass of the body, v - speed

$U = mgh$ is potential energy, g - gravitational acceleration, h – height

$$T_1 + U_1 = T_2 + U_2$$

1 - initial state: $T_1 = 0, U_1 = mgh$

2 - final state: $T_2 = \frac{mv^2}{2}, U_2 = 0$

Therefore:

$$mgh = \frac{mv^2}{2}$$

$$v = \sqrt{2gh} \cong 8.3\frac{m}{s}$$

Answer: $8.3\frac{m}{s}$