

Answer on Question #42961 – Physics - Mechanics | Kinematics | Dynamics

an object is dropped from the window of an apartment in a high rise building reaches the ground in 3 seconds. on which floor the apartment is located if height of each floor is 4 m and window is 1 meter above the ground of that floor?

Solution:

$t = 3\text{ s}$ – time of the flight;

$h = 4\text{ m}$ – height of the one floor;

$H = 1\text{ m}$ – position of the window above the ground of the floor;

N – number of the floor, from which an object was dropped;

Equation of motion of the object along Y-axis:

$$\begin{aligned} y: (N - 1) \cdot h + H &= \frac{gt^2}{2} \\ Nh &= \frac{gt^2}{2} - H + h \\ N = \frac{gt^2}{2h} - \frac{H}{h} + 1 &= \frac{9.8 \frac{\text{m}}{\text{s}^2} \cdot (3 \text{ s})^2}{2 \cdot 4\text{ m}} - \frac{1\text{ m}}{4\text{ m}} + 1 = 11.78 \approx 12 \end{aligned}$$

Answer: apartment is located on 12 floor.