

Distance covered by tile that falls from rest (general equation):

$$h = \frac{gt^2}{2} \quad (1)$$

Let  $x$  be the distance from the sill of the upper window to the roof;  $t$  – time to pass distance  $x$ ;  $\Delta x = 3$  m – distance between two windowsills;  $\Delta t = 0.39$  s – time to pass distance  $\Delta x$ .

Let's use (1) to get the equation for distance  $x$ :

$$x = \frac{gt^2}{2}; \quad (2)$$

And for total distance from roof to lower windowsill:

$$x + \Delta x = \frac{g(t + \Delta t)^2}{2} \quad (3)$$

Now let's combine (2) and (3) to a system:

$$\begin{cases} x + \Delta x = \frac{g(t + \Delta t)^2}{2} \\ x = \frac{gt^2}{2} \end{cases}$$

Simplifying and deducting equations:

$$\begin{cases} 2x + 2\Delta x = gt^2 + 2gt\Delta t + g\Delta t^2; \\ 2x = gt^2 \end{cases};$$

$$2\Delta x = 2gt\Delta t + g\Delta t^2;$$

$$t = \frac{2\Delta x - g\Delta t^2}{2g\Delta t};$$

$$t = \frac{2 \cdot 3 - 9.8 \cdot 0.39^2}{2 \cdot 9.8 \cdot 0.39};$$

$$t = 0.59 \text{ s}$$

Now let's find  $x$  from (2):

$$x = \frac{9.8 \cdot 0.59^2}{2};$$

$$x = 1.71 \text{ m}$$