Answer on Question #42633 – Physics – Mechanics | Kinematics | Dynamics

1. With what velocity that a body projected up so that distances traveled by it in 5th and 6th second are equal?

$\Delta t = 1s$	*Solution.*
$v_0 - ?$	The distances traveled by the same intervals of time are equal, only if this distances were covered just before the upper point and just after this point. At other neighbor intervals the distances must be different, as the motion is with the constant acceleration.

The y-coordinate of the body is $y = v_0 t - \frac{gt^2}{2}$,

where v_0 is the initial velocity.

Let express the equality of distances, covered by the 5th and 6th seconds:

$$v_0(5t_0 - 4t_0) - \frac{g}{2}\left[(5t_0)^2 - (4t_0)^2\right] = -v_0(6t_0 - 5t_0) + \frac{g}{2}\left[(6t_0)^2 - (5t_0)^2\right].$$

As one can derive, the initial velocity is $\boxed{v_0 = \sqrt{\frac{5g}{t_0}}}$.

Let check the dimension: $[v_0] = \sqrt{\frac{m}{s^2} : s} = \frac{m}{s}$.

Let evaluate the quantity: $v_0 = \sqrt{\frac{5 \cdot 9.81}{1}} = 49.05\left(\frac{m}{s}\right)$.

Answer: $49.05\frac{m}{s}$.