Answer on Question#52859 - Physics - Mechanics - Kinematics - Dynamics

A baby has a tantrum and throws itself down on the bed that is a distance of .3m below. She hits the bed in 1.5 seconds. What is the initial velocity?

<u>Solution:</u>

The dependence of the child's height above the bed is given by

$$h(t) = h_0 + v_0 t - \frac{g \cdot t^2}{2},$$

where $h_0 = 0.3$ m – is the initial height, v_0 – is the initial velocity, $g = 9.8 \frac{m}{s^2}$ – acceleration due to gravity, t – time. Since $h(1.5\ s) = 0$, we get the equation for v_0:

$$0 = 0.3\text{m} + v_0 \cdot 1.5\text{s} - \frac{9.8\frac{m}{s^2} \cdot (1.5\text{s})^2}{2}$$

Therefore,

$$v_0 = 7.15 \frac{m}{s}$$

<u>Answer:</u> $7.15 \frac{m}{s}$ (directed upward).