Task. A ball is dropped from a balloon going up at a speed of 7 m/sec. If the balloon was at a height $h_0 = 60\,m$ at the time of dropping the ball, how long will the ball take to reach the ground?

Solution. There is a gravitation force acting on a ball so that it moves with a constant acceleration $g = 9.8\ m/s^2$. The initial velocity of the ball is $v_0 = -7\ m/s$, so it is opposite to the acceleration. Therefore the height of the ball at time t is given by the following formula:

$$h(t) = h_0 + v_0 t - \frac{gt^2}{2}.$$

We should find time t when $h(t) = 0$, so we obtain the following equation:

$$60 + 7t - \frac{9.8t^2}{2} = 0,$$

$$4.9t^2 - 7t - 60 = 0,$$

$$D = (-7)^2 - 4 * 4.9 * (-60) = 1225 = 35^2$$

$$t_1 = \frac{7+35}{2*4.9} = 4.29\ s, \qquad t_2 = \frac{7-35}{2*4.9} = -2.86\ s < 0.$$

Thus only the first solution is admissible, and so $t = 4.29$ s.