Answer on Question #54622, Physics / Mechanics | Kinematics | Dynamics

(7.00) A person throws a ball straight up. He releases the ball at a height of 1.75 m above the ground and with a velocity of 12.0 m/s. Ignore the effects of air resistance.

(a) How long until the ball reaches its highest point?

(b) How high above the ground does the ball go?

Solution:

(a)

When the ball reaches the highest point his velocity equals to zero:

$$v = v_0 - gt = 0$$

Whether explicitly stated or not, the value of the acceleration in the kinematic equations is $g = -9.8 \, m/s^2$ for any freely falling object.

Thus,

$$t = \frac{v_0}{g} = \frac{12}{9.8} = 1.22 \text{ s} \approx 1.2 \text{ s}$$

(b)

From the equation of the motion:

$$h = h_0 + v_0 t - \frac{gt^2}{2} = 1.75 + 12 * 1.22 - 9.8 * \frac{1.22^2}{2} \approx 9.1 \, m.$$

Answer: (a) 1.22 s; (b) 9.1 m