# Answer on Question #46140, Physics, Mechanics | Kinematics | Dynamics

You throw a rock straight upward at 30m/s. approximately how long does it rise? How long until it stops at the top of its flight?

**Solution:**

Given:

$v_0 = 30$ m/s,

$v_f = 0$,

$t =?,$

$h =?$

The kinematic equation that describes an object's motion is:

$$2gh = v_f^2 - v_0^2$$

where $g = -9.81 \, m/s^2$ is acceleration, $h$ is coordinate, $v_0$ is initial velocity and $v_f$ is final velocity.

Thus,

$$h = \frac{-v_0^2}{-2g} = \frac{30^2}{2 \cdot 9.81} = 45.9 \text{ m}$$

The other kinematic equation is:

$$g = \frac{v_f - v_0}{t}$$

Thus,

$$t = \frac{v_f - v_0}{g} = \frac{0 - 30}{-9.81} = 3.06 \text{ s} \approx 3.1 \text{ s}$$

**Answer:**  $t = 3.1$ s,  $h = 45.9$ m.