Chapter 2 Problem 71 [†]

Given
$y_0 = 12\ m$
$v_0 = 0\ m/s$
$g_{moon} = -1.62\ m/s^2$

Solution
Find the time it takes to fall and its impact speed.

Use the following kinematic equation to find the time.

$$\Delta y = y - y_0 = v_0 t + \tfrac{1}{2} a t^2$$

Since the initial velocity is zero this equation becomes

$$\Delta y = \tfrac{1}{2} a t^2$$

Solving for t gives.

$$t = \sqrt{\frac{2\Delta y}{a}} = \sqrt{\frac{2(y_f - y_0)}{a}} = \sqrt{\frac{2(0\ m - 12\ m)}{-1.62\ m/s^2}} = 3.85\ s$$

The impact velocity is then

$$v = v_0 + at = 0\ m/s + (-1.62\ m/s^2)(3.85\ s) = -6.24\ m/s$$

The negative sign indicates that the velocity is in the downward direction.

[†]Problem from Essential University Physics, Wolfson