Answer on Question #38205 – Physics - Mechanics | Kinematics | Dynamics

A rebounder in v basketball has a vertical leap of 1.2 meter. What is his launch speed and "hang time"?

Solution:

$S = 1.2m -$ height of vertical leap

$V = 0 -$ velocity at the top (turning point)

Acceleration due to gravity, $g = -9.81 \frac{m}{s^2}$ (since motion is in opposite direction as gravity)

Law of energy conservation:

$$\frac{mV^2}{2} = \frac{mU^2}{2} + mgS$$
$$V^2 = U^2 + 2gS$$
$$U = \sqrt{-2gS} = \sqrt{2 \cdot 9.81 \frac{m}{s^2} \cdot 1.2m} = 4.9 \frac{m}{s}$$

Hang time (assuming hang time is the total time from launch to land):

After land, displacement from launch to land is equal to zero:

$$0 = Ut_h + \frac{gt_h^2}{2}$$
$$0 = 4.9t_h - 4.9t_h^2$$
$$t_h = 1s$$

Answer: launch speed is equal to $4.9 \frac{m}{s}$; "hang time" is equal to 1s.