Answer on Question #44370, Physics, Electromagnetism

A flea jumps straight up to a maximum height of 0.530 m. What is its initial velocity v_0 as it leaves the ground?

Solution:

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

$$v_f^2 = v_i^2 + 2ad$$

The symbol *d* stands for the displacement of the object. The symbol *a* stands for the acceleration of the object. And the symbol v stands for the velocity of the object; a subscript of i after the v indicates that the velocity value is the initial velocity value and a subscript of f indicates that the velocity value is the final velocity value.

In our case:

$v_f = 0\ m/\text{s}$,

$a = -g = -9.81\ \text{m/s}^2$,

$d = h = 0.530\ \text{m}$,

$v_i = ?$,

Thus,

$$0 = v_i^2 - 2gh$$

So,

$$v_i = \sqrt{2gh}$$

$$v_i = \sqrt{2 \cdot 9.81 \cdot 0.530} = 3.225\ \text{m/s}$$

Answer: $v_0 = 3.225\ \text{m/s}$.