

## Answer on Question #74232, Physics / Other

A train traveling at 7.55m/s accelerates to 975m in 31.5 s. What is the final velocity?

### Solution:

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

$$d = v_i t + \frac{1}{2} a t^2$$

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.

The acceleration is

$$a = \frac{2(d - v_i t)}{t^2} = \frac{2 \times (975 - 7.55 \times 31.5)}{31.5^2} = 1.49 \text{ m/s}^2$$

The acceleration is also

$$a = \frac{v_f - v_i}{t}$$

Thus,

$$v_f = v_i + a t = 7.55 + 1.49 \times 31.5 \approx 54.5 \text{ m/s}$$

**Answer:** 54.5 m/s

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