Answer on Question #51423, Physics, Astronomy Astrophysics

A spaceship moving with an initial velocity of 58.0 meters/second experiences a uniform acceleration and attains a final velocity of 153 meters/second. What distance has the spaceship covered after 12.0 seconds?

Solution:

Change of speed is described by the Eq.(1)

$$v = v_0 + at \tag{1}$$

where $v_0 = 58 m/s$ is the initial velocity; a is the acceleration.

From Eq.(1)

$$a = \frac{v - v_0}{t} \tag{2}$$

The change of coordinates is described by the equation

$$x = v_0 t + \frac{at^2}{2} \tag{3}$$

From Eq.(2) and Eq.(3)

$$x = v_0 t + \frac{(v - v_0) t^2}{2t} = t \left(v_0 + \frac{v - v_0}{2} \right) = \frac{v + v_0}{2} t = \frac{58 + 153}{2} \cdot 12 = 1266 m \tag{4}$$

Answer: 1266m