Answer on Question #49168, Physics, Mechanics | Kinematics | Dynamics

A puck of mass 30.0kg slides across rough ice, experiencing a frictional force of 0.20 N. If it was moving at 10.0 km/h when it hit the ice patch, how long did it take to stop?

Solution:

The magnitude of force is equated to the product of the mass times the acceleration.

$$F = -ma$$

Thus, the acceleration is

$$a = -\frac{F}{m} = \frac{-0.20}{30.0} = -0.0067\ m/s^2$$

The kinematics equation is

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

$$v_f = 0$$

$$v_i = 10.0 \times \frac{1000}{3600} = 2.78\ m/s$$

Thus, time is

$$t = \frac{-v_i}{a} = \frac{-2.78}{-0.0067} = 414.9\ s$$

Answer: $t = 414.9\ s$.