2.19. Model: We will represent the skier as a particle.

Visualize:

Known

$x_0 = 0 \quad t_0 = 0$

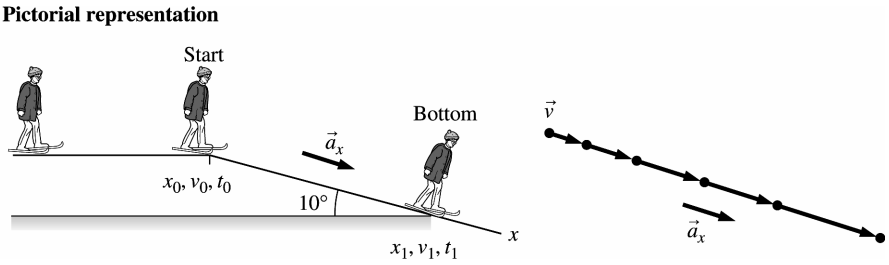
$v_0 = 3.0$ m/s

$a_x = g \sin 10°$

$v_1 = 15$ m/s

Find

$x_1 \quad t_1$



Note that the skier's motion on the horizontal, frictionless snow is not of any interest to us. Also note that the acceleration parallel to the incline is equal to $g \sin 10°$.

Solve: Using the following constant-acceleration kinematic equations,

$$v_{fx}^2 = v_{ix}^2 + 2a_x(x_f - x_i)$$

$$\Rightarrow (15 \text{ m/s})^2 = (3.0 \text{ m/s})^2 + 2(9.8 \text{ m/s}^2)\sin 10°(x_1 - 0 \text{ m}) \Rightarrow x_1 = 64 \text{ m}$$

$$v_{fx} = v_{ix} + a_x(t_f - t_i)$$

$$\Rightarrow (15 \text{ m/s}) = (3.0 \text{ m/s}) + (9.8 \text{ m/s}^2)(\sin 10°)t \Rightarrow t = 7.1 \text{ s}$$

Assess: A time of 7.1 s to cover 64 m is a reasonable value.