

A rocket skateboard of mass 3.00 kg has an initial velocity of (5.00, 2.50) m/s. A net force of (3.40, 2.67) N is applied to it for 10.0 s. At the end of this time, what is its velocity?

$$m = 3.00 \text{ kg}$$

$$v_i = 5 \text{ m/s } \hat{x}, 2.5 \text{ m/s } \hat{y}$$

$$F_{\text{net}} = 3.4 \text{ N } \hat{x}, 2.67 \text{ N } \hat{y}$$

$$v_f = ? \quad a = ?$$

$$F = ma$$

$$a = \frac{F}{m}$$

$$a_x = \frac{3.4 \text{ N}}{3 \text{ kg}} = 1.13 \text{ m/s}^2$$

$$a_y = \frac{2.67 \text{ N}}{3 \text{ kg}}$$

$$a_y = 0.89 \text{ m/s}^2$$

$$v_f = v_0 + at$$

$$v_{fx} = 5 \text{ m/s} + (1.13)(10)$$

$$v_f = 16.3 \text{ m/s } \hat{x}$$

$$v_f = 2.5 + 0.89(10) = 11.4 \text{ m/s } \hat{y}$$

$$v_f = 16.3 \text{ m/s } \hat{x}, 11.4 \text{ m/s } \hat{y}$$