# PHYS 211 College Physics I
# Exam 3C

October 25, 2017

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1. A 1250 kg car is moving due west with an initial speed of 38.0 m/s. After 10.0 s the car has slowed down to 18.0 m/s.

   Find the magnitude and direction of the force that produces the deceleration.

   a. Magnitude 2500 N

   b. Direction EAST ($\vec{x}$)


$v_0 = 38.0$ m/s

$t = 10$

$v = 18.0$

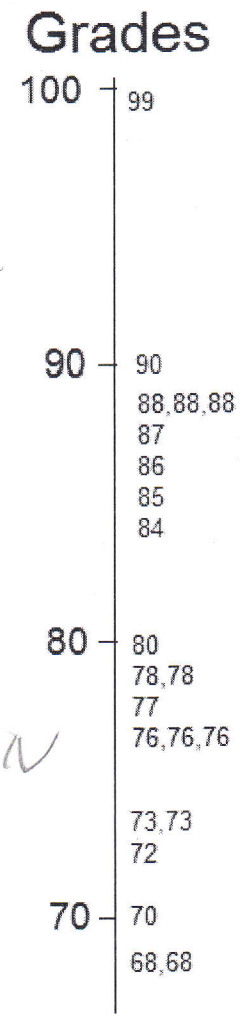
$\vec{F} = m\vec{a}$

$$a = \frac{\Delta v}{t} = \frac{v - v_0}{t} = \frac{18 - 38}{10} = \frac{-20}{10}$$

$a = -2$ m/s$^2$

$\vec{F} = m\vec{a} = 1250 * -2\,\vec{x} = -2500\,\vec{x}$ N

EAST



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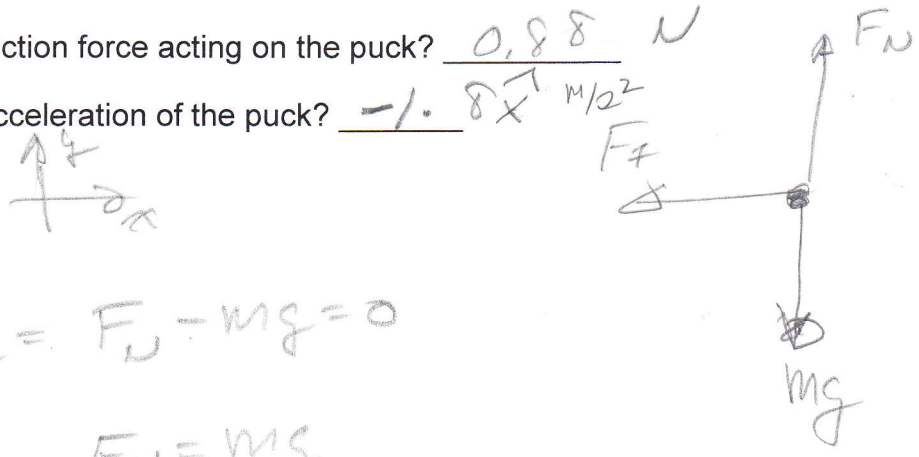
2. A 0.50 kg hockey puck is sliding on ice. The coefficent of kinetic friction is 0.180.

   a. What is the friction force acting on the puck? 0.88 N

   b. What is the acceleration of the puck? $-1.8\hat{x}$ m/s²




$$\sum F_y = F_N - mg = 0$$

$$F_N = mg$$

$$F_f = \mu_K F_N = \mu_K mg$$

$$= 0.18 * 0.5 * 9.8$$

$$= 0.882 \text{ N}$$

$$\vec{F}_f = -0.882\hat{x}$$

$$F = ma$$

$$\vec{a} = \frac{\vec{F}}{m} = \frac{-0.882\hat{x}}{.5} = -1.76\hat{x} \text{ m/s}^2$$

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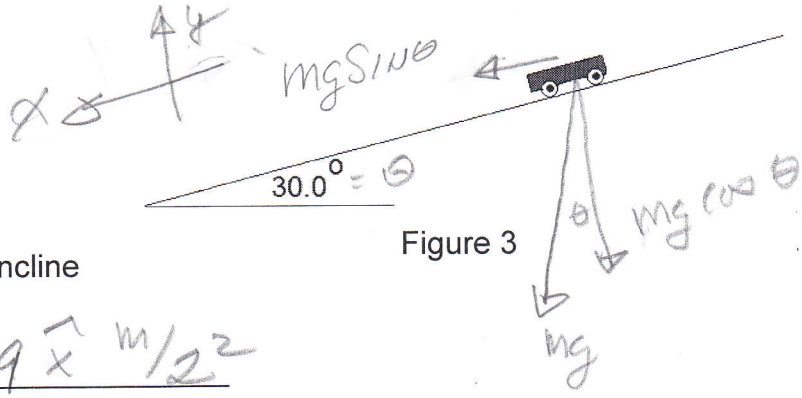


Figure 3

3. A 1.50 kg cart is rolling down the frictionless incline shown in Figure 3.

   a. What is its acceleration? $4.9\hat{x}\ m/s^2$

   b. Starting from rest, how long does it take for it to travel 1.50 m? 0.782 s

$$\Sigma F_x = mg\sin\theta = ma_x$$

$$a_x = g\sin\theta = 9.8\sin 30^\circ$$

$$= 4.9\ m/s^2$$

$$x = \frac{1}{2}at^2$$

$$t = \sqrt{\frac{2x}{a}} = \sqrt{\frac{2\times 1.5}{4.9}} = \sqrt{\frac{3}{4.9}}$$

$$t = 0.782\ s$$