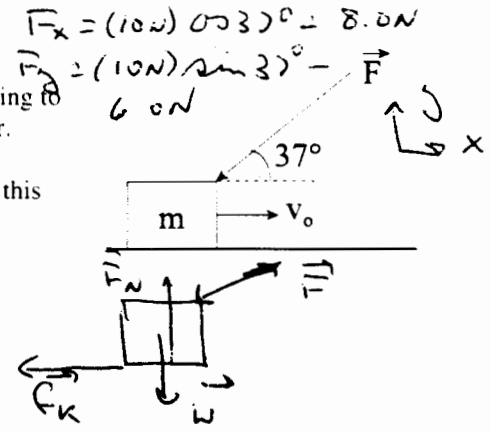


EXAM 2

Name: _____ Student ID #: _____

TA (circle one): Ali Ben Brigham Dan Elspeth Eric Geoff

A 12.0 kg block (m) is sliding to the right across a horizontal surface and is subject to a constant force, $\vec{F} = 10.0 \text{ N}$ (see drawing). At the initial instant $t_i = 0$, the block is traveling to the right at $v_i = 8.50 \text{ m/s}$. The block comes to rest with uniform acceleration 5.00 s later.



A. [8 pts.] What is the acceleration of the block, magnitude and direction, during this motion?

$$a = \frac{\Delta v}{\Delta t} = \frac{0 - 8.5 \text{ m/s}}{5.0 \text{ s}}$$

$a = -1.70 \text{ m/s}^2$ (TO LEFT)

B. [8 pts.] What frictional force does the block feel from the horizontal surface while it is slowing down?

$$F_{NET} = ma = -F \cos 37^\circ - f_k$$

$$= (12 \text{ kg})(-1.7 \text{ m/s}^2) = -8.0 \text{ N} - f_k$$

$f_k = 12.4 \text{ N}$ (THIS IS MAGNITUDE OR f_k)
 (DIR. IS TO LEFT)

C. [10 pts.] What is the coefficient of kinetic friction, μ_k , between the block and the horizontal surface?

$$f_k = \mu_k F_N \quad \text{TO GET } F_N \text{ USE } F_N - W - F \sin 37^\circ = 0$$

$$F_N = (12 \text{ kg})(9.8 \text{ m/s}^2) + 6.0 \text{ N}$$

$$F_N = 124 \text{ N}$$

$$\mu_k = \frac{f_k}{F_N} = \frac{12.4 \text{ N}}{124 \text{ N}} = \boxed{0.100}$$

D. [10 pts.] How long would it take the block to come to rest from the initial 8.50 m/s if the applied force, \vec{F} , were not acting?

$$F_{NET} = ma = -f_k = -\mu_k F_N' = -\mu_k mg$$

$$a = -\mu_k g = -0.98 \text{ m/s}^2$$

$$v = v_0 + at$$

$$t = \frac{v - v_0}{a} = \frac{0 - 8.50 \text{ m/s}}{0.98 \text{ m/s}^2}$$

$t = 8.67 \text{ s}$