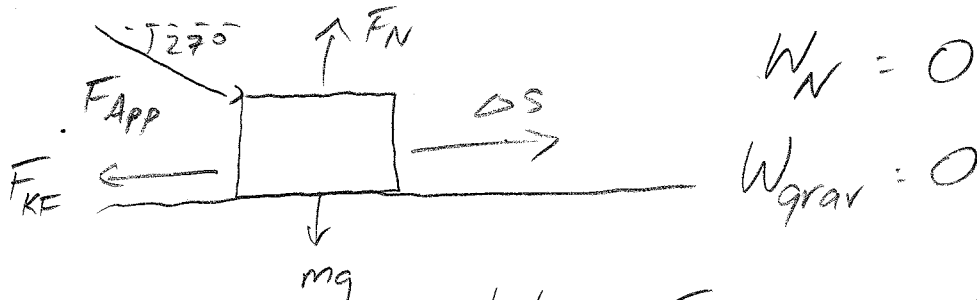


Physics 10154 - Exam #5D

Each problem is worth 50 points. Partial credit will be given provided you show all work and are solving parts of the problem correctly. Points will be deducted if you don't show your work (or if some parts are incorrect) even if you get the right answer. Clearly indicate your answer with a circle or box and remember to include correct units and significant figures.

1. A 14-kg block is pushed across a rough surface at a constant velocity of 1.8 m/s by an applied force of 48 Newtons angled 27° below the horizontal. Use the Work-Energy theorem to determine the coefficient of kinetic friction between the block and surface.



$$\Sigma F_{\perp} = F_N - mg - F_{App} \sin 27^\circ = 0 \quad W_{App} = F_{App} \Delta s \cos 27^\circ$$

$$F_N = mg + F_{App} \sin 27^\circ = (48) \Delta s \cos 27^\circ = 42.77 \Delta s$$

$$W_{KF} = -\mu_k (mg + F_{App} \sin 27^\circ) \Delta s$$

$$= -\mu_k (137.2 + 21.79) \Delta s$$

constant speed
 $\rightarrow \Delta K = 0$

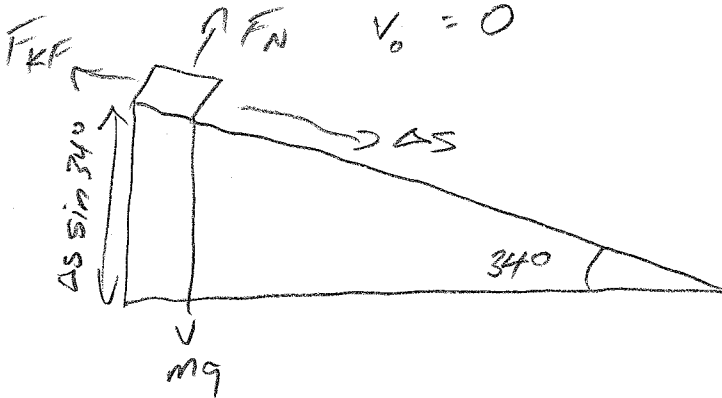
$$= -156 \mu_k \Delta s$$

$$\Sigma W_F = 0 + 0 + 42.77 \Delta s - 156 \mu_k \Delta s = 0$$

$$42.77 \Delta s = 156 \mu_k \Delta s$$

$$\mu_k = \frac{42.77}{156} = \boxed{0.27}$$

2. Starting from rest, a 8.0 kg block slides 3.0 meters down to the bottom of a ramp inclined 34° above the horizontal. At the bottom of the ramp, the speed of the block is estimated to be 3.8 m/s. What is the work done by kinetic friction during the motion?



$$W_N = 0$$

$$W_{grav} = mg \Delta s \sin 34$$

$$= 131.5 \text{ J}$$

$$W_{KF} = ?$$

$$\Sigma W_F = 0 + 131.5 + W_{KF} = \frac{1}{2}(8)(3.8)^2 - 0$$

$$131.5 + W_{KF} = 57.76$$

$$W_{KF} = -74 \text{ J}$$