

Instructor(s): *J. Ipser*PHYSICS DEPARTMENT
2nd Exam

October 30, 2006

Name (print, last first): _____ Signature: _____

*On my honor, I have neither given nor received unauthorized aid on this examination.***YOUR TEST NUMBER IS THE 5-DIGIT NUMBER AT THE TOP OF EACH PAGE.**

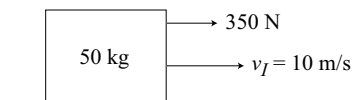
- (1) **Code your test number on your answer sheet (use lines 76–80 on the answer sheet for the 5-digit number).** Code your name on your answer sheet. **DARKEN CIRCLES COMPLETELY.** Code your UFID number on your answer sheet.
- (2) Print your name on this sheet and sign it also.
- (3) Do all scratch work anywhere on this exam that you like. **Circle your answers on the test form.** At the end of the test, this exam printout is to be turned in. No credit will be given without both answer sheet and printout.
- (4) **Blacken the circle of your intended answer completely, using a #2 pencil or blue or black ink.** Do not make any stray marks or some answers may be counted as incorrect.
- (5) The answers are rounded off. Choose the closest to exact. There is no penalty for guessing. If you believe that no listed answer is correct, **leave the form blank.**
- (6) **Hand in the answer sheet separately.**

$$g = 9.80 \text{ m/s}^2$$

1. A lady stands on a scale in an elevator. The lady's mass is 50 kg. The elevator is moving downward toward the ground floor and its speed is decreasing at a rate of 3 m/s^2 . What is the reading on the scale?

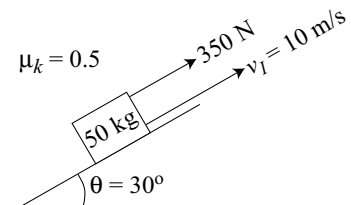
- (1) 640 N (2) 225 N (3) 860 N (4) 125 N (5) 500 N

2. A 50 kg block is moving across a horizontal surface. The coefficient of kinetic friction is $\mu_k = 0.5$. A horizontal force of 350 N is applied to the block in the direction in which the block is moving. At time $t = 0$ the block's velocity is 5 m/s. How far along the surface does the block move in the next 5 s?



- (1) 51 m (2) 42 m (3) 33 m (4) 22 m (5) 15 m

3. A 50 kg block is moving up an incline that makes an angle of 30° with the horizontal. A force of 350 N is applied to the block as shown. The coefficient of kinetic friction is $\mu_k = 0.5$. At time $t = 0$ the block's velocity is $v_I = 10 \text{ m/s}$. At what time does the block's speed decrease to 0?



- (1) 4.7 s (2) 3.6 s (3) 2.4 s (4) 6.9 s (5) 7.9 s

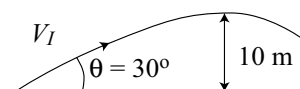
4. A 2000 kg auto accelerates at a constant rate from 0 to 30 m/s in 8 s, without "spinning" its wheels (i.e., no slipping of wheels). What is the minimum value of the coefficient of static friction?

- (1) 0.38 (2) 0.49 (3) 0.57 (4) 0.66 (5) 0.74

5. A 2000 kg elevator starts from rest and is lifted at constant acceleration $a = 1 \text{ m/s}^2$. What is the instantaneous power output of the elevator motor after the elevator has been lifted for 5 s?

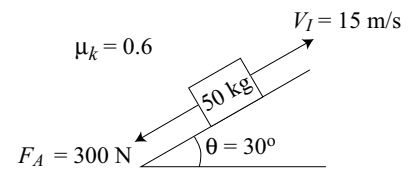
- (1) 10^5 W (2) $4.5 \times 10^5 \text{ W}$ (3) $7 \times 10^4 \text{ W}$ (4) $2.5 \times 10^3 \text{ W}$ (5) $8 \times 10^5 \text{ W}$

6. A rock is thrown up from the ground at an angle $\theta_I = 30^\circ$ and reaches a maximum height of 10 m. What is the rock's initial speed when it is thrown up, in m/s?



- (1) 28 (2) 21 (3) 14 (4) 8 (5) 39

7. A 50 kg block is moving up an incline that makes an angle of 30° with respect to the horizontal. The block's initial speed is 15 m/s. The coefficient of kinetic friction is 0.6. An applied force $F_A = 300$ N acts on the block in the downward direction along the incline. How far up along the incline does the block travel until its velocity drops to 0?



- (1) 7 m (2) 5 m (3) 3 m (4) 10 m (5) 12 m
8. A baseball of mass 0.1 kg is traveling horizontally with speed 40 m/s and is struck by the batter. The impulse of the bat on the baseball is directed straight up vertically and has magnitude $I = 10$ Ns. What is the baseball's speed immediately after it is struck by the bat?
- (1) 108 m/s (2) 330 m/s (3) 87 m/s (4) 65 m/s (5) 146 m/s