

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

March 6, 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 with scratch work most questions demand.
- (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.
- (6) **Hand in the answer sheet separately.**

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

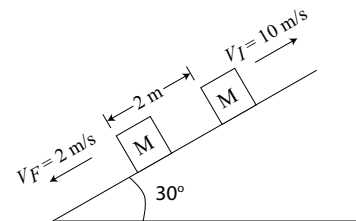
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1. A 10 kg block is accelerated across a horizontal floor from rest to 5 m/s in 3 s. The magnitude of the work done by friction on the block is 75 J. How much work is done by the applied force that causes the block to accelerate?

(1) 200 J (2) 50 J (3) 100 J (4) 150 J (5) 300 J

2. At time $t = 0$ a 2000 kg elevator is moving down with speed 7 m/s as it passes the third floor of a building. Twenty seconds later the elevator is moving up with speed 4 m/s as it passes the fifth floor, which is 15 m above the third floor. How much work is done by the elevator motor during this 20 s time interval?

(1) $2.6 \times 10^5 \text{ J}$ (2) 10^5 J (3) $4.8 \times 10^4 \text{ J}$ (4) $-4 \times 10^4 \text{ J}$ (5) $-8 \times 10^5 \text{ J}$

3. At time $t = 0$ a 5 kg block is moving up a 30° incline with speed 10 m/s. Only the force of friction and of gravity have components parallel to the incline. 5 s later the block is moving down the incline with speed 2 m/s, at a distance of 2 m down along the incline from its original position. How much work is done by friction during this 5 s interval?

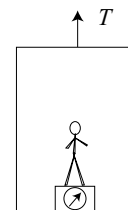


(1) -290 J (2) -125 J (3) -200 J (4) $+360 \text{ J}$ (5) $+25 \text{ J}$

4. A 2000 kg elevator is accelerated upward from rest at a constant rate for 5 s and achieves a final speed of 10 m/s. What is the power output of the elevator motor at this point in time?

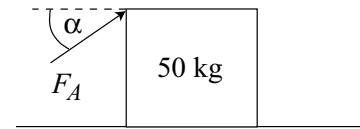
(1) $2.4 \times 10^5 \text{ W}$ (2) $3.9 \times 10^5 \text{ W}$ (3) $7.5 \times 10^5 \text{ W}$ (4) $1.2 \times 10^5 \text{ W}$ (5) $6.9 \times 10^6 \text{ W}$

5. A 50 kg lady (her mass is 50 kg) stands on a scale in an elevator. The scale reads 40 kg. The mass of the elevator system is 2,500 kg. What is the tension in the elevator cable?

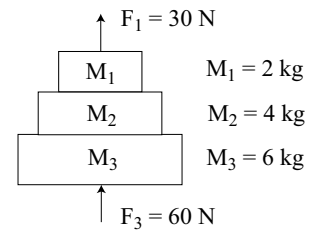


(1) $2 \times 10^4 \text{ J}$ (2) 10^4 J (3) $4 \times 10^4 \text{ J}$ (4) $6 \times 10^4 \text{ J}$ (5) $5 \times 10^8 \text{ J}$

6. A force F_A is applied as shown to a 50 kg trunk in order to move it across a horizontal floor. The angle α is 45° . If the coefficient of kinetic friction is $\mu_k = 0.5$, what value of F_A is needed to keep the trunk moving at constant velocity?



- (1) 231 N (2) 53 N (3) 106 N (4) 403 N (5) 326 N
7. Three blocks are glued together and move above the Earth. The vertical force $F_1 = 30\text{N}$ and the vertical force $F_3 = 60\text{N}$. The system starts from rest. What is the force of M_1 on M_2 5 s later?



- (1) 15 N (2) 20 N (3) 25 N (4) 30 N (5) 35 N
8. A 2×10^3 kg auto accelerates along a horizontal track from 0 to 30 m/s in 6 s. What is the total force of the auto on the track? Be sure to consider vertical as well as horizontal forces.
- (1) $2.2 \times 10^4\text{N}$ (2) $1.1 \times 10^4\text{N}$ (3) $3.3 \times 10^4\text{N}$ (4) $4.3 \times 10^4\text{N}$ (5) $6.4 \times 10^4\text{N}$