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 76-80 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.

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

1. A 2000 kg auto accelerates along a horizontal roadway from 0 to $40 \mathrm{~m} / \mathrm{s}$ in 10 s without its wheels slipping. What is the minimum value of the coefficient of static friction?
(1) 0.4
(2) 0.2
(3) 0.6
(4) 0.8
(5) 1.2
2. A force $F_{A}=200 \mathrm{~N}$ is applied to a block of mass $M=10 \mathrm{~kg}$, at an angle of $45^{\circ}$ below the horizontal. The block sits on a horizontal surface, and the force of friction has a magnitude of 100 N . If the block is initially at rest, how much time passes before the block's speed is $5 \mathrm{~m} / \mathrm{s}$ ?
(1) 1.2 s
(2) 1.7 s
(3) 2.1 s
3. Four blocks are glued together and move above the Earth. Each of the blocks has a mass of 2 kg . A force $F_{A}=70 \mathrm{~N}$ is applied in the upward vertical direction to the bottom of block 4. What is the force of block 1 on block 2 ?
(1) 17.5 N
(2) 22 N
(3) 26 N
4. The tension in an elevator cable is $1.5 \times 10^{4} \mathrm{~N}$. The mass of the elevator system is $2 \times 10^{3} \mathrm{~kg}$. A lady of mass 60 kg stands on a scale in the elevator. If the elevator starts from rest at $t=0$, what is the reading on the scale 5 s later?
(4) 10 N
(5) 8 N

(1) 450 N
(2) 300 N
(3) 600 N
(4) 800 N
(5) 0
5. A block of mass $M=5 \mathrm{~kg}$ is initially moving up an incline with speed $V_{I}=10 \mathrm{~m} / \mathrm{s}$. A force $F_{A}=30 \mathrm{~N}$ is applied to the block, parallel to the incline in the downward direction. If the magnitude of the friction force is 30 N , how much time passes before the block's speed drops to zero? The angle of the incline is $30^{\circ}$.
(1) 0.6 s
(2) 0.3 s
(3) 0.9 s
(4) 1.2 s
(5) 1.5 s
6. A block of mass 5 kg is accelerated from rest up a $30^{\circ}$ incline by an applied force $F_{A}=50 \mathrm{~N}$ for 10 s . The force $F_{A}$ is then withdrawn, and 15 s later the block is moving down the incline at $5 \mathrm{~m} / \mathrm{s}$. What is the total work done on the block by all of the forces acting during the 25 s time interval?
(1) 62.5 J
(2) 0
(3) 123.6 J
(4) 32.9 J
(5) not enough information
7. The tension in an elevator cable is $2 \times 10^{4} \mathrm{~N}$. Beginning from rest, the elevator rises 10 m and reaches a speed of $8 \mathrm{~m} / \mathrm{s}$. What is the elevator's mass, in kg?

(1) $1.5 \times 10^{3}$
(2) $0.2 \times 10^{3}$
(3) $6 \times 10^{3}$
(4) $3.5 \times 10^{3}$
(5) $9.5 \times 10^{3}$
8. A block of mass $M=10 \mathrm{~kg}$ is initially moving up a $30^{\circ}$ incline with a speed of $10 \mathrm{~m} / \mathrm{s}$. The coefficient of kinetic friction is 0.7 . How far up along the incline does the block travel before coming to rest?

(1) 4.6 m
(2) 3.9 m
(3) 3.5 m
(4) 3.2 m
(5) 2.8 m
