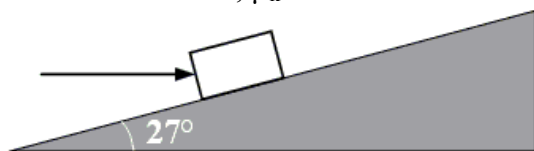


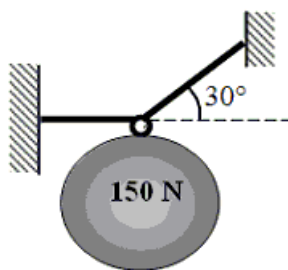
(The actual exam will have 15 questions)

- A 975-kg car accelerates from rest to 26.7 m/s in a distance of 120 m. What is the magnitude of the average net force acting on the car?
A) 740 N B) 2900 N C) 91 N D) 1300 N E) 7900 N
- A horse pulls a cart along a flat road. Consider the following four forces that arise in this situation.
(1) the force of the horse pulling on the cart (3) the force of the horse pushing on the road
(2) the force of the cart pulling on the horse (4) the force of the road pushing on the horse
Which two forces form an "action-reaction" pair that obeys Newton's third law?
A) 1 and 4 B) 1 and 3 C) 2 and 4 D) 3 and 4 E) 2 and 3
- A 8-kg block is set moving with an initial speed of 6 m/s on a rough horizontal surface. If the force of friction is 12 N, approximately how far does the block travel before it stops?
A) 1.5 m B) 3 m C) 6 m D) 9 m E) 12 m
- A 250-N force is directed horizontally as shown to push a 29-kg box up an inclined plane at a constant speed. Determine the magnitude of the normal force, F_N , and the coefficient of kinetic friction, μ_k .



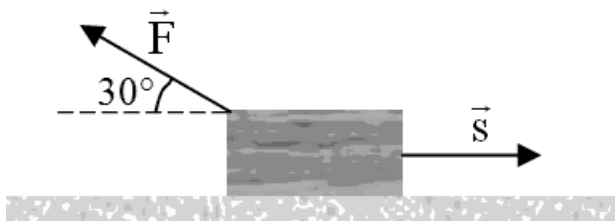
| | F_N | μ_k |
|----|-------|---------|
| A) | 330 N | 0.31 |
| B) | 310 N | 0.33 |
| C) | 250 N | 0.27 |
| D) | 290 N | 0.30 |
| E) | 370 N | 0.26 |

- A system of two cables supports a 150-N ball as shown. What is the tension in the right-hand cable?

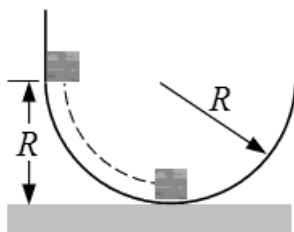


- 87 N
- 150 N
- 170 N
- 300 N
- 260 N

6. Callisto and Io are two of Jupiter's satellites. The distance from Callisto to the center of Jupiter is approximately 4.5 times farther than the distance from Io to the center of Jupiter. How does Callisto's orbital period, T_C , compare to that of Io, T_I ?
 A) $T_C = 4.5 T_I$ B) $T_C = 21 T_I$ C) $T_C = 9.5 T_I$ D) $T_C = 0.2 T_I$ E) $T_C = 2.7 T_I$
7. A ball is whirled on the end of a string in a horizontal circle of radius R at constant speed v . Complete the following statement: The centripetal acceleration of the ball can be increased by a factor of 4 by
 A) keeping the speed fixed and increasing the radius by a factor of 4.
 B) keeping the radius fixed and increasing the speed by a factor of 4.
 C) keeping the radius fixed and increasing the period by a factor of 4.
 D) keeping the radius fixed and decreasing the period by a factor of 4.
 E) keeping the speed fixed and decreasing the radius by a factor of 4.
8. A car enters a horizontal, curved roadbed of radius 50 m. The coefficient of static friction between the tires and the roadbed is 0.20. What is the maximum speed with which the car can safely negotiate the unbanked curve?
 A) 5 m/s B) 10 m/s C) 20 m/s D) 40 m/s E) 100 m/s
9. A constant force of 25 N is applied as shown to a block which undergoes a displacement of 7.5 m to the right along a frictionless surface while the force acts. What is the work done by the force?



- A) zero joules B) +94 J C) -160 J D) +160 J E) -94 J
10. A block of mass m is released from rest at a height R above a horizontal surface. The acceleration due to gravity is g . The block slides along the inside of a frictionless circular hoop of radius R . Which one of the following expressions gives the speed of the mass at the bottom of the hoop?



- A) zero m/s^2 B) $v = mgR$ C) $v = \frac{mg}{2R}$
 D) $v^2 = \frac{g^2}{R}$ E) $v^2 = 2gR$

11. A 51-kg woman runs up a flight of stairs in 5.0 s. Her net upward displacement is 5.0 m. Approximately, what average power did the woman exert while she was running? (1 kilowatt, kW = 1000 W).
A) 5.0 kW B) 1.0 kW C) 0.75 kW D) 0.50 kW E) 0.25 kW
12. A 0.065-kg tennis ball moving to the right with a speed of 15 m/s is struck by a tennis racket, causing it to move to the left with a speed of 15 m/s. If the ball remains in contact with the racquet for 0.020 s, what is the magnitude of the average force exerted on the ball?
A) 0 N B) 98 N C) 160 N D) 240 N E) 320 N
13. A 100-kg cannon at rest contains a 10-kg cannon ball. When fired, the cannon ball leaves the cannon with a speed of 90 m/s. What is the recoil speed of the cannon?
A) 4.5 m/s B) 9 m/s C) 45 m/s D) 90 m/s E) zero m/s
-

Answers:

1. B
2. D
3. E
4. E
5. D
6. C
7. E
8. B
9. C
10. E
11. D
12. B
13. B