

Practice Exam

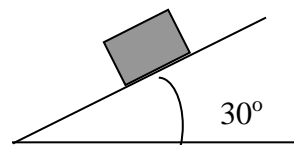
1. A shot-putter accelerates a 5.00-kg shot from rest to 10.0 m/s in 2.00 s. What average power was developed?
- A) 125 W
 - B) 1250 W
 - C) 12.5 W
 - D) 12500 W
 - E) 1.25 W

2. A 10-kg sphere with a 25.0 cm radius has a moment of inertia of $\frac{2}{5} MR^2$. If a torque of 2.0 N-m is applied to the object, the angular acceleration of the object is

- A) 1.0 rad/s^2 .
- B) 2.0 rad/s^2 .
- C) 4.0 rad/s^2 .
- D) 6.0 rad/s^2 .
- E) 8.0 rad/s^2 .

3. A man pushes a 2.0-kg block 5.0 m along a frictionless incline at an angle of 30° with the horizontal at constant speed. What is the work done by his force?

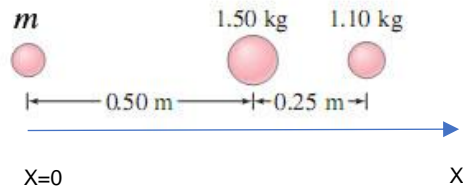
- A) 0 J
- B) 98 J
- C) 34 J
- D) 62 J
- E) 49 J



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4. Find the center of mass of the three-mass system relative to $m = 1.00$ kg mass with respect to the coordinative system given in the figure below.

- A) 0.72 m
- B) 0.44 m
- C) 0.60 m
- D) 0.22 m
- E) 0.15 m



5. A 2.3 -kg object traveling at 6.1 m/s in the positive x direction, collides head-on with a 3.5 -kg object traveling in the opposite direction at 4.8 m/s. The two objects stick together in a totally inelastic collision. What is the final velocity of the combined object?

- A) -0.48 m/s
- B) 7.1 m/s
- C) -3.8 m/s
- D) 4.3 m/s
- E) 6.6 m/s

6. A 0.145 -kg baseball pitched at 31.0 m/s is hit on a horizontal line drive straight back at the pitcher at 46 m/s. If the contact time between the bat and the ball is 5.00×10^{-3} s, calculate the average value of the force (assumed to be constant) between the ball and the bat.

- A) 2230 N
- B) 3000 N
- C) 4359 N
- D) 1330 N
- E) 1100 N

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7. A grinding wheel is running at its high operational speed of 22.0 rad/s. The machinist turns the switch to a position for a lower operational speed. The wheel rotates through an angle of 13.8 rad as it slows down uniformly from 22.0 rad/s to 13.5 rad/s. What is the magnitude of the angular acceleration of the wheel?
- A) 0.616 rad/s²
 - B) 5.34 rad/s²
 - C) 111 rad/s²
 - D) 22.5 rad/s²
 - E) 10.9 rad/s²
8. A force of 16.88 N is applied tangentially to the rim of a wheel of radius 0.340 m and it causes an angular acceleration of 1.20 rad/s². What is the moment of inertia of the wheel?
- A) 4.78 kg · m²
 - B) 3.59 kg · m²
 - C) 5.98 kg · m²
 - D) 7.17 kg · m²
 - E) 5.98 kg · m²
9. A 4.00-kg solid sphere ($I = \frac{2}{5} MR^2$) is spinning with an angular velocity of 23.0 rad/s. The diameter of the sphere is 20.0 cm. The rotational kinetic energy of the spinning sphere is
- A) 3.02 J.
 - B) 3.52 J.
 - C) 3.75 J.
 - D) 4.02 J.
 - E) 4.23 J.

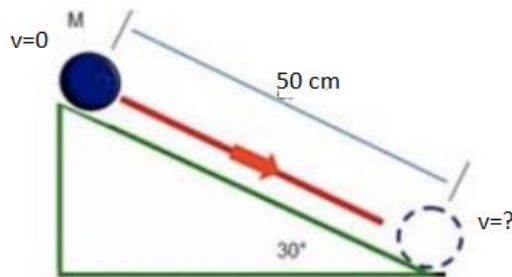
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10. A 100-kg solid spherical rock ($I = \frac{2}{5} MR^2$) has a diameter of 50.0 cm and the rock is rolling down a hill. When the rock is rolling down with an instantaneous velocity of 5.00 m/s during its motion, the total kinetic energy (angular + translational) of the rolling rock for this velocity is

- A) 1,750 J.
- B) 2,000 J.
- C) 2,250 J.
- D) 2,670 J.
- E) 2,900 J.

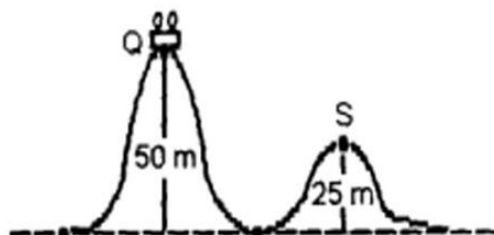
11. A 4.00-kg hollow sphere ($I = \frac{2}{3} MR^2$) of radius 5.00 cm starts from rest and rolls without slipping down a 30.0-degree incline. If the length of the incline is 50.0 cm, then the velocity of the center of mass of the hollow sphere at the bottom of the incline is

- A) 1.28 m/s.
- B) 1.44 m/s.
- C) 1.65 m/s.
- D) 1.71 m/s.
- E) 1.98 m/s.



12. The figure shows a famous roller coaster ride. You can ignore friction. If the roller coaster leaves point Q from rest, what is its speed at the top of the 25-m peak (at point S)?

- A) 10 m/s
- B) 22 m/s
- C) 44 m/s
- D) 62 m/s
- E) 120 m/s



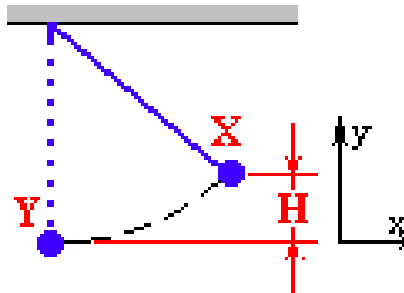
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13. If it requires 10.0 J of work to stretch a particular spring by 1.0 cm from its equilibrium length, how much more work will be required to stretch it an additional 2.0 cm?

- A) 10 J
- B) 20 J
- C) 30 J
- D) 40 J
- E) 50 J

14. A simple pendulum consists of a 15-kg mass attached to a string. It is released from rest at X at $H = 1.85$ m above the lowest point as shown. Its speed at the lowest point Y is:

- A) 2.0 m/s
- B) 2.7 m/s
- C) 6.0 m/s
- D) 3.5 m/s
- E) 8.6 m/s



15. A 500 g newspaper is thrown with a speed of 3.0 m/s. The impulse provided by this force is

- A) 0.15 kg.m/s
- B) 1.5 kg.m/s
- C) 15 kg.m/s
- D) 150 kg.m/s
- E) 1500 kg.m/s

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