KING SAUD UNIVERSITY
PHYSICS & ASTRONOMY DEPARTMENT
103-Phys (Dr.ABDALLAH M. AZZEER)

MCQ- *CHAPTER 9 and CHAPTER 10*

WRITE YOUR ANSWER ON THE ATTACHED SHEET

1. A 2000-kg truck traveling at a speed of 6.0 m/s makes a 90 turn in a time of 4.0 s and emerges from this turn with a speed of 4.0 m/s. What is the magnitude of the average resultant force on the truck during this turn?

a. 4.0 kN b. 5.0 kN c. 3.6 kN d. 6.4 kN e. 0.67 kN

2. A 1.2-kg object moving with a speed of 8.0 m/s collides perpendicularly with a wall and emerges with a speed of 6.0 m/s in the opposite direction. If the object is in contact with the wall for 2.0 ms, what is the magnitude of the average force on the object by the wall?

a. 9.8 kN b. 8.4 kN c. 7.7 kN d. 9.1 kN e. 1.2 kN

3. A 2.4 kg ball falling vertically hits the floor with a speed of 2.5 m/s and rebounds with a speed of 1.5 m/s. What is the magnitude of the impulse exerted on the ball by the floor?

a. 9.6 N s b. 2.4 N s c. 6.4 N s d. 1.6 N s e. 1.0 N s

4. A 1.6-kg ball is attached to the end of a 0.40 m string to form a pendulum. This pendulum is released from rest with the string horizontal. At the lowest point of its swing, when it is moving horizontally, the ball collides with a 0.80 kg block initially at rest on a horizontal frictionless surface. The speed of the block just after the collision is 3.0 m/s. What is the speed of the ball just after the collision?

a. 1.7 m/s b. 1.1 m/s c. 1.5 m/s d. 1.3 m/s e. 2.1 m/s

5. A 2.0-kg object moving with a velocity of 5.0 m/s in the positive x direction strikes and sticks to a 3.0-kg object moving with a speed of 2.0 m/s in the same direction. How much kinetic energy is lost in this collision?

a. 2.4 J b. 9.6 J c. 5.4 J d. 0.6 J e. 6.0 J

6. A 12-g bullet is fired into a 3.0-kg ballistic pendulum initially at rest and becomes embedded in it. The pendulum subsequently rises a vertical distance of 12 cm. What was the initial speed of the bullet?

a. 0.38 km/s b. 0.44 km/s c. 0.50 km/s d. 0.54 km/s e. 0.024 km/s

7. A 6.0-kg object moving 5.0 m/s collides with and sticks to a 2.0-kg object. After the collision the composite object is moving 2.0 m/s in a direction opposite to the initial direction of motion of the 6.0-kg object. Determine the speed of the 2.0-kg object before the collision.

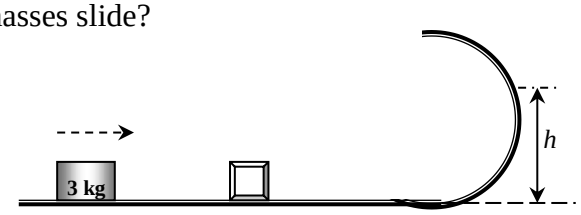
a. 15 m/s b. 7.0 m/s c. 8.0 m/s d. 23 m/s e. 11 m/s

8. A 3.0 kg mass sliding on a frictionless surface has a velocity of 5.0 m/s east when it undergoes a one-dimensional inelastic collision with a 2.0 kg mass that has an initial velocity of 2.0 m/s west. After the collision the 3.0 kg mass has a velocity of 1.0 m/s east. How much kinetic energy does the two-mass system lose during the collision?

a. 22 J b. 24 J c. 26 J d. 20 J e. 28 J

9. A 3.0-kg mass is sliding on a horizontal frictionless surface with a speed of 3.0 m/s when it collides with a 1.0 kg mass initially at rest as shown in the figure. The masses stick together and slide up a frictionless circular track of radius 0.40 m. To what maximum height, h, above the horizontal surface will the masses slide?

a. 0.18 m
b. 0.15 m
c. 0.21 m
d. 0.26 m
e. 0.40 m



10. A 10-g bullet moving horizontally with a speed of 2.0 km/s strikes and passes through a 4.0-kg block moving with a speed of 4.2 m/s in the opposite direction on a horizontal frictionless surface. If the block is brought to rest by the collision, what is the kinetic energy of the bullet as it emerges from the block?

a. 0.51 kJ b. 0.29 kJ c. 0.80 kJ d. 0.13 kJ e. 20 kJ

11. A 6.0-kg object, initially at rest in free space, "explodes" into three segments of equal mass. Two of these segments are observed to be moving with equal speeds of 20 m/s with an angle of 60 between their directions of motion. How much kinetic energy is released in this explosion?

a. 2.4 kJ b. 2.9 kJ c. 2.0 kJ d. 3.4 kJ e. 1.2 kJ

12. At t = 0, a wheel rotating about a fixed axis at a constant angular acceleration has an angular velocity of 2.0 rad/s. Two seconds later it has turned through 5.0 complete revolutions. What is the angular acceleration of this wheel?

a. 17 rad/s^2 b. 14 rad/s^2 c. 20 rad/s^2 d. 23 rad/s^2 e. 13 rad/s^2

13. A wheel rotates about a fixed axis with an initial angular velocity of 20 rad/s. During a 5.0 s interval the angular velocity increases to 40 rad/s. Assume that the angular acceleration was constant during the 5.0 s interval. How many revolutions does the wheel turn through during the 5.0 s interval?

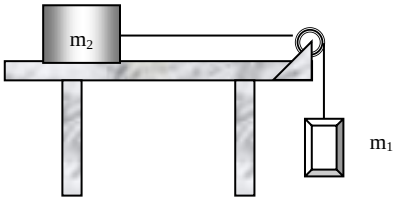
a. 20 rev b. 24 rev c. 32 rev d. 28 rev e. 39 rev

14. A thin uniform rod (length = 1.2 m, mass = 2.0 kg) is pivoted about a horizontal, frictionless pin through one end of the rod. (The moment of inertia of the rod about this axis is ML 2 /3.) The rod is released when it makes an angle of 37° with the horizontal. What is the angular acceleration of the rod at the instant it is released?

a. 9.8 rad/s^2 b. 7.4 rad/s^2 c. 8.4 rad/s^2 d. 5.9 rad/s^2 e. 6.5 rad/s^2

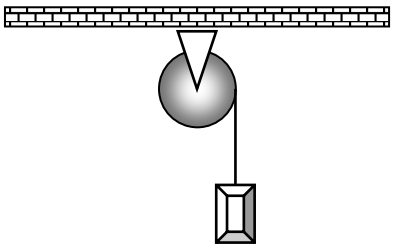
15. A mass (m_1 = 5.0 kg) is connected by a light cord to a mass (m_2 = 4.0 kg) which slides on a smooth surface, as shown in the figure. The pulley (radius = 0.20 m) rotates about a frictionless axle. The acceleration of m_2 is 3.5 m/s^2 . What is the moment of inertia of the pulley?

a. 0.29 kg.m^2
b. 0.42 kg.m^2
c. 0.20 kg.m^2
d. 0.62 kg.m^2
e. 0.60 kg.m^2



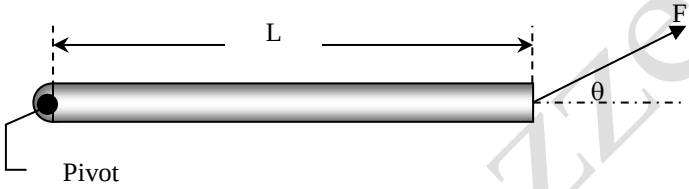
16. A wheel (radius = 0.20 m) is mounted on a frictionless, horizontal axis. A light cord wrapped around the wheel supports a 0.50-kg object, as shown in the figure. When released from rest the object falls with a downward acceleration of 5.0 m/s^2 . What is the moment of inertia of the wheel?

a. 0.023 kg.m^2
b. 0.027 kg.m^2
c. 0.016 kg.m^2
d. 0.019 kg.m^2
e. 0.032 kg.m^2



17. A uniform rod of mass M = 1.2 kg and length = 0.80 m is free to pivot about one end as shown. The moment of inertia of the rod about an axis perpendicular to the rod and through the center of mass is given by L^2 /12. If a force (F = 5.0 N, θ = 40°) acts as shown, what is the resulting angular acceleration about the pivot point?

a. 16 rad/s^2
b. 12 rad/s^2
c. 14 rad/s^2
d. 10 rad/s^2
e. 33 rad/s^2



18. Four identical particles (mass of each = 0.24 kg) are placed at the vertices of a rectangle (2.0 m, 3.0 m) and held in those positions by four light rods which form the sides of the rectangle. What is the moment of inertia of this rigid body about an axis that passes through the center of mass of the body and is parallel to the shorter sides of the rectangle?

a. 2.4 kg.m^2 b. 2.2 kg.m^2 c. 1.9 kg.m^2 d. 2.7 kg.m^2 e. 8.6 kg.m^2

Additional Problems

19. A 10-gram bullet is fired into a 100-gram block of wood at rest on a horizontal surface. After impact, the block slides 8 m before coming to rest. If the coefficient of friction $\mu = 0.6$, find the speed of the bullet before impact. (***ANS:* 106.7 m/s**)

20. A uniform solid sphere rolls without slipping along a horizontal surface. What fraction of its total kinetic energy is in the form of rotational kinetic energy about the CM? (***ANS:* 2/7**)

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ANSWER SHEET **FOR MCQ-** ***CHAPTER 9 and CHAPTER 10***

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MCQ- ***CHAPTER 9 and CHAPTER 10***
ANSWER KEY FOR MCQ- ***CHAPTER 9 and CHAPTER 10***

1. c

2. b

3. a

4. d

5. c

6. a

7. d

8. b

9. d

10. a

11. c

12. b

13. b

14. a

15. c

16. d

17. d

18. b

19. 106.7 m/s

20. 2/7