```
Q1 Q0 Two balls, with masses m and 2m, are dropped
   Q0 to the ground from the roof of a building. (Assume no air
   Q0 resistance.) Just before hitting the ground, the heavier
   Q0 ball has:
   Q0
   A1   two times as much kinetic energy as the lighter one.
   A2   as much kinetic energy as the lighter one.
   A3   half as much kinetic energy as the lighter one.
   A4   four times as much kinetic energy as the lighter one.
   A5   a kinetic energy that is impossible to determine.
   Q0
Q2 Q0 An object is pushed by a variable force, plotted in Fig 1,
   Q0 as a function of position, x.
   Q0 How much work has the force done on the object when it
   Q0 has moved from x=0 to x=+6 m?
   Q0
   A1   2  J
   A2   10 J
   A3   -6 J
   A4   0  J
   A5   12 J
   Q0
Q3 Q0 A helicopter lifts a 72 kg man 15 m vertically
   Q0 by means of a cable. The acceleration of the man is
   Q0 1.20 m/s**2. How much work is done on the man by
   Q0 the tension of the cable?
   Q0
   A1 12   kJ
   A2 10   kJ
   A3 0    kJ
   A4 14   kJ
   A5 16   kJ
   Q0
Q4 Q0 A force acting on a particle is conservative if
   Q0
   A1 its work is zero when the particle moves
   A1         around any closed path.
   A2 its work depends on the path between the end
   A2         points of the motion.
   A3 its work equals the change in linear momentum of
   A3         the particle.
   A4 it must be perpendicular to the velocity of the particle
   A4         on which it acts.
   A5 it is a frictional force.
   Q0
Q5 Q0 A simple pendulum consists of a 2.0 kg mass attached
   Q0 to a string of length R=1.5 m.  It is pulled up until
   Q0 the string is horizontal, and then released from rest
   Q0 (see Fig 3). Its speed (v) at the lowest point is
   Q0
   A1  5.4 m/s
   A2  4.1 m/s
   A3  9.8 m/s
   A4  8.5 m/s
   A5  2.0 m/s
   Q0
Q6 Q0 A block of mass m=3.0 kg is kept at rest after it has
   Q0 compressed a horizontal massless spring (k=500 N/m)
```

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FIGURE-1

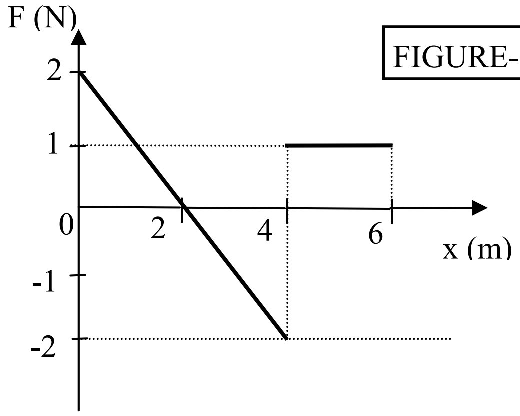


FIGURE-2

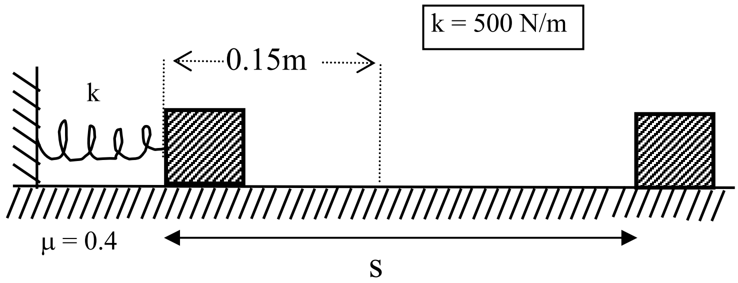


FIGURE-3

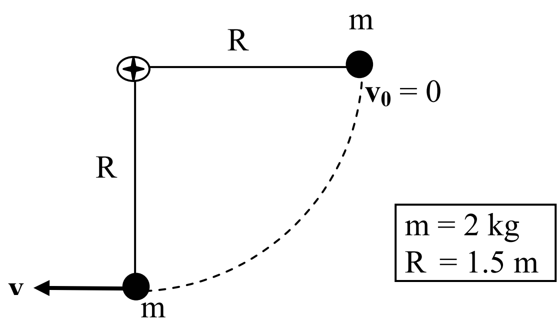


FIGURE-4

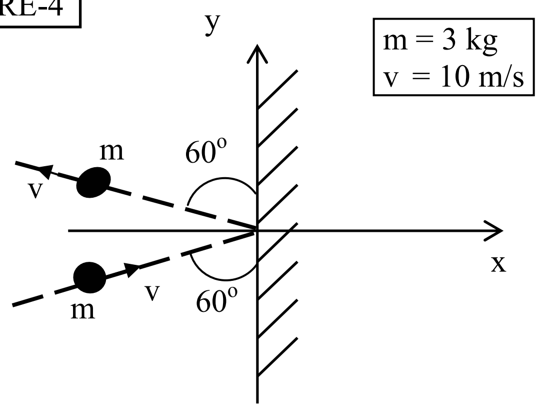


FIGURE-5

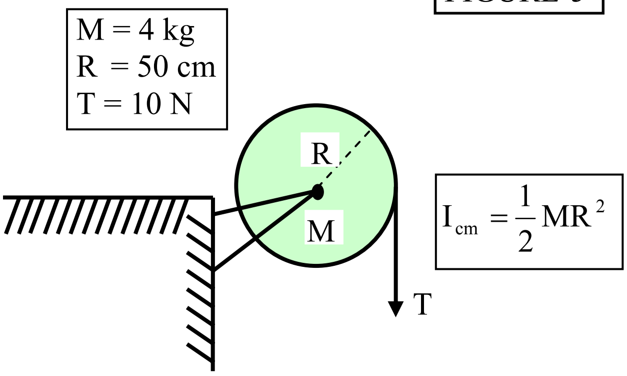


FIGURE-6

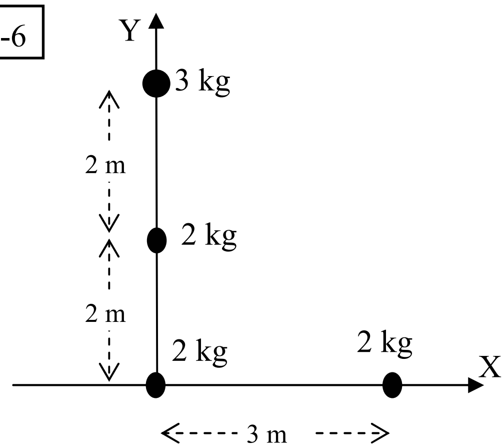
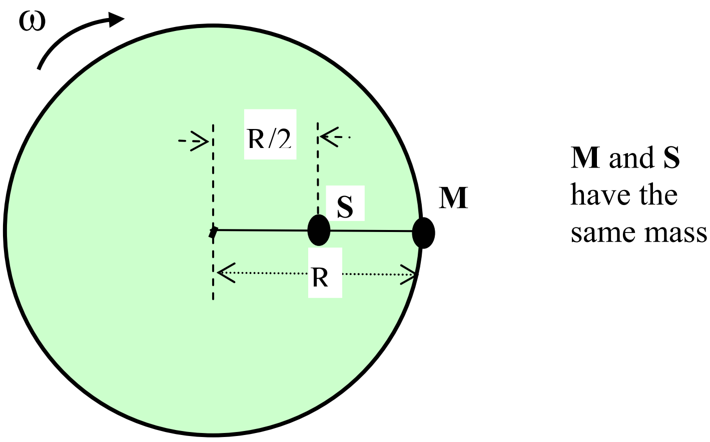


FIGURE-7



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   Q0 by 0.15 m, as shown in Fig. 2. When the block is
   Q0 released, it travels a distance S on a horizontal
   Q0 rough surface (mu=0.4) before stopping.
   Q0 Calculate the distance S.
   Q0
   A1  0.48 m
   A2  2.1  m
   A3  3.2  m
   A4  1.9  m
   A5  0.15 m
   Q0
Q7 Q0 Three particles are placed in the xy plane. A 40-g particle is
   Q0 located at(4,3) m, and a 50-g particle is located at (-2,-2) m.
   Q0 Where must a 20-g particle be placed so that the center of mass
   Q0 of the three-particle system is at the origin (0,0)?
   Q0
   A1 (-3, -1) m
   A2 (+3, -1) m
   A3 (+1, +3) m
   A4 (+1, -3) m
   A5 (-1, -1.5) m
   Q0
Q8 Q0 A 2000-kg truck traveling at a speed of 6.0 m/s makes a 90 deg.
   Q0 turn in a time of 4.0 s and emerges from this turn with a speed
   Q0 of 4.0 m/s. What is the magnitude of the average resultant force
   Q0 on the truck during this turn?
   Q0
   A1 3.6 kN
   A2 4.0 kN
   A3 5.0 kN
   A4 6.4 kN
   A5 1.0 kN
   Q0
Q9 Q0 An 8.0 kg object moving at 4.0 m/s in the positive x direction
   Q0 makes a one-dimensional collision with a 2.0 kg object moving
   Q0 at 3.0 m/s in the opposite direction. The final velocity of the
   Q0 8.0 kg object is 2.0 m/s in the positive x direction. What is
   Q0 the total kinetic energy of the two objects after the collision?
   Q0
   A1 41 J
   A2 32 J
   A3 52 J
   A4 25 J
   A5 29 J
   Q0
Q10Q0 A 4.0 kg mass has a velocity of (4.0 i) m/s, when it explodes
   Q0 into two 2.0 kg masses. After the explosion, one of the masses
   Q0 has a velocity of 3.0 m/s making an angle of 60 degrees with the
   Q0 +x axis. What is the magnitude of the velocity of the other mass
   Q0 after the explosion?
   Q0
   A1 7.0 m/s
   A2 7.9 m/s
   A3 8.9 m/s
   A4 6.1 m/s
   A5 6.7 m/s
   Q0
Q11Q0 A 3.0 kg steel ball strikes a wall with a speed of 10 m/s at
   Q0 an angle of 60 degrees with the surface. It bounces off with
   Q0 the same speed and angle (see Fig.  4). If the ball is in
```

```
   Q0 contact with the wall for 0.20 s, what is the average force
   Q0 exerted on the ball by the wall?
   Q0
   A1 (-260 i) N
   A2 (-780 i) N
   A3 ( 150 i) N
   A4 ( 780 i) N
   A5 zero
   Q0
Q12Q0 A 3.0 kg object with an initial velocity of (5 i) m/s collides
   Q0 with and sticks to a 2.0 kg object moving with an initial
   Q0 velocity of (-3 j) m/s. Find the final velocity of the composite
   Q0 body.
   Q0
   A1  ( 3.0 i - 1.2 j)  m/s
   A2  ( 15  i - 6.0 j)  m/s
   A3  (-3.0 i + 1.2 j)  m/s
   A4  (-15  i + 6.0 j)  m/s
   A5  ( 1.2 i - 3.0 j)  m/s
   Q0
Q13Q0 Which of the following statements is TRUE for a collision of
   Q0 an isolated system of two particles:
   Q0
   A1 In any kind of collision linear momentum is conserved.
   A2 In an elastic collision linear momentum is conserved
   A2       but kinetic energy is not conserved.
   A3 In a completely inelastic collision both linear momentum and
   A3       kinetic energy are conserved.
   A4 Momentum is not conserved in a completely inelastic collision.
   A5 Kinetic energy is conserved in an inelastic collision.
   Q0
Q14Q0 A uniform disk of radius 50 cm and mass 4 kg is mounted on
   Q0 a frictionless axle, as shown in Fig 5. A light cord is wrapped
   Q0 around the rim of the disk and a steady downward pull of 10 N is
   Q0 exerted on the cord. Find the tangential acceleration of a point
   Q0 on the rim of  the disk.
   Q0
   A1 5.0 m/s**2
   A2 4.0 m/s**2
   A3 3.0 m/s**2
   A4 2.0 m/s**2
   A5 1.0 m/s**2
   Q0
Q15Q0 At t=0, the motor of a turntable (radius = 10 cm) rotating
   Q0 at 33.33 rev/ min is turned off. It slows down uniformly and
   Q0 stops at t=2 min. What is the magnitude of the angular
   Q0 acceleration of the turntable?
   Q0
   A1 0.029 rad/s**2
   A2 0.123 rad/s**2
   A3 0
   A4 0.107 rad/s**2
   A5 0.003 rad/s**2
   Q0
Q16Q0 The angular position of a point on the rim of a rotating wheel
   Q0 is given by THETA = 4.0t -3.0t**2 + t**3, where THETA is in
   Q0 radians and t is in seconds. What is the average angular
   Q0 acceleration for the time interval that begins at t = 0 s and
   Q0 ends at t = 1.0 s?
   Q0
```

```
   A1 -3.0 rad/s**2
   A2 +3.0 rad/s**2
   A3 +2.5 rad/s**2
   A4 -2.5 rad/s**2
   A5 +1.4 rad/s**2
   Q0
Q17Q0 The four particles in Fig. 6 are connected by rigid rods of
   Q0 negligible mass. Find the rotational inertia of the four
   Q0 particles about the y-axis.
   Q0
   A1 18 kg.m**2
   A2 20 kg.m**2
   A3 38 kg.m**2
   A4 12 kg.m**2
   A5 45 kg.m**2
   Q0
Q18Q0 A star of radius R is spinning with an angular velocity w. If
   Q0 it shrinks till its radius becomes R/2, find the ratio of the
   Q0 final angular momentum to its initial angular momentum.
   Q0
   A1 1
   A2 2
   A3 4
   A4 1/2
   A5 1/4
   Q0
Q19Q0 Mohammed (M) and Salim (S) (have the same mass) are riding on
   Q0 a merry-go-round rotating at a constant rate. Salem is half way
   Q0 in from the edge, as shown in Fig 7. The angular momenta of
   Q0 Salem and Mohammed about the axis of rotation are Ls and Lm
   Q0 respectively. Which of the following relations is correct?
   Q0
   A1 Lm = 4 Ls
   A2 Lm = Ls
   A3 Lm = Ls/4
   A4 Lm = 2 Ls
   A5 Lm = Ls/2
   Q0
Q20Q0 A particle located at the position vector r=(1.2 i+ 1.2 j) m has
   Q0 a force  F=(150 i) N acting on it. The torque (in N.m)
   Q0 of the force about the origin is:
   Q0
   A1 -180 k
   A2  180 k
   A3  180 i
   A4  180 (i+j)
   A5 -180 j
```