Major 2 Exam – 041

```
Q1 Q0 A particle moves in the x-y plane from the point (0,1) m to
   Q0 point (3,5) m while being acted upon by a constant force
   Q0 F = 4i + 2j +4k (N). The work done on the particle by
   Q0 this force is:
   Q0
   A1  20 J
   A2  10 J
   A3 -20 J
   A4  30 J
   A5   0
   Q0
Q2 Q0 Which of the following statements is CORRECT?
   Q0
   A1 The centripetal force acting on a particle rotating in a
   A1     circle does no work on the particle.
   A2 The work done by a force is always equal to the product of
   A2     the force and the distance travelled.
   A3 When an object is displaced horizontally, the gravitational
   A3     force does work on it.
   A4 When an object is displaced horizontally on a table, the normal
   A4     force does work on it.
   A5 If a person lifts a heavy block a vertical distance, then
   A5     his work is zero.
   Q0
Q3 Q0 A car accelerates from zero to 30 m/s in 1.5 s. Assuming
   Q0 the same average power is delivered by the car, how long
   Q0 does it take to accelerate it from zero to 60 m/s.
   Q0 (Ignore friction).
   Q0
   A1 6.0   s
   A2 3.0   s
   A3 4.5   s
   A4 1.5   s
   A5 9.0   s
   Q0
Q4 Q0 A 3.0 kg block is released from a compressed spring (k=120 N/m).
   Q0 It travels over a horizontal surface (mu =0.20) for a distance
   Q0 of 2.0 m before coming to rest, Fig 1. How far was the spring
   Q0 compressed before being released ?
   Q0
   A1 0.44 m
   A2 0.39 m
   A3 0.23 m
   A4 0.13 m
   A5 0.56 m
   Q0
Q5 Q0 A projectile is fired from the top of a 40 m high building with
   Q0 a speed of 20 m/s. What will be its speed when it strikes the
   Q0 ground?
   Q0
   A1  34  m/s
   A2  10  m/s
   A3  82  m/s
   A4  16  m/s
   A5  50  m/s
   Q0
Q6 Q0 A 75 kg parachutist releases himself off a tower that is 85 m
   Q0 high. Assume that he starts from rest and reaches the ground
```

Q0 with a speed of 5.0 m/s. How much work was done by the
Q0 nonconservative forces on him?
Q0
A1 -6.2* 10**4 J
A2 -3.2* 10**5 J
A3 -4.5* 10**4 J
A4 -9.8* 10**4 J
A5 -4.5* 10**5 J
Q0
Q7 Q0 A 1.0 kg particle is moving with a velocity of 16 m/s along the
Q0 positive x direction while a 3.0 kg particle is moving with a
Q0 velocity of 4.0 m/s along the positive y direction.
Q0 Find the magnitude of their center of mass velocity.
Q0
A1 5.0 m/s
A2 4.0 m/s
A3 16 m/s
A4 7.0 m/s
A5 0
Q0
Q8 Q0 A 10 kg bomb initially at rest explodes, breaking into two
Q0 pieces of masses 4.0 kg and 6.0 kg. The 4.0 kg piece fly off
Q0 along the +x axis with a speed 30 m/s. Find the velocity of
Q0 the 6.0 kg piece.
Q0
A1 20 m/s along the -x axis
A2 30 m/s along the -x axis
A3 30 m/s along the +x axis
A4 20 m/s along the +x axis
A5 15 m/s along the -x axis
Q0
Q9 Q0 A 0.5 kg ball having velocity (10 i + 10 j) m/s collides and
Q0 bounces off a wall with a velocity of (-5.0 i + 10 j) m/s. Find
Q0 the average force on the ball if the collision time is 0.01 s.
Q0
A1 (-750 i) N
A2 (-250 i) N
A3 (-200 i) N
A4 (150 i + 200 j) N
A5 (25 i + 100 j) N
Q0
Q10Q0 A circular hole of radius 5.0 cm is cut from a uniform square
Q0 of metal sheet having sides 20 cm as shown in Fig 2. Which
Q0 point could be the center of mass of this sheet?
Q0
A1 Point B
A2 Point A
A3 Point C
A4 Point D
A5 Point E
Q0
Q11Q0 A 2.0 kg block is given a single impulsive force in the
Q0 positive x-direction as shown in Fig 3. If the velocity of
Q0 the block at t=0 was -2.0 m/s, find its velocity at t=5.0 s.
Q0
A1 3.0 m/s
A2 5.0 m/s
A3 2.0 m/s
A4 6.0 m/s
A5 1.0 m/s

PHYS101 – Second Major Exam – 041

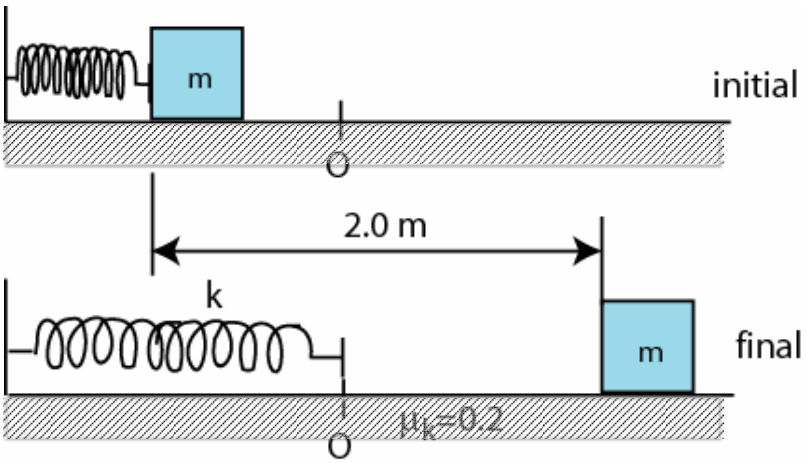

Figure 1

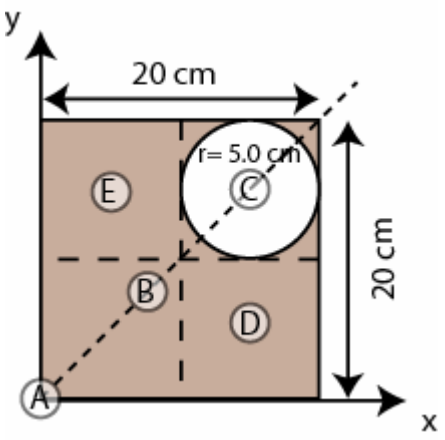

Figure 2

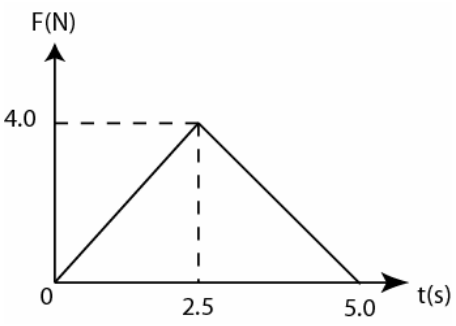

Figure 3

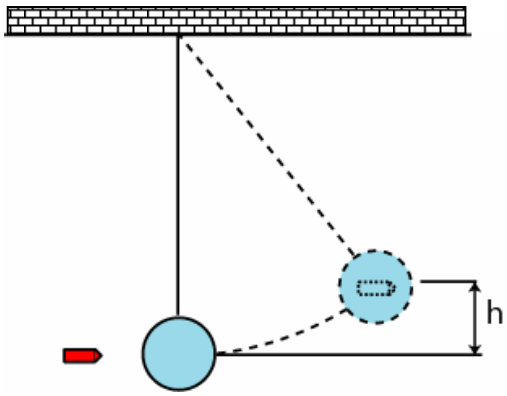

Figure 4

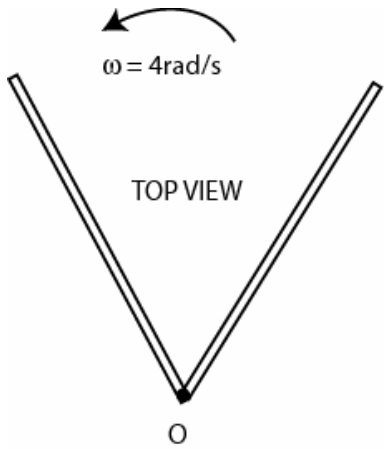

Figure 5

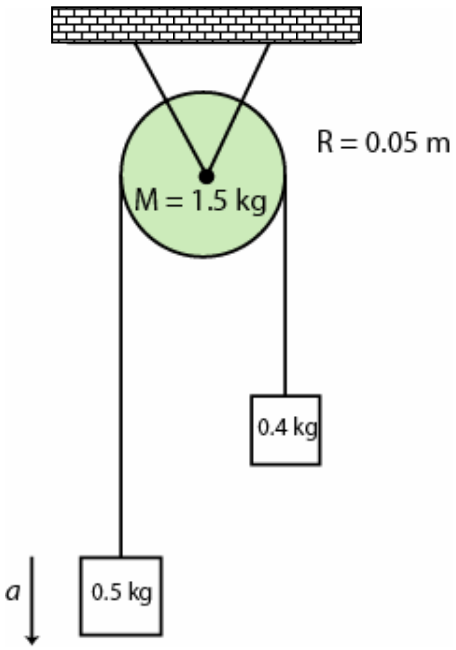

Figure 6

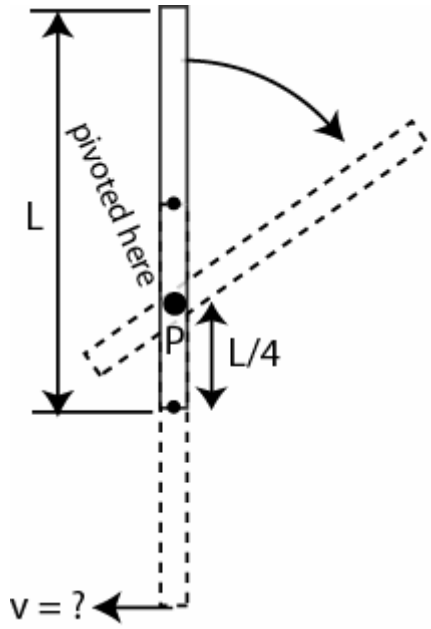

Figure 7

```
   Q0
Q12Q0 As shown in Fig 4, a ball of mass M is hanging from a rope to
   Q0 make a pendulum. A 10 g bullet strikes the ball with a speed
   Q0 v=308 m/s. The center of mass of the ball + bullet rises
   Q0 a vertical distance of h=12 cm. Assuming that the bullet
   Q0 remains embedded, calculate the mass M of the ball.
   Q0
   A1 2.0 kg
   A2 5.0 kg
   A3 3.0 kg
   A4 6.0 kg
   A5 8.0 kg
   Q0
Q13Q0 A ball of mass m1= 0.2 kg and speed= v1 makes an elastic head-on
   Q0 collision with another ball of mass m2 initially at rest. After
   Q0 collision, m1 continues to move in the original direction but
   Q0 with speed = (1/3)v1. What is the value of m2?
   Q0
   A1 0.1 kg
   A2 0.3 kg
   A3 0.2 kg
   A4 0.4 kg
   A5 0.5 kg
   Q0
Q14Q0 A uniform rod (M = 2.0 kg, L = 2.0 m) is held vertical about
   Q0 a pivot at point P, a distance L/4 from one end (see Fig 7).
   Q0 The rotational inertia of the rod about P is 1.17 kg*m**2. If it
   Q0 starts rotating from rest, what is the linear speed of the
   Q0 lowest point of the rod as it passes again through the vertical
   Q0 position (v)?
   Q0
   A1 8.7  m/s
   A2 4.8  m/s
   A3 17   m/s
   A4 2.4  m/s
   A5 zero
   Q0
Q15Q0 Consider two thin rods each of length (L = 1.5 m) and mass 30 g,
   Q0 arranged on a frictionless table as shown in Fig 5. The system
   Q0 rotates about a vertical axis through point O with constant
   Q0 angular speed of 4.0 rad/s. What is the angular momentum of the
   Q0 system about O?
   Q0
   A1 0.18 kg*m**2/s
   A2 0.54 kg*m**2/s
   A3 1.5  kg*m**2/s
   A4 0.27 kg*m**2/s
   A5 0.0
   Q0
Q16Q0 At t=0, a disk has an angular velocity of 360 rev/min, and
   Q0 constant angular acceleration of -0.50 rad/s**2. How many
   Q0 rotations does the disk make before coming to rest?
   Q0
   A1 226
   A2 180
   A3 360
   A4 90
   A5 113
   Q0
```

```
Q17Q0 In Fig 6, m1 = 0.50 kg, m2 = 0.40 kg and the pulley has a disk
   Q0 shape of radius 0.05 m and mass M = 1.5 kg. What is the linear
   Q0 acceleration of the block of mass m2?
   Q0
   A1 0.59 m/s**2
   A2 0.42 m/s**2
   A3 1.46 m/s**2
   A4 0.21 m/s**2
   A5 0.0
   Q0
Q18Q0 A uniform solid sphere of radius 0.10 m rolls smoothly across
   Q0 a horizontal table at a speed 0.50 m/s with total kinetic
   Q0 energy 0.70 J. Find the mass of the sphere.
   Q0
   A1 4.0  kg
   A2 8.0  kg
   A3 2.0  kg
   A4 1.0  kg
   A5 5.0  kg
   Q0
Q19Q0 A 2.0 kg particle is moving such that its position vector (r)
   Q0 relative to the origin is r =(-2.0*t**2 i + 3.0 j) m. What is
   q0 the torque (about the origin) acting on the particle at t=2.0 s?
   Q0
   A1  24 k   N.m
   A2 -36 k   N.m
   A3 -24 k   N.m
   A4 -48 k   N.m
   A5   0
   Q0
Q20Q0 A man, with his arms at his sides, is spinning on a light
   Q0 turntable that can rotate freely about a vertical frictionless
   Q0 axis. When he extends his arms:
   Q0
   A1 his angular velocity will decrease.
   A2 his angular momentum will increase.
   A3 his angular velocity remains the same.
   A4 his rotational inertia decreases.
   A5 his rotational kinetic energy remains the same.
```