Phys 101 Final Exam - 031

Q1 Q0 The system in Fig 2 is in equilibrium. A mass (M) of 5.0 kg
13 Q0 hangs from the end of the uniform beam of mass = 10.0 kg.
Q0 The tension in the cable is:
Q0
A1 190 N
A2 210 N
A3 69 N
A4 51 N
A5 98 N
Q0

Q2 Q0 Two scales are 2.0 m apart. A uniform 40 kg beam of the same
13 Q0 length is placed on top of them (see Fig 3). A 10 kg block is
Q0 placed on the beam after which the right scale reads 22 kg and
Q0 the left scale reads 28 kg. How far from the right scale is the
Q0 center of gravity of the block located?
Q0
A1 1.6 m
A2 0.2 m
A3 1.3 m
A4 1.4 m
A5 0.8 m
Q0

Q3 Q0 A 500 kg mass is hung from the ceiling with a steel wire. The
13 Q0 wire has a length = 45.0 cm, radius = 4.00 mm and has negligible
Q0 mass. Calculate the change in the length of the wire.
Q0 (Youngs modulus of steel E = 2.00* 10**11 N/m**2)
Q0
A1 0.22 mm
A2 0.15 mm
A3 0.75 mm
A4 0.50 mm
A5 0.05 mm
Q0

Q4 Q0 A space ship is going from the Earth to the Moon along the line
14 Q0 joining their centers. At what distance from the center of the
Q0 Earth will the net gravitational force on the space ship be zero?
Q0 Assume that Me = 81 Mm, where Me is the mass of the Earth
Q0 and Mm is the mass of the Moon. (The distance from the center of
Q0 the Earth to the center of the Moon is 3.8*10**5 km).
Q0
A1 3.4*10**5 km
A2 3.8*10**5 km
A3 3.0*10**5 km
A4 4.3*10**5 km
A5 1.9*10**5 km

Q0
Q5 Q0 A satellite circles the Earth at an altitude equal to 3 times
14 Q0 the radius of Earth. Find the gravitational acceleration due
Q0 to Earth at the satellite.
Q0 (g on the surface of Earth is 9.8 m/s**2)
Q0
A1 0.61 m/s**2
A2 0.22 m/s**2
A3 9.8 m/s**2
A4 3.3 m/s**2
A5 0.0 m/s**2
Q0
Q6 Q0 Two moons orbit a planet in circular orbits. Moon (A) has
14 Q0 orbital radius R and moon (B) has orbital radius 4R. Moon A
takes
Q0 20 days to complete its orbit. How long does it take moon (B) to
Q0 complete its orbit?
Q0
A1 160 days
A2 20 days
A3 80 days
A4 320 days
A5 100 days
Q0
Q7 Q0 What is the escape speed from the surface of a planet whose
14 Q0 radius is 5000 km, if the gravitational acceleration on its
Q0 surface is 4.0 m/s**2?
Q0
A1 6.3 km/s
A2 2.8 km/s
A3 2.0 km/s
A4 4.0 km/s
A5 8.0 km/s
Q0
Q8 Q0 Two different solid metal pieces experience the same buoyant
15 Q0 force when completely submerged in the same liquid. Which of
the
Q0 following statements is CORRECT?
Q0
A1 Their volumes are equal.
A2 Their densities are equal.
A3 Their masses are equal.
A4 They displace different volumes of the liquid.
A5 All of the other answers are wrong.
Q0
Q9 Q0 How deep into a lake would you have to dive so that the
increase
15 Q0 in pressure you experience is one atmosphere?
Q0 (The density of water = 10**3 kg/m**3).

Q0 (1 atmosphere = 1.01 * 10**5 N/m**2)
Q0
A1 10.3 m
A2 9.8 m
A3 4.9 m
A4 2.01 m
A5 100 m
Q0
Q10Q0 A pipe 16 cm in diameter is used to fill a tank of volume
15 Q0 5000 liters in 5 minutes. What is the speed at which the water
Q0 leaves the pipe? (1 liter = 10**-3 m**3)
Q0
A1 50 m/min
A2 40 m/min
A3 200 m/min
A4 25 m/min
A5 100 m/min
Q0
Q11Q0 Consider a large, closed, cylindrical tank with oil inside it.
15 Q0 There is a small hole at a height of 1 m from the bottom of the
Q0 tank. The air above the oil is maintained at a pressure
Q0 1.5 x 10**5 Pa (see Fig 7). Find the speed at which oil leaves
Q0 the hole, when the oil level is 20 m above the bottom of the
Q0 tank. (The density of oil is 850 kg/m**3).
Q0
A1 22 m/s
A2 11 m/s
A3 44 m/s
A4 33 m/s
A5 55 m/s
Q0
Q12Q0 A 5.0 kg mass stretches a spring by 10 cm when the mass is
16 Q0 attached to the spring. The mass is then displaced downward
Q0 an additional 5.0 cm and released. Its position (y) in m from
Q0 its equilibrium position as a function of time (t) is:
Q0
A1 y = 0.05 cos (10 * t)
A2 y = 0.10 cos (10 * t)
A3 y = 0.10 sin (10 * t)
A4 y = 0.10 cos (5 * t)
A5 y = 0.05 sin (5 * t)
Q0
Q13Q0 A particle (m = 0.2 kg) is attached to a spring. The motion of
16 Q0 the particle is described by x = 0.10 cos (10*t +P I/3)
Q0 where x is m and t is in s. What is the mechanical energy of
Q0 the particle?
Q0
A1 0.1 J
A2 0.8 J

A3 0.6 J
A4 1.0 J
A5 10 J
Q0
Q14Q0 The frequency of small oscillations of a simple pendulum of
16 Q0 length (L) on the surface of Earth is (f). What will be its
Q0 frequency on the surface of the Moon if we increase its length
Q0 to become (2L)? (Take: g(Moon) = 0.17 g(Earth))
Q0
A1 0.29 * f
A2 3.4 * f
A3 f
A4 2*f
A5 0.085 * f
Q0
Q15Q0 A mass m = 2 kg is attached to a spring having a force
constant
16 Q0 k = 300 N/m. The mass is displaced from its equilibrium position
Q0 and released. Its period of oscillation (in s) is
Q0 approximately
Q0
A1 0.5
A2 10
A3 2.0
A4 0.01
A5 0.08
Q0
Q16Q0 The average density of blood is 1.06 x 10**3 kg/m**3. If you
1 Q0 donate one pint of blood, what is the mass of the blood you
Q0 have donated, in grams?
Q0 (1 pint = 1/2 Liter, 1 Liter = 1000 cm**3)
Q0
A1 530
A2 5.30 x 10**3
A3 0.530
A4 5.30 x 10**5
A5 1060
Q0
Q17Q0 A car travels along a straight road with a speed of v1=15 m/s
2 Q0 for half the distance between two cities and with a speed
Q0 v2=30 m/s for the other half. What is the average velocity of
Q0 the car for the entire trip?
Q0
A1 20.0 m/s
A2 22.5 m/s
A3 25.0 m/s
A4 18.5 m/s
A5 24.0 m/s
Q0

Q18Q0 Which of the following is a unit vector?
3 Q0
A1 j x i
A2 (1/2) (i - j)
A3 (1/2) (i + j)
A4 (1/sqrt(2)) (i + j + k)
A5 0.3 j + 0.4 k
Q0
Q19Q0 An object (A) is shot horizontally with a speed Vo from the top
4 Q0 of a building of height (h). It takes a time tA for it to reach
Q0 the ground. Another object (B) is dropped from the same height
Q0 and reaches the ground in time tB. Which of the following
Q0 statements is CORRECT?
Q0
A1 tA = tB
A2 tA > tB
A3 tA < tB
A4 Both objects will hit the ground with the same speed.
A5 The acceleration of object (A) is zero.
Q0
Q20Q0 Two forces F1 = 20 N and F2 = 15 N, act on a block of mass
5 Q0 5.0 kg as shown in Fig 4. Find the magnitude of the
Q0 acceleration of the block.
Q0
A1 6.1 m/s**2
A2 5.5 m/s**2
A3 2.6 m/s**2
A4 1.3 m/s**2
A5 8.1 m/s**2
Q0
Q21Q0 A box slides down an inclined plane at constant velocity.
6 Q0 Which of the following statements is CORRECT?
Q0
A1 A frictional force must be acting on it.
A2 A net force is acting on it.
A3 Its acceleration is half the acceleration of gravity.
A4 Gravity is not acting on it.
A5 Its potential energy is constant.
Q0
Q22Q0 Fig 1 shows a force Fx, directed along the x-axis, acting on
7 Q0 a particle. The particle begins from rest at x = 0. What is
Q0 particle's position when it has the greatest speed?
Q0
A1 10 m
A2 5 m
A3 15 m
A4 8 m
A5 2 m
Q0

Q23Q0 A particle moves under the influence of a single conservative
ch8Q0 force. At point (A) the potential energy associated with the
Q0 conservative force is +40 J. As the particle moves from (A) to
Q0 (B), the force does +25 J of work on the particle. What is the
Q0 value of the potential energy at point B?
Q0
A1 +15 J
A2 +65 J
A3 +35 J
A4 +45 J
A5 +40 J
Q0
Q24Q0 A 5.0 kg block starts up a 30 degrees incline
8 Q0 with 150 J of kinetic energy. How far will it
Q0 slide up the incline if the coefficient of kinetic
Q0 friction between the block and the incline is 0.30?
Q0
A1 4.0 m
A2 3.5 m
A3 7.0 m
A4 8.2 m
A5 2.4 m
Q0
Q25Q0 Block (A) of mass 0.2 kg, travelling on a frictionless
9 Q0 horizontal plane at 3.0 m/s, hits block (B) of mass 0.4 kg which
Q0 is initially at rest. After the collision the center of mass of
Q0 the two blocks has a speed of:
Q0
A1 1.0 m/s
A2 2.0 m/s
A3 3.0 m/s
A4 0 m/s
A5 4.0 m/s
Q26Q0 A 1500 kg car tavelling east with a speed of 25 m/s collides
10 Q0 with a 2500 kg van traveling north with a speed of 20 m/s at
Q0 an intersection. The two cars stick together after the collision
Q0 and move in the direction shown in Fig 6. What is the speed of
Q0 the two cars after the collision?
Q0
A1 15.6 m/s
A2 20.8 m/s
A3 17.7 m/s
A4 18.2 m/s
A5 25.1 m/s
Q0
Q27Q0 A certain force accelerates a 5 kg object from a velocity of
10 Q0 (2i+4j) m/s to a velocity (-2i+4j) m/s in 2 s. Find the average
Q0 force acting on the object during this time interval.
Q0

A1 (-10 i) N
A2 (10 j) N
A3 (-20 i) N
A4 (20 j) N
A5 zero
Q0
Q28Q0 Increasing the angular speed of a rotating body will NOT cause
11 Q0 an increase in:
Q0
A1 the rotatioal inertia
A2 angular momentum
A3 linear speed
A4 rotational kinetic energy
A5 translational kinetic energy
Q0
Q29Q0 A merry-go-round, of radius R=2.0 m and rotational inertia
12 Q0 I = 250 kg.m**2, is rotating at 19 rev/min about its axle.
Q0 A 25 kg boy jumps onto the edge of the merry-go-round. What is
Q0 the new angular speed of the merry-go-round?
Q0
A1 13.6 rev/min
A2 26.6 rev/min
A3 19.0 rev/min
A4 11.2 rev/min
A5 9.51 rev/min
Q0
Q30Q0 A wheel of radius 0.5 m rolls without slipping on a
12 Q0 horizontal surface as shown in Fig 5. Starting from rest, the
Q0 wheel moves with constant angular acceleration of 6.0 rad/s**2.
Q0 The distance traveled by the center of the wheel from t=0
Q0 to t=3.0 s is:
Q0
A1 13.5 m
A2 18.1 m
A3 27.4 m
A4 0 m
A5 9.8 m

PHYS101 - FINAL EXAM – FIGURES Term-031

FIGURE-1

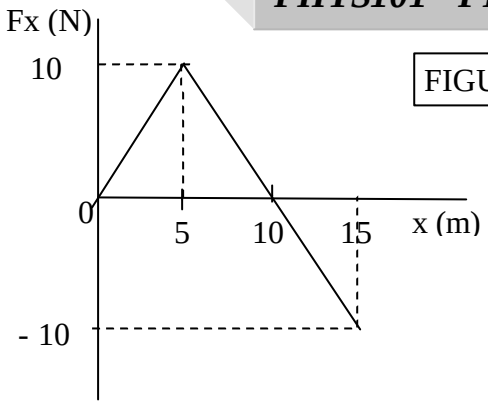


FIGURE-2

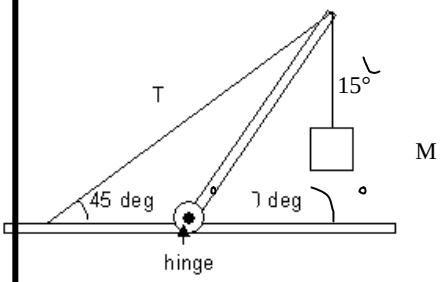


FIGURE-3

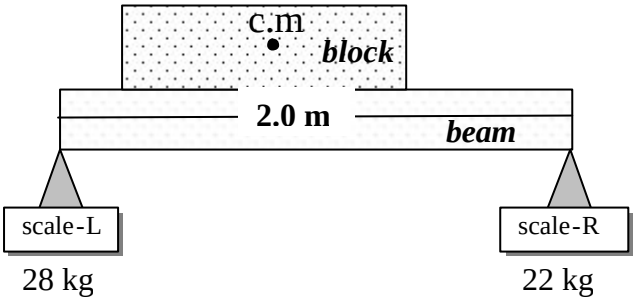
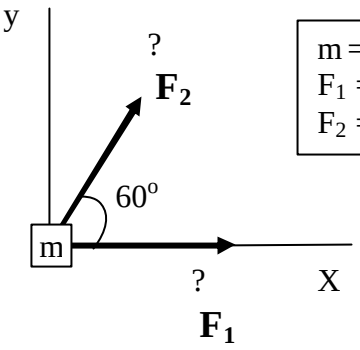


FIGURE-4



m = 5 kg
F_1 = 20 N
F_2 = 15 N

FIGURE-5

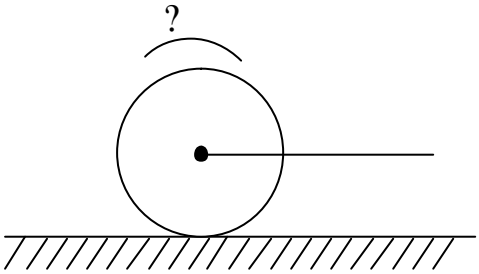


FIGURE-6

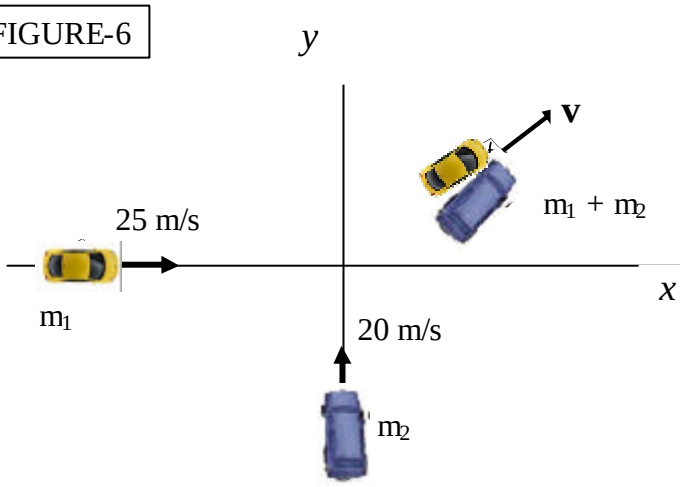


FIGURE-7