Phys 101 Final Exam 981

Q0 If A = E*t, where E is energy and t is time, then the

Q0 dimension of A is the same as that of:
Q0
A1 angular momentum
A2 angular acceleration
A3 torque
A4 power
A5 linear momentum
Q0
Q0 A ball is thrown vertically up. What is the magnitude of its
Q0 acceleration just before it reaches its highest point?
Q0
A1 Exactly g
A2 Zero
A3 Twice g
A4 Slightly more than g

A5 None of the other answers
Q0
Q0 If A =(3*i+7*j) and B =(-i+2*j), find the angle between the
Q0 vectors A and B.
Q0
A1 50 deg
A2 67 deg
A3 38 deg
A4 63 deg
A5 90 deg
Q0
Q0 At t=0 a particle leaves the origin with an initial velocity
Q0 (10*i+15*j) m/s. It experiences a constant acceleration
Q0 (-2*i) m/s**2. At what time does the particle reach its maximum
Q0 x-displacement?
Q0
A1 5.0 s
A2 3.0 s
A3 1.0 s
A4 8.0 s

A5 9.8 s
Q0
Q0 A projectile is fired at an angle of 30 deg above the
Q0 horizontal ground. Which of the following statements is TRUE?
Q0
A1 The speed of the projectile is minimum at the highest point.
A2 The speed of the projectile is maximum at the highest point.
A3 The speed of the projectile is zero at the highest point.
A4 The speed of the projectile is zero just before it hits the
A4 ground.
A5 None of the other answers.
Q0
Q0 An elevator of total mass 2000 kg moves upward. The
Q0 tension in the cable pulling the elevator is 24000 N. Find
Q0 the magnitude of the acceleration of the elevator.
Q0
A1 2.2 m/s**2
A2 12 m/s**2
A3 9.8 m/s**2
A4 4.0 m/s**2
A5 3.6 m/s**2
Q0
Q0 The horizontal surface on which the two objects in Figure 1
Q0 slide is frictionless. If M = 1 kg and F = 7.8 N, find the
Q0 magnitude of the force exerted by the 2M block on the 4M block.
Q0
A1 5.2 N
A2 8.6 N
A3 10 N
A4 3.0 N
A5 0 N
Q0
Q0 A car of mass 1000 kg and a truck of mass 2000 kg go around a
Q0 flat curve of radius r with the same speed v without slipping.
Q0 If they go any faster they will both begin slipping. The
Q0 following relation holds for the coefficient of static

Q0 friction of the car, mu(car), and the coefficient of static
Q0 friction of the truck, mu(truck):
Q0
A1 mu(car) = mu(truck)
A2 mu(car) = 0.5 mu(truck)
A3 mu(car) = 2 mu(truck)
A4 mu(car) = 4 mu(truck)
A5 None of the other answers.
Q0
Q0 What average power is used to lift a 50 kg object a height of
Q0 20 m in 1 minute?
Q0
A1 163 W
A2 117 W
A3 980 W
A4 100 W
A5 205 W
Q0
Q0 A block of mass 2 kg, initially at rest, slides straight down
Q0 a rough incline a distance 4 m. The incline makes an angle of
Q0 30 deg with the horizontal. The work done by friction is -20 J.
Q0 Find the speed of the block at the end of this 4m distance.
Q0
A1 4.4 m/s
A2 3.2 m/s
A3 9.1 m/s
A4 12 m/s
A5 0 m/s
Q0
Q0 Which of the following statements is TRUE?
Q0
A1 The work done by the tension during the oscillations of a
A1 simple pendulum is zero.
A2 Potential energy is associated with non-conservative forces.
A3 Gravitational potential energy can never be negative.
A4 Potential energy can not be converted into kinetic energy.
A5 Kinetic energy is conserved during projectile motion.
Q0

Q0 A bullet is fired vertically into a 1.4 kg wooden block at
Q0 rest directly above it (Figure 2). The bullet's mass is 30.0 g
Q0 and its speed just before hitting the block is 300 m/s. The
Q0 bullet remains embedded in the block. How high will the block
Q0 rise?
Q0
A1 2.0 m
A2 9.8 m
A3 6.3 m
A4 12 m
A5 15 m
Q0
Q0 A 2 kg particle has a velocity of v1 = [2*i-10*(t**2)*j] m/s,
Q0 where t is in seconds. A 3 kg particle moves with a velocity of
Q0 v2 = (4*i-2*t*j) m/s. Find the acceleration of the center of
Q0 mass of this two-particle system at t = 2 s.
Q0
A1 -17*j m/s**2
A2 (2.0*i-4.0*j) m/s**2
A3 0 m/s**2
A4 (2.0*i-17*j) m/s**2
A5 2.0*i m/s**2
Q0
Q0 Two particles of mass M and 3M are connected by a massless rod
Q0 of length L as shown in Figure 3. This rigid body rotates with
Q0 an angular speed of 5 rad/s about an axis through its center of
Q0 mass and perpendicular to the paper. If M = 2 kg and L = 80 cm,
Q0 what is the kinetic energy of this body?
Q0
A1 12 J
A2 15 J
A3 18 J
A4 23 J
A5 10 J
Q0

Q0 Find the magnitude of the net torque on the wheel shown in
Q0 Figure 4 about the axle through O, if a = 20 cm and b = 50 cm.
Q0
A1 7.10 N m
A2 3.55 N m
A3 5.25 N m
A4 8.34 N m
A5 0 N m
Q0
Q0 A disk rotates about a frictionless, vertical axle with an
Q0 angular speed of 6 rad/s (see Figure 5). The moment of inertia
Q0 of this disk about the axle is I1 = 1.2 kg m**2. A second disk,
Q0 having moment of inertia about the axle I2 = 0.6 kg m**2 and
Q0 initially at rest, drops onto the first disk and sticks
Q0 to it. Find the final angular speed.
Q0
A1 4.0 rad/s
A2 6.0 rad/s
A3 9.0 rad/s
A4 12 rad/s
A5 0 rad/s
Q0
Q0 A particle is located at the position r = (2*i-3*j) m and a
Q0 force F = (2*i+3*j) N acts on it. Find the magnitude of the
Q0 torque about the origin.
Q0
A1 12 N m
A2 5.0 N m
A3 8.0 N m
A4 13 N m
A5 0 N m
Q0
Q0 A uniform 60 kg beam is supported in a horizontal position by
Q0 a pin and cable as shown in Figure 6. What is the tension in
Q0 the cable?
Q0

A1 368 N
A2 487 N
A3 294 N
A4 586 N
A5 600 N
Q0
Q0 A simple pendulum of a certain length has a period 2 s. If its
Q0 length is changed to 4 times its original length, what is its
Q0 new period?
Q0
A1 4 s
A2 8 s
A3 2 s
A4 32 s
A5 1 s
Q0
Q0 The simple harmonic oscillations of a simple pendulum are
Q0 described by the angle theta = (pi/10) sin[2*pi*t + (pi/2)] rad,
Q0 where pi = 3.14 and t is in s. Find the maximum speed of the
Q0 point mass at the end of this pendulum.
Q0
A1 0.5 m/s
A2 pi/10 m/s
A3 2*pi m/s
A4 1.2 m/s
A5 pi/2 m/s
Q0
Q0 A spring-mass oscillator has an amplitude 14 cm. Find the
Q0 magnitude of x at which the kinetic energy becomes twice the
Q0 spring potential energy.
Q0
A1 8.1 cm
A2 9.9 cm
A3 14 cm
A4 4.7 cm
A5 0 cm
Q0
Q0 A body undergoing simple harmonic motion has a maximum speed
Q0 of 2.5 m/s and a maximum acceleration of 10*pi m/s**2.

Find the
Q0 period of the motion.
Q0
A1 1/2 s
A2 2 s
A3 1 s
A4 4 s
A5 1/4 s
Q0
Q0 What is the acceleration due to the Earth's gravity at an
Q0 altitude equal to the Earth's radius? For the Earth,
Q0 mass = 5.98*10**24 kg and radius = 6.37*10**6 m.
Q0
A1 2.5 m/s**2
A2 9.8 m/s**2
A3 4.9 m/s**2
A4 19 m/s**2
A5 0 m/s**2
Q0
Q0 A satellite of Mars has a period of 7.65 hours. The mass
of
Q0 Mars is 6.42*10**23 kg. Find the radius of the
satellite's
Q0 orbit.
Q0
A1 9.37*10**6 m
A2 6.11*10**5 m
A3 3.99*10**6 m
A4 5.21*10**6 m
A5 4.33*10**5 m
Q0
Q0 A 1200 kg satellite orbits the Earth at an altitude equal
to
Q0 the Earth's radius R = 6.37*10**6 m. How much energy must
be
Q0 added to the satellite to increase its altitude to 2R?
Q0
A1 6.25*10**9 J
A2 1.87*10**10 J
A3 11.8*10**9 J
A4 3.74*10**10 J
A5 4.26*10**8 J
Q0
Q0 What is the escape speed on a planet whose radius is 500
km,
Q0 if the gravitational acceleration at its surface is 4

m/s**2?
Q0
A1 2.0 km/s
A2 2.8 km/s
A3 6.3 km/s
A4 63 km/s
A5 8.0 km/s
Q0
Q0 A solid sphere of mass 10 kg is floating in oil with half of
Q0 its volume submerged. The density of oil is 750 kg/m**3. The
Q0 buoyant force on the sphere is
Q0
A1 98 N
A2 49 N
A3 75 N
A4 196 N
A5 750 N
Q0
Q0 A submarine is initially moving at a certain depth in the sea.
Q0 Seeing an enemy ship, it dives down to a depth of 1 km. The
Q0 change in pressure on the submarine is 6*10**6 Pa. If the
Q0 density of sea water is 1020 kg/m**3, find the initial depth
Q0 at which the submarine was moving.
Q0
A1 400 m
A2 700 m
A3 900 m
A4 1400 m
A5 0 m
Q0
Q0 A U-tube of uniform cross-section, open at both ends, is filled
Q0 with pure water (density 1000 kg/m**3) and oil as shown in
Q0 Figure 7. Water and oil do not mix. Find the density of oil.
Q0
A1 654 kg/m**3
A2 346 kg/m**3
A3 750 kg/m**3
A4 1000 kg/m**3

A5 500 kg/m**3
Q0
Q0 A horizontal pipe 8 cm in diameter has a smooth reduction to a
Q0 pipe 4 cm in diameter (see Figure 8). If the pressure of the
Q0 water in the larger pipe is 5*10**4 Pa and the pressure in the
Q0 smaller pipe is 3*10**4 Pa, at what rate does water flow
Q0 through the pipes?
Q0
A1 8.19 kg/s
A2 12.8 kg/s
A3 1.92 kg/s
A4 0.75 kg/s
A5 3.04 kg/s
Q0