EXAM 3-952

Q1 One gallon of paint (volume = 3.78*10-3 m^3) covers a wall of area 2*105 cm^2. What is the thickness of the paint on the wall assuming that it is uniform

A: 0.189 m m
B: 0.458 m m
C: 0.326 m m
D. 1.142 m m
E: 1.856 m m

Q2 If vector B is added to vector A, the result is 6i+j. If vector B is subtracted from vector A, the result is -4i+7j. What is the magnitude of vector A ?

A: 4.12
B: 1.81
C: 2.24
D: 3.63
E: 5.40

Q3 A particle moving along the x axis has its position given by x = (24t - 2t3) m, where t is measured in s. How far is the particle from the origin (x=0) when it stops momentarily?

A: 32 m
B: 0 m
C: 52 m
D: 60 m
E: 15 m

Q4 A particle moves along a circular path having a radius of 0.2 m. At an instant when the speed of the particle is equal to 3.0 m/s and is changing at the rate of 5.0 m/s2, what is the magnitude of the total acceleration of the particle?

A: 45.3 m/s2
B: 12.2 m/s2
C. 1.5 m/s2
D. 93.1 m/s2
E. 28.3 m/s2

Q5 A block of mass M = 2.0 kg is pushed up a frictionless 30 incline by a force F = 14 N, parallel to the incline, as shown in the Figure 2**.** What is the magnitude of the resulting acceleration of the block?

A: 2.1 m/s2
B: 3.5 m/s2
C: 1.1 m/s2
D: 5.2 m/s2
E: 9.8 m/s2

Q6 A car goes over a circular hill of 200 m radius at a constant speed of 28 m/s. What is the force of the car seat on the 75 kg driver at the top of the hill?

A: 441 N, up
B: 302 N, up
C: 200 N, down
D: 130 N, down
E: 754 N, up

Q7 A spring (k = 600 N/m) is placed in a vertical position with its lower end supported by a horizontal surface as shown in the Figure 1. The upper end is compressed 20 cm, and a 4.0 kg block is placed on the compressed spring. The system is then released from rest. How far above the point of release will t he block rise?

A: 30.6 cm
B: 41.8 cm
C: 82.1 cm
D: 55.0 cm
E: 72.5 cm

Q8 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: 0.0 N*s

Q9 A 2.0 kg object moving at 5.0 m/s in the positive x direction makes a one dimensional elastic collision with a 2.0 kg object moving at 1.0 m/s in the same direction. Find the ratio of the total initial kinetic energy to the total final kinetic energy?

A: 1.0
B: 0.1
C: 2.1
D: 3.4
E: 0.0

Q10 The turntable of a record player has an angular velocity of 8.0 rad/s when it is turned off. The turntable comes to rest after 2.5 s. Through how many radians does the turntable rotate after being turned off? Assume a constant angular acceleration.

A: 10 rad
B: 8 rad
C: 14 rad
D: 26 rad
E: 34 rad

Q11 A 2-kg particle moves in the xy plane with a constant speed of 3 m/s along the line y = 5 m parallel to the x-axis. What is the magnitude of its angular momentum (in kg*m2/s) relative to the origin?

A: 30
B: 20
C: 10
D: 50
E: 70

Q12 A uniform beam having a mass of 20 kg and a length of 12 m is supported by a pin and a horizontal cable as shown in the Figure 3. What is the magnitude of the force of the pin on the beam?

A: 259 N
B: 152 N
C: 110 N
D: 393 N
E: 520 N

Q13 A 5-kg mass attached to a spring executes a simple harmonic motion with a period of 2.0 s. If the total energy of the system is 10 J, the amplitude of oscillation (in m) is:

A: 0.637
B: 0.365
C: 0.132
D: 1.240
E: 2.113

Q14 A 0.4-kg mass attached to a spring of force constant 40 N/m vibrates with a simple harmonic motion of amplitude 10 cm. Calculate the shortest time that is taken by the mass to move from x = 0 to x = 10 cm.

A: 0.157 s
B: 1.571 s
C: 0.753 s
D: 1.820 s
E: 1.023 s

Q15 A uniform rod of length L = 1 m and mass m = 2 kg is suspended in a vertical position from a pivot a distance d = 0.25 m above its center of mass. The period of small oscillations of this pendulum is (Ic(rod) = (1/12) m*L2)

A: 1.53 s
B: 2.72 s
C: 3.50 s
D: 0.21 s
E: 0.93 s

Q16 Three 4 kg masses are located in the xy plane as shown in the Figure 4. What is the magnitude of the resultant force (caused by the other two masses) on the mass at the origin? (G = 6.67*10-11 N*m2/kg2)

A: 1.5*10-9 N
B. 2.0*10-9 N
C. 3.9*10-9 N
D. 1.2*10-9 N

E.

Q17 A spaceship of mass m circles a planet of mass M in an orbit of radius R. How much energy is required to transfer the spaceship to a circular orbit of radius 3R?

A: GmM / (3R)
B: GmM / (2R)
C: GmM / (4R)
D: GmM
E: GmM/ (6R)

Q18 A swimming pool of dimensions 30.0 m by 10.0 m has a flat horizontal bottom. When the pool is filled to a depth of 2.0 m with fresh water, what is the total force on the bottom surface of this swimming pool?(assume the density of water to be 103 kg/m3 and Pa = 1.01*105 N/m2)

A: 3.6*107 N
B: 1.4*107 N
C: 6.2*106 N
D: 2.1*106 N
E: 3.8*105 N

Q19 Consider an ice cube of 10 cm side and average density of 917 kg/m3. What is the magnitude of the minimum force that one has to exert on its top surface to hold it completely submerged under water? (the density of water 103 kg/m3)

A: 0.813 N
B: 0.216 N
C: 0.124 N
D: 1.280 N
E: 2.804 N

Q20 A 2-cm diameter faucet is observed to fill a 0.1 m3 container in 50 seconds. What is the speed at which the water leaves the faucet?(assume the speed to be constant)

A: 6.37 m/s
B: 2.85 m/s
C: 1.76 m/s
D: 5.09 m/s
E: 3.20 m/s

Q21 If you push a 100 kg box at a constant speed of 2 m/s across a horizontal floor (= 0.5), what is the power delivered to the box?

A: 980 W
B: 120 W
C: 420 W
D: 1300 W
E: 6200 W

Q22 The moon is 384400 km distant from the earth's center (note that this distance is about 60 times the radius of the earth). Find the moon's acceleration due to the gravitational force of the earth (the mass of the earth is 5.98*1024 kg and G = 6.67*10-11 N*m2/kg2).

A: 2.7*10-3 m/s2
B: 9.8 m/s2
C: 1.63 m/s2
D: 9.8*10-3 m/s2
E: 5.4*10-3 m/s2

Q23 Determine the total kinetic energy of a sphere of mass M and radius R rolling without slipping on a horizontal surface and whose center of mass moves with a speed v. (Ic(sphere)=(2/5)*M*R2)

A: (7/10)*M*v2
B: (2/5)*M*v2
C: (1/2)*M*v2
D: (5/7)*M*v2
E: M*v2.

Q24 A mechanic pushes a 2000-kg car from rest to a speed v doing 4000 J of work in the process. Neglecting the work of frictional forces what is the final speed, v, of the car?

A: 2 m/s
B: 8 m/s
C: 6 m/s
D: 5 m/s
E: 3 m/s

Q25 A 1-kg mass attached to a 1-m long light string rotates in a circular motion on a horizontal, frictionless table. Find the work do ne by the tension during one complete revolution.

A: 0.0 J
B: 61.6 J
C: 30.4 J
D: 9.8 J
E: 19.6 J

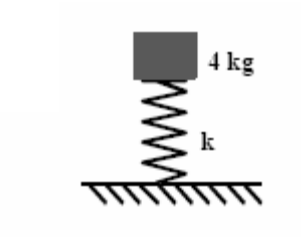

Figure 1

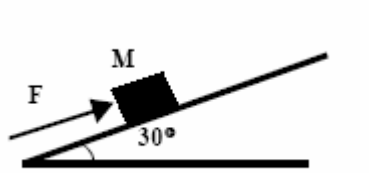

Figure 2

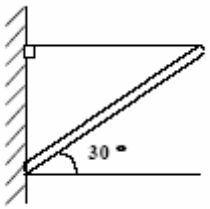

Figure 3

Figure 4