Exam 1-992

Q1 A cube of copper has a mass m = 126 g. Find the number of copper atoms in this cube.
1. Q0 Atomic mass of copper = 63.0 g/mole Avogadro number = 6.02 * 10**23 atoms/mole

A1: 1.20 * 10**24
A2: 6.02 * 10**23
A3: 3.01 * 10**23
A4: 2.80 * 10**24
A5: 5.68 * 10**24

Q2 Pressure, P, is a physical quantity defined as: P = F / A
where F is force, and A is the area of the surface on which F is applied. Find the dimensions of P.

A1: M/(L*T**2)
A2: M*L/T**2
A3: M*T**2/L
A4: M*L/T
A5: L/T**2

Q3 A car starts a trip from Dammam, goes 480 km in a straight line to Riyadh in 4.0 hours. Immediately, the car is turned around, and returns to Dammam in 6.0 hours. Find the average speed of the car for the whole trip.

A1: 96 km/h
A2: 50 km/h
A3: 120 km/h
A4: 0 km/h
A5: 480 km/h

Q4 An object is released from rest at a height H. It takes 2.00 s for the object to fall from point A to point B (see Figure 1). What is the initial height H?

A1: 385 m
A2: 463 m
A3: 260 m
A4: 320 m
A5: 140 m

Q5 Figure 2 represents the straight line motion of a car. What is the distance traveled by the car from t = 0 to t = 5 h? (h stands for hours)

A1: 480 km
A2: 120 km
A3: 0 km
A4: 840 km
A5: 360 km

Q6 Starting from the origin, a boy walks 3.5 m South, then 10 m at 30 degrees North of East,
3. Q0 and finally 10 m West. Find the resultant displacement vector. Take East along the positive x-axis and North along the positive y-axis.

A1: (-1.34 i - 1.5 j) m
A2: (10 i + 2.6 j) m
A3: (8.6 i - 5.1 j) m
A4: (5.1 i + 6.2 j) m
A5: (10 i) m

Q7 Which of the following statements is CORRECT?

A1: The magnitude of a vector cannot be negative.
A2: The magnitude of a particle displacement can be greater than the distance traveled.
A3: It is possible to add a vector quantity to a scalar quantity.
A4: When the result of adding two vectors gives zero, then these vectors have different magnitudes.
A5: An object moved once around a given circle has a non-zero displacement.

Q8 A particle leaves the origin at t=0 with a velocity V0 = (8.0 i) m/s. The constant acceleration of the particle is a = (-2.0 i + 3.0 j) m/s**2. Find the y-coordinate of the particle when it reaches its maximum positive x-coordinate.

A1: 16 m
A2: 14 m
A3: 24 m
A4: 34 m
A5: 10 m

Q9 A stone is thrown horizontally from the top of a building, of height 75 m, with an initial speed of 15 m/s. Find the speed of the stone 2.0 s after it is thrown.

A1: 25 m/s
A2: 10 m/s
A3: 15 m/s
A4: 38 m/s
A5: 0 m/s

Q10 A particle rotates in a horizontal circle of radius 3.5 m. At a given instant, its total acceleration is 2.1 m/s**2 in a direction that makes an angle of 60 deg to the radial direction (see Figure 3). Determine the speed of the particle, v, at this instant.

A1: 1.9 m/s
A2: 2.5 m/s
A3: 4.2 m/s
A4: 9.8 m/s
A5: 7.4 m/s

Q11 Two roads intersect as shown in Figure 4. At this instant, a police car (P) is approaching the intersection along the x-axis at 80 km/h while a truck (T) is moving along the y-axis at 60 km/h. What is the velocity of the police car relative to truck?

A1: (80 i - 60 j) km/h
A2: (80 j) km/h
A3: (60 i + 80 j) km/h
A4: (60 j) km/h
A5: (80 i) km/h

Q12 An ice-boat sails across the surface of a frozen lake with constant acceleration produced by the wind. At a given instant, the velocity of the boat is v = (6.3 i -8.4 j) m/s. Three seconds later, because of change of wind direction, the boat comes instantaneously to rest. Find the average acceleration of the boat during this 3.0 s interval.

A1: (-2.1 i + 2.8 j) m/s**2
A2: (2.1 i - 2.8 j) m/s**2
A3: (2.8 j) m/s**2
A4: (-2.8 j) m/s**2
A5: 0 m/s**2

Q13 A block of mass m = 4.0 kg is pushed up a smooth 30 deg inclined plane, by a constant force of magnitude 40 N and parallel to the incline. Find the magnitude of the acceleration of the block.

A1: 5.1 m/s**2
A2: 9.8 m/s**2
A3: 1.2 m/s**2
A4: 7.3 m/s**2
A5: 0. m/s**2

Q14 In the system shown in Figure 5, a horizontal force (F) acts on M1(=2.0 kg). If the acceleration of the system has a value of a = 3.5 m/s**2, find the value of (F). (Ignore force of friction)

A1: 60.2 N
A2: 12.7 N
A3: 0.0 N
A4: 38.2 N
A5: 9.8 N

Q15 Two blocks of masses M1 = 2.0 kg and M2 = 4.0 kg are in contact with each other and move on a frictionless horizontal surface under the action of a horizontal force F = 60 N (see Figure 6). Find the magnitude of the force that M1 exerts on M2.

A1: 40 N
A2: 10 N
A3: 9.8 N
A4: 0   N
A5: 60 N

Q16 Acceleration is always in the direction:

A1: of the net force.
A2: of the displacement.
A3: of the initial velocity.
A4: of the final velocity.

A5: opposite to the frictional force.

Q17 A ball of mass 100 g is connected to a string that can withstand a maximum tension of 50 N before it breaks. The ball rotates in a circle of radius 20 cm a horizontal frictionless plane. The maximum speed the ball can have before the string breaks is:

A1: 10 m/s
A2: 20 m/s
A3: 15 m/s
A4: 18 m/s
A5: 35 m/s

Q18 A racing car, moving on a horizontal circular track of radius 500 m, accelerates at a uniform rate from 0.0 m/s to a speed of 35 m/s in 11 s. Find the magnitude of the total acceleration of the car when its speed is 30 m/s.

A1: 3.7 m/s**2
A2: 3.2 m/s**2
A3: 1.8 m/s**2
A4: 2.0 m/s**2
A5: 4.4 m/s**2

Q19 A car is traveling at 80 km/h on a horizontal highway. If the coefficient of kinetic friction between the road and tires is 0.1, what is the minimum distance in which the car will stop after applying the brakes?

A1: 252 m
A2: 161 m
A3: 103 m
A4: 415 m
A5: 0 m

Q20 An object is moving in a circle at constant speed. Which of the following statements is CORRECT?

A1: It has an acceleration of constant magnitude.
A2: It must have only one force acting on it.
A3: It is not accelerating.
A4: It must have a constant velocity.
A5: It has an acceleration that is tangent to the circle.

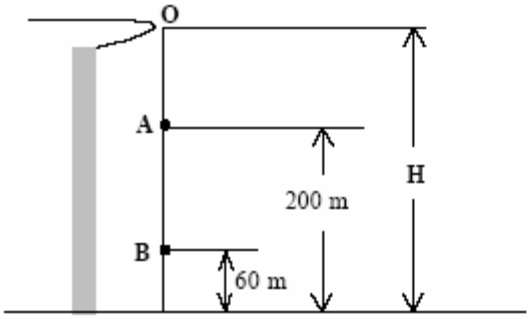

Figure 1

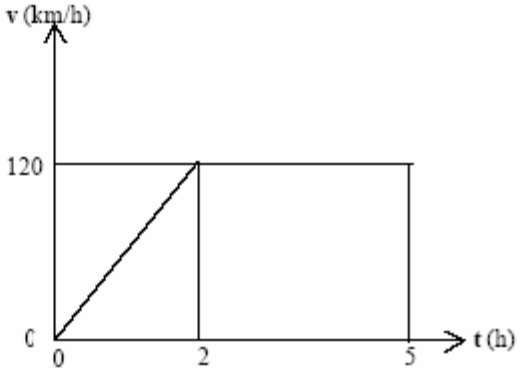

Figure 2

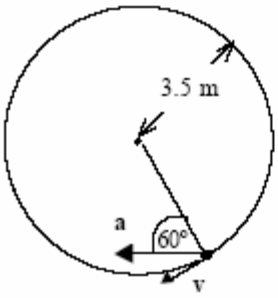

Figure 3

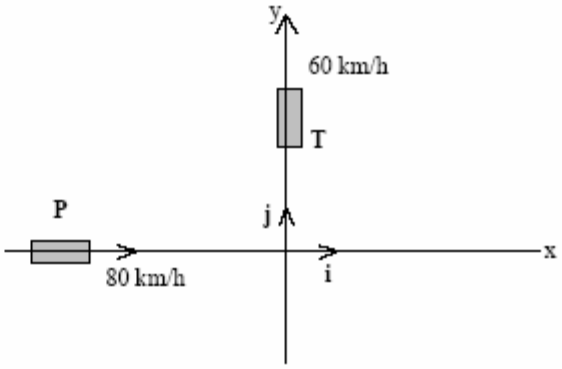

Figure 4

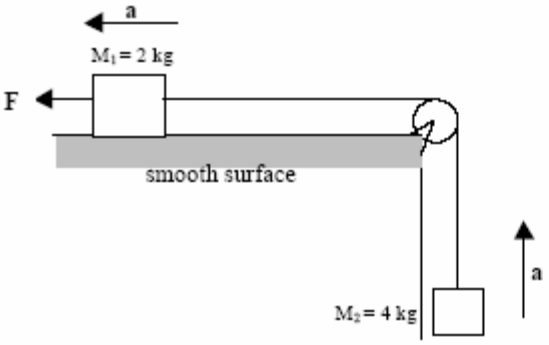

Figure 5

Figure 6