Exam 1-022

Q1 Which of the following is NOT a unit vector?

A1: (1/2) (i + j)
A2: vector a / |a|
A3: j x i
A4: (1/sqrt(3)) (i + j + k)
A5: 0.6 j + 0.8 k

Q2 What is the angle between the two vectors A = (i - 2j + 2k) and B = (-2i +j +2k)?

A1: 90 degrees
A2: 30 degrees
A3: 45 degrees
A4: 60 degrees
A5: 0 degrees

Q3 A student makes the journey from KFUPM to a Super Market and then to Khobar City Center and finally to Exhibition Center. The magnitude and the direction of each of these displacements are indicated in Fig. 1. Give the resultant displacement from KFUPM to the Exhibition Center in unit vector notation.

A1: (6.2 i+5.8 j) km
A2: (-0.5 i+12.1 j) km
A3: (5.2 i+5.8 j) km
A4: (13.2 i+12.1 j) km
A5: (9.1 i+8.7 j) km

Q4 Dimension of an atom is often measured in a unit called Angstrom which is equal to 0.1 nm. 1 mm is equal to: (1 nm = 10**(-9) m)

A1: 10 000 000 Angstrom
A2: 10 000 Angstrom
A3: 100 000 Angstrom
A4: 1 000 000 Angstrom
A5: 20 000 Angstrom

Q5 A student remembers that it takes roughly 8.4 minutes for the sun's light to reach the earth. Using this information and the fact that the speed of light is (3.0 x10**8) m/s, estimate the distance to the sun in km.

A1: 1.50 x 10**8 km
A2: 3.60 x 10**9 km
A3: 1.50 x 10**6 km
A4: 2.50 x 10**7 km
A5: 2.00 x 10**4 km

Q6 A car travels in a straight road with a velocity of v1=15 m/s for half the distance between two cities and with a velocity v2=30 m/s for the other half. What is the average velocity of the car for the entire trip?

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

Q7 An object moving along the x axis has a position given by x = (3 t - t**3) m, where t is measured in s. What is the acceleration of the object when its velocity is zero?

A1: -6.0 m/s**2
A2: Zero
A3: 4.0 m/s**2
A4: -3.5 m/s**2
A5: 3.5 m/s**2

Q8 A particle moving with a constant acceleration has a velocity of 10 cm/s when its position is x0 =10 cm. Its position 4.0 s later is x= -14 cm. What is the acceleration of the particle?

A1: -8.0 cm/s**2
A2: -5.5 cm/s**2
A3: 5.5 cm/s**2
A4: 8.4 cm/s**2
A5: -2.0 cm/s**2

Q9 A stone is thrown vertically upward such that it has a speed of 9.0 m/s when it reaches one half of its maximum height above the launch point. Determine the maximum height.

A1: 8.3 m
A2: 2.8 m
A3: 5.3 m
A4: 6.5 m
A5: 17 m

Q10 At t=0, a particle leaves the origin with a velocity of 9.0 m/s in the positive y direction and moves in the xy plane with a constant acceleration a = (2.0 i-4.0 j) m/s**2. At the instant the x-coordinate of the particle is 16 m, what is the velocity of the particle?

A1: v = (8i - 7j) m/s
A2: v = (8i + 25j) m/s
A3: v = (4i - 7j) m/s
A4: v = (4i + 5j) m/s
A5: v = (4i - 25j) m/s

Q11 A ball is hit at ground level. After 3.0 s the ball is observed to reach its maximum height above the ground level at a horizontal distance of 30 m from where it been hit. What is the initial speed of ball?

A1: 31 m/s
A2: 25 m/s
A3: 35 m/s
A4: 23 m/s
A5: 10 m/s

Q12 A wheel has a 15 m radius and completes five turns about its axis every minute at constant rate. What is the magnitude of the acceleration of a point on the rim of the wheel?

A1: 4.1 m/s**2
A2: 5.7 m/s**2
A3: 14 m/s**2
A4: 19 m/s**2
A5: 1.0 m/s**2

Q13 A wide river has a uniform flow speed of 3.0 m/s toward the east. A boat with a speed of 8.0 m/s relative to the water leaves point (A) and heads in such a way that it crosses to a point (B) (see Fig.2). In what direction relative to east must the boat be pointed?

A1: 112 degrees
A2: 68 degrees
A3: 100 degrees
A4: 80 degrees
A5: 65 degrees

Q14 A 25-kg box is pushed across a rough horizontal floor with a force of 200 N, directed 20 degrees below the horizontal (Fig.3). The coefficient of kinetic friction between the box and the floor is 0.2. The acceleration of the box is:

A1: 5.0 m/s**2
A2: 5.6 m/s**2
A3: 1.8 m/s**2
A4: 7.0 m/s**2
A5: 4.7 m/s**2

Q15 A 700-kg elevator accelerates downward at 3.8 m/s**2. The tension force of the cable on the elevator is:

A1: 4.2 kN, up
A2: 2.1 kN, down
A3: 2.1 kN, up
A4: 4.8 kN, down
A5: 9.0 kN, up

Q16 When a 40-N force, parallel to the incline and directed up the incline, is applied to a crate on a frictionless incline that is 30 degrees above the horizontal, the acceleration of the crate is 2.0 m/s**2, down the incline. The mass of the crate is:

A1: 14 kg
A2: 4.1 kg
A3: 5.8 kg
A4: 10 kg
A5: 6.2 kg

Q17 Three blocks (A,B,C), each having mass M, are connected by strings as shown in Fig.4. Block C is pulled to the right by a force F that causes the entire system to accelerate. Neglecting friction, the tension T1 between blocks B and C is:

A1: 2F/3
A2: zero
A3: F/2
A4: F/3
A5: F

Q18 Block A, with mass m_A, is initially at rest on a frictionless horizontal floor. Block B, with mass m_B, is initially at rest on the top surface of A (Fig.5). The coefficient of static friction between the two blocks is (μ). Block A is pulled with a force such that it begins to slide out from under B when its acceleration reaches:

A1: μ . g
A2: g
A3: m_B . μ . g
A4: (m_A/m_B) . μ . g
A5: (mB/mA) . μ . g

Q19 A box with a weight of 50 N rests on a horizontal surface. A person pulls horizontally on it with a force of F1=10 N and it does not move. To start it moving, a second person pulls vertically upward on the box (Fig. 6) with a force F2. If the coefficient of static friction is 0.4, what is the smallest F2 for which the box moves?

A1: 25 N
A2: 10 N
A3: 14 N
A4: 4 N
A5: 35 N

Q20 The iron ball shown in Fig. 7 is being swung in a vertical circle at the end of a 0.70-m string. What is the speed the ball can have at top of the circle for the tension in the string to be zero at that point?

A1: 2.6 m/s
A2: 1.3 m/s
A3: 3.9 m/s
A4: 6.9 m/s
A5: 9.8 m/s

PHYS101 - FIRST MAJOR EXAM – FIGURES
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FIGURE-1

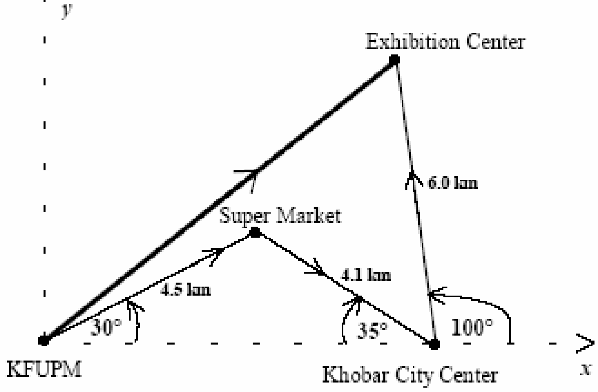

FIGURE-2

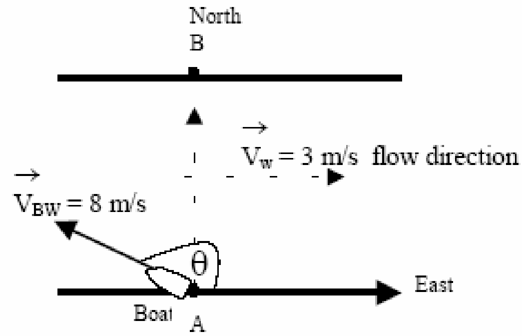

FIGURE-3

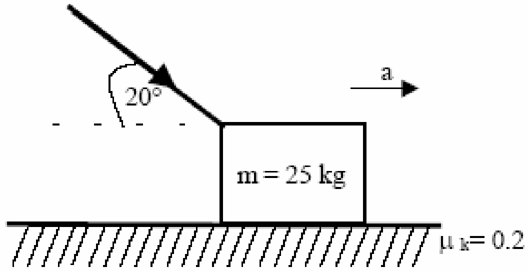

FIGURE-4

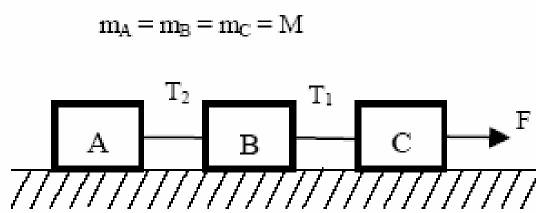

FIGURE-5

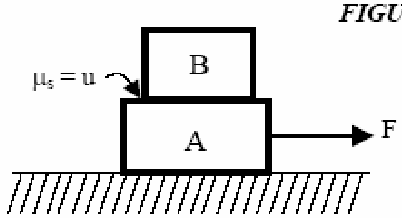

FIGURE-6

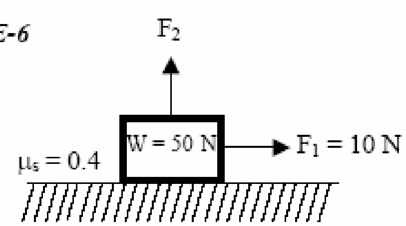

FIGURE-7