Exam 1–002

Q1 A car travels at 40.0 km/h for 2.00 h , then at 50.0 km/h for 1.00 h, and finally at 20.0 km/h for 0.500 h. What is the average speed of the car?

A1: 40.0 km/h
A2: 36.7 km/h
A3: 55.0 km/h
A4: 45.0 km/h
A5: 31.6 km/h

Q2 Which of the following statements is CORRECT?

A1: The magnitude of a vector cannot be negative.

A2: The magnitude of the displacement of a particle 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 A5 a non-zero displacement.

Q3 A stone is thrown horizontally from the top of a building, of height H, with an initial speed of v_0 = 15 m/s. Find the speed (v) of the stone 2.0 s after it is thrown (see Fig. 5).

A1: 25 m/s
A2: 20 m/s
A3: 15 m/s
A4: 38 m/s
A5: 0 m/s

Q4 A 2.0 kg block slides down a frictionless 15 degrees inclined plane. A force, F, acting parallel to the incline is applied to the block (see Fig. 1). The acceleration of the block is 1.5 m/s**2 down the incline. What is the magnitude of F?

A1: 2.1 N
A2: 8.1 N
A3: 3.0 N
A4: 1.0 N
A5: 16 N

Q5 A certain brand of house paint claims a coverage of 500 ft**2/gal (1 ft = 30.48 cm ; 1 gal = 3.78 liter). Express this quantity in m**2/liter.

A1: 12.3
A2: 5.60
A3: 7.43
A4: 3.54
A5: 18.1

Q6 If the position of a particle is given by: x = 10*t - t**3 where t is in seconds and x in meters. Find the average velocity between t = 1 and t = 3 s.

A1: -3.0 m/s
A2: 6.0 m/s
A3: -4.0 m/s
A4: -2.5 m/s
A5: 10   m/s

Q7 A jet-plane must reach a speed of 500 km / h on the runway for take off. Starting from rest, what is the least constant acceleration needed for take off from a 3.0 km runway?

A1: 4.17 x 10**4 km/h**2
A2: 1.60x 10**2 km/h**2
A3: 9.81 km/h**2
A4: 0 km/h**2
A5: 7.82x 10**4 km/h**2

Q8 A boy throws a stone vertically downward with an initial speed of 10.0 m/s from the top of a 30.0 m high building. What is the speed of the stone when it hits the ground?

A1: 26.2 m/s
A2: 9.81 m/s
A3: 4.90 m/s
A4: 31.5 m/s
A5: 0 m/s

Q9 The angle between vector B = 4.0 j + 3.0 k, and the positive y axis is approximately:

A1: 37 degrees
A2: 68 degrees
A3: 53 degrees
A4: 90 degrees
A5: 0 degree

Q10 Fig. 2 shows vectors A and B which have the same magnitudes.
Let C = A - B and let the x and y components of C be Cx and Cy, respectively. What are the signs of Cx and Cy?

A1: Cx is negative and Cy is positive
A2: Cx is positive and Cy is positive
A3: Cx is negative and Cy is negative
A4: Cx is positive and Cy is negative
A5: Cx is zero and Cy is zero

Q11 A car is moving with a speed of 18.0 m/s due north at one moment and 35.2 m/s due east 8.00 s later. Over this time interval, determine the average acceleration of the car.

A1: 4.94 m/s**2 making an angle 27 degrees S of E
A2: 4.94 m/s**2 making an angle 27 degrees N of E
A3: 6.65 m/s**2 making an angle 27 degrees S of E
A4: 6.65 m/s**2 making an angle 27 degrees N of E
A5: 2.15 m/s**2 making an angle 63 degrees N of E

Q12 Find the magnitude of the centripetal acceleration of a particle on the tip of a fan blade, 0.150 m in radius, rotating at 1200 revolutions every minute.

A1: 2370 m/s**2
A2: 9810 m/s**2
A3: 4750 m/s**2
A4: 6550 m/s**2
A5: 1110 m/s**2

Q13 A boat can travel with a velocity of 1.70 m/s in still water (that is Vbw = 1.70 m/s). The boat heads (points) across a river where the current is 0.75 m/s (that is Vwg = 0.75 m/s). What is the speed of the boat relative to the ground?

A1: 1.86 m/s
A2: 0.75 m/s
A3: 9.81 m/s
A4: 4.90 m/s
A5: 1.70 m/s

Q14 Fig. (3) shows a circular path taken by a particle. The particle is traveling clockwise around the circle. At one instant, the velocity of the particle is v = - 3*i + 3*j m/s, where i and j are unit vectors along the x and y axes, respectively. In which quadrant is the particle traveling at this instant?

A1: Quadrant (3)
A2: Quadrant (2)
A3: Quadrant (1)
A4: Quadrant (4)
A5: none of the other answers

Q15 A 500 N man is riding in an elevator. At a certain instant his feet push against the floor with a force of more than 500 N. At this instant, the elevator may be:

A1: accelerating upward.
A2: accelerating downward
A3: moving downward at constant speed.
A4: not moving.
A5: moving upward at constant speed.

Q16 Two men pull in opposite directions on the two ends of a light rope. Each man pulls with a force 100 N. Find the tension in the rope.

A1: 100 N
A2: 50 N
A3: 200 N
A4: 150 N
A5: 141 N

Q17 Two masses m1 = 10 kg, m2 = 5 kg are attached by a light string that passes over a frictionless pulley of negligible mass (Fig. 4). The mass m1 lies on a horizontal frictionless surface and is acted on by a force F = 10 N. The mass m2 is:

A1: Falling with an acceleration of 2.7 m/s**2.
A2: Rising with an acceleration of 2.7 m/s**2.
A3: Falling with constant speed of 5.0 m/s.
A4: Staying stationary
A5: Falling with an acceleration of 9.8 m/s**2.

Q18 A certain force when applied to mass m1 gives an acceleration of 12.0 m/s**2 and when applied to mass m2 gives an acceleration of 3.30 m/s**2. What acceleration would the same force give when applied to an object of mass = (m1 + m2)?

A1: 2.59 m/s**2
A2: 6.00 m/s**2
A3: 7.65 m/s**2
A4: 8.70 m/s**2
A5: 15.3 m/s**2

Q19 A 5.0-kg block is pulled on a horizontal floor with a force of 20 N that makes an angle 30 degrees with the horizontal (see Fig. 6). If the block is pulled at a constant velocity, what is the coefficient of kinetic friction between the block and the floor?

A1: 0.44
A2: 0.31
A3: 0.12
A4: 0.53
A5: 0.80

Q20 One end of a 1.0-m string is fixed, the other end is attached to a 2.0-kg stone. The stone swings in a vertical circle, and has a speed of 4.0 m/s at the top of the circle. The tension in the string at this point is approximately:

A1: 12 N
A2: 0 N
A3: 20 N
A4: 32 N
A5: 9.8 N