

Exam 1 -012

Q1 Speed of sound is 340 m/s. Express this in millimeters per nanosecond[1 ns = $10^{**(-9)}$ s].

- A1: $3.40 \times 10^{**(-4)}$ mm/ns
- A2: $3.40 \times 10^{**(-6)}$ mm/ns
- A3: $3.40 \times 10^{**(-3)}$ mm/ns
- A4: $3.40 \times 10^{**(+3)}$ mm/ns
- A5: $3.40 \times 10^{**(+6)}$ mm/ns

Q2 The position of an object moving along an X-axis is given by:
 $x = 3 + 12t - t^{**3}$, where x is in meters and t is in seconds. At what time is the particle momentarily at rest?

- A1: 2 s
- A2: 4 s
- A3: 3 s
- A4: 1 s
- A5: 0 s

Q3 A rock is dropped ($V_0 = 0$) from a 100-m high cliff. It takes the rock 3.2 s to fall the first 50 m. How long does it take to fall the second 50 m?

- A1: 1.3 s
- A2: 1.6 s
- A3: 4.8 s
- A4: 3.2 s
- A5: 0.0 s

Q4 The position-time graph for an object is a straight line with a positive slope. The object has:

- A1: a constant velocity
- A2: a decreasing acceleration
- A3: an increasing velocity
- A4: an increasing acceleration
- A5: a decreasing velocity

Q5 A balloon is going up with a speed of 10 m/s and is 100 m above the ground when a package is dropped from the balloon. How long does the package take to reach the ground?

- A1: 5.7 s
- A2: 4.0 s
- A3: 3.7 s
- A4: 2.0 s
- A5: 6.0 s

Q6 The two vectors A and B shown in Fig. 1 have equal magnitudes of 10.0 m. Find the magnitude of the resultant, R, of these vectors and the angle theta it makes with the positive x-axis.

- A1: R = 14.1 m, THETA = 75 degrees
- A2: R = 10.0 m, THETA = 90 degrees
- A3: R = 12.0 m, THETA = 60 degrees
- A4: R = 16.0 m, THETA = 30 degrees
- A5: R = 20.0 m, THETA = 45 degrees

Q7 A vector in the xy-plane has a magnitude of 25.0 and an x-component of 12.0. The angle that it makes with the positive x-axis is:

- A1: 61.3 degrees
- A2: 25.6 degrees
- A3: 28.7 degrees
- A4: 64.3 degrees
- A5: 95.3 degrees

Q8 The unit vectors in the positive directions of the x, y, and z axes are labeled i , j , and k . The value of $[i \cdot (j \times k)]$ is:

- A1: +1
- A2: -1
- A3: 0
- A4: - i
- A5: + j

Q9 Car A is moving with a speed of 30 km/h along the positive x-axis and car B is moving with a speed of 40 km/h along the positive y-axis. What is the velocity of car B with respect to car A?

- A1: $(-30i + 40j)$ km/h
- A2: $(30i + 40j)$ km/h
- A3: $(-30i - 40j)$ km/h
- A4: $(40i + 30j)$ km/h
- A5: $(40i - 30j)$ km/h

Q10 A ball leaves the ground with a speed of 50 m/s at an angle of 60 degrees with the horizontal. Find its speed at its highest point.

- A1: 25 m/s
- A2: 50 m/s
- A3: 0.0 m/s
- A4: 43 m/s
- A5: 10 m/s

Q11 A stone is thrown from the ground into the air with an initial velocity $V = (5.0i + 9.0j)$ m/s. To what maximum height will the stone rise?

- A1: 4.1 m
- A2: 1.3 m
- A3: 9.0 m
- A4: 5.0 m
- A5: 7.0 m

Q12 The airplane shown in Fig. 2 is in level flight at an altitude of 500 m and a speed of 41.7 m/s. At what distance d should it release a bomb to hit the target q_0 at point A?

- A1: 421 m
- A2: 150 m
- A3: 300 m
- A4: 590 m
- A5: 832 m

Q13 A constant force, F , acts on a 19-kg particle. The particle, initially at rest, moves a distance of 22 m in 3.8 s. Find the magnitude of the force F .

- A1: 58 N
- A2: 86 N
- A3: 50 N
- A4: 41 N
- A5: 12 N

Q14 In Fig. 3, $m_1 = 22$ kg and $m_2 = 37$ kg. The masses are connected by a light, horizontal cord and are being pulled across a smooth level surface by a horizontal force $F = 46$ N. Find the tension in the cord.

- A1: 17 N
- A2: 29 N
- A3: 46 N
- A4: 31 N
- A5: 63 N

Q15 Three books (X, Y, and Z) rest on a table as shown in Fig. 4. The weight of each book is also indicated in the Figure. The magnitude of the force of book Z on book Y is:

- A1: 9.0 N
- A2: 4.0 N
- A3: 5.0 N
- A4: 14 N
- A5: 19 N

Q16 Two blocks weighing 25 kg and 35 kg respectively, are connected by a string that passes over a mass less pulley as shown in Fig. 5. The tension in the string is:

- A1: 286 N
- A2: 210 N
- A3: 500 N
- A4: 350 N
- A5: 250 N

Q17 A 90-kg man stands in an elevator that is moving up at a constant speed of 5.0 m/s. The magnitude of the force exerted by him on the floor is:

- A1: 882 N
- A2: 0 N
- A3: 94 N
- A4: 450 N
- A5: 49 N

Q18 A 3.5-kg block is pulled at constant velocity along a horizontal floor by a force $F = 15$ N that makes an angle of 40 degrees with the horizontal (Fig.6). Find the magnitude of the force of friction between the block and the floor:

- A1: 11 N
- A2: 15 N
- A3: 34 N
- A4: 0.0 N
- A5: 26 N

Q19 Find the minimum coefficient of static friction between the tires of a car and a level road if the car is to make a circular turn of radius 90 m at a speed of 60 km/h.

- A1: 0.315
- A2: 0.521
- A3: 0.423
- A4: 0.214
- A5: 0.125

Q20 One end of a 1.0-m string is fixed, the other end is attached to a 1.0-kg stone. The stone swings in a vertical circle, and has a speed of 5.0 m/s at the top of the circle. The tension in the string at this point is approximately:

- A1: 15 N
- A2: 11 N
- A3: 28 N
- A4: 31 N
- A5: 10 N