Q1.
Iron has a density of 7.87 g/cm^3. What is the mass of an iron block having a volume of 2 in^3 ? (1 in = 2.54 cm)

A) 0.26 kg
B) 0.33 kg
C) 0.55 kg
D) 0.76 kg
E) 0.13 kg

Q2.
The speed of sound v in a fluid depends upon the fluid density ρ and its bulk modulus B as follows: $v = \rho^n B^m$. Using dimensional analysis, find the values of constants n and m, respectively. The unit of density ρ is kg/m^3 and that of bulk modulus B is kg / (m.s^2)

A) -1/2, +1/2
B) -1/2, -1/2
C) +1/2, -1/2
D) +1/2, +1/2
E) - 1, + 1

Q3.
Two cars A and B travel on a straight line. The displacement of car A is given by $x_A(t) = 2.60\,t + 1.20\,t^2$, where t is in seconds and x_A in m. The displacement of car B is given by $x_B(t) = 2.80\,t^2 - 0.20\,t^3$. At what time the two cars will have the same acceleration?

A) 2.67 s
B) 6.27 s
C) 7.26 s
D) 9.36 s
E) 0.67 s

Q4.
A ball is thrown from ground straight upward with a velocity of 26 m/s. How long does it take the ball to strike the ground?

A) 5.3 s
B) 2.7 s
C) 1.6 s
D) 0.8 s
E) 7.5 s

Q5.
Two automobiles, 150 kilometers apart, are traveling toward each other. One automobile is moving at 60km/h and the other is moving at 40 km/h. In how many hours will they meet?

A) 1.5
B) 2.0
C) 1.0
D) 2.5
E) 3.0

Q6.
The graph shown in Fig.1 represents the straight-line motion of a car.
Find its acceleration at t = 6 s.

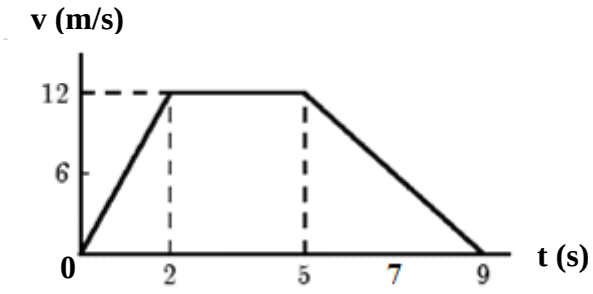


Fig. 1

A) –3.00 m/s^2
B) +5.00 m/s^2
C) +3.00 m/s^2
D) –5.00 m/s^2
E) +1.0 m/s^2

Q7.
Vector **A** has a magnitude of 40.0 cm and is directed 60.0 degrees above the negative x-axis. Vector **B** has magnitude of 20.0 cm and is directed along the positive x-axis. Find the resultant vector (**i** and **j** are unit vectors along positive x and y axes, respectively).

A) 34.6 **j** cm
B) 34.6 **i** cm
C) 20.0 **i** cm
D) 20.0 **j** cm
E) (20.0 **i** + 34.6 **j**) cm

Q8.
Consider two vectors **A** = (3 **i** + 4 **j**) cm and **B** = (- 4 **i** + 3 **j**) cm. Find the angle between these two vectors.

A) 90 degrees
B) 45 degrees
C) 120 degrees
D) 0 degrees
E) 25 degrees

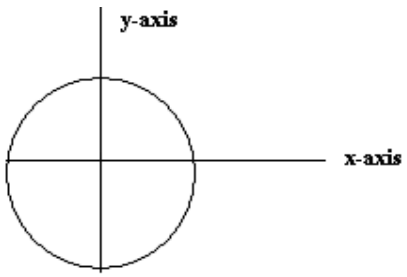
Q9.
If vector **A** is added to vector **B**, the result is (6 **i** + 1**j**) m. If **A** is subtracted from **B**, the result is (- 4 **i** + 7 **j**) m. Find the magnitude of **B**.

A) 4 m.
B) 8 m.
C) 2 m.
D) 1 m.
E) 9 m.

Q10.
The airport terminal in Dammam has a 100 m "moving sidewalk" that moves at a constant speed of 1.00 m/s. A boy boards the moving sidewalk and walks on it with a speed of 2.00 m/s to make a round trip. How long does it take this boy to make the round trip on the moving sidewalk?

A) 133 s
B) 331 s
C) 200 s
D) 419 s
E) 255 s

Q11.
Fig. 2 shows a circular path taken by a particle. If the instantaneous velocity of the particle is **v** = - (4.0 m/s) **i** + (4.0 m/s) **j,** through which quadrant is the particle moving at that instant if it is traveling counterclockwise?



A) First quadrant
B) Third quadrant.
C) Second quadrant
D) Fourth quadrant
E) None of the quadrants

Q12.
A particle leaves the origin with an initial velocity **v** = (3.00 **i**+ 4.00 **j**) m/s and has a constant acceleration **a** = (-1.00 **i** - 0.400 **j**) m/s^2. What is its position vector when it reaches its maximum x coordinate?

A) (4.50 **i** + 10.2 **j**) m
B) (4.50 **i**) m
C) (10.2 **j**) m
D) (4.50 **i** - 10.2 **j**) m
E) (10.2 **i** + 4.50 **j**) m

Q13.
A plane, diving with constant speed at an angle of 37.0 degrees with the vertical, releases a package at a height of 950 m. The package hits the ground 6.00 s after release. Find the speed of the plane.

A) 161 m/s
B) 200 m/s
C) 103 m/s
D) 302 m/s
E) 98.0 m/s

Q14.
A meter stick is rotating about one end and completes 500 revolutions every minute. Find the speed and acceleration of its tip (the other end).

A) 52.4 m/s; 2.74 x 10^3 m/s^2
B) 25.4 m/s; 27.4 x 10^1 m/s^2
C) 5.24 m/s; 15.5 x 10^3 m/s^2
D) 10.0 m/s; 7.34 x 10^3 m/s^2
E) 1.50 m/s; 5.50 x 10^3 m/s^2

Q15.

You stand on a spring scale on the floor of an elevator. The scale shows the highest reading when the elevator:

A) moves downward with decreasing speed
B) moves downward with increasing speed
C) remains stationary
D) moves upward with decreasing speed
E) moves upward at constant speed

Q16.
A 70 N block A and a 35 N block B are connected by a string, as shown in Fig 3. If the pulley is massless and the surface is frictionless, the magnitude of the acceleration of the 35 N block is:

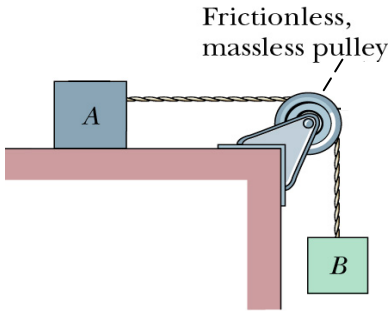


Fig. 3

A) 3.3 m/s^2
B) 1.5 m/s^2
C) 4.9 m/s^2
D) 6.7 m/s^2
E) 9.8 m/s^2

Q17.
When a 25.0 kg crate is pushed across a frictionless horizontal floor with a force of 200 N, directed 20° below the horizontal, the magnitude of the normal force of the floor on the crate is:

A) 313 N
B) 680 N
C) 180 N
D) 250 N
E) 210 N

Q18.

A 5 kg block is placed on top of a 10 kg block which is lying on a frictionless horizontal surface, as shown in Fig. 4. A horizontal force F of 60 N is applied to the 10 kg block. Find the static frictional force on 5 kg block from the 10 kg block such that the 5 kg block does not slip.

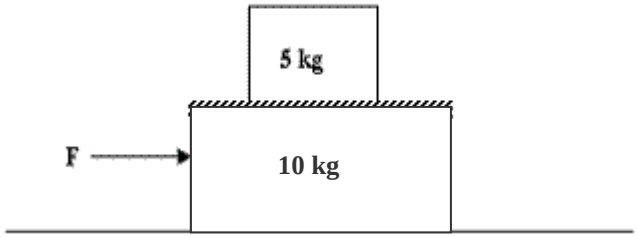


Fig. 4

A) 20 N to the right
B) 20 N to the left
C) 16 N to the right
D) 16 to the left
E) 0 N

Q19.
A crate is sliding down an incline that is 35° above the horizontal. If the coefficient of kinetic friction is 0.4, the acceleration of the crate is:

A) 2.4 m/s^2
B) 0.0 m/s^2
C) 5.8 m/s^2
D) 8.8 m/s^2
E) 9.3 m/s^2

Q20.
An automobile moves on a level horizontal road in a circle of radius 30 m. The coefficient of static friction between tires and road is 0.5 . The maximum speed with which this car can travel round this curve without sliding is:

A) 12 m/s
B) 4.9 m/s
C) 9.8 m/s
D) 3.0 m/s
E) 15 m/s
