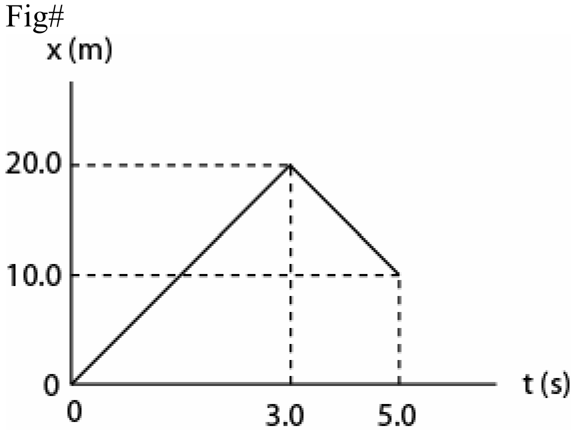
Q1.
A swimming pool is filled with 16,500 ft^3 of water. What is the volume of water in m^3? (12 inch = 1 ft and 2.54 cm = 1 inch).

A) 467 m^3
B) 541 m^3
C) 115 m^3
D) 1010 m^3
E) 45.1 m^3

Q2.
The position x of a particle is given by $x = B\,t^2 + \frac{C}{B}t$, where x is in meters and t is in seconds. The dimension of C is:

A) $\frac{L^2}{T^3}$
B) $\frac{L}{T}$
C) L
D) T
E) $\frac{L}{T^2}$

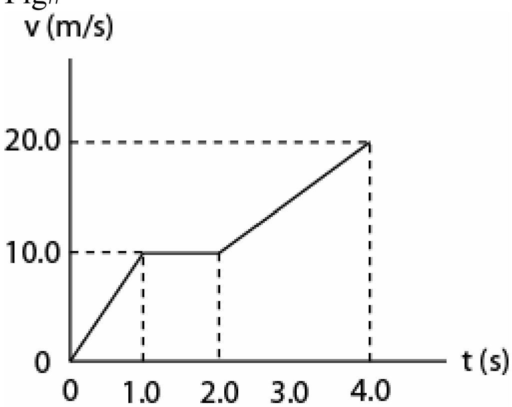
Q3.
Fig 1 shows the position-time graph of an object. What is the average velocity of the object between t=0.0 s and t= 5.0 s?

Fig#


A) 2.0 m/s
B) 1.0 m/s
C) 3.0 m/s

D) 4.0 m/s
E) none of the other answers

Q4.
Fig 2 shows a velocity-time graph of a runner. If the runner starts from the origin, find his position at t = 4.0 s.

Fig#


A) 45 m
B) 25 m
C) 35 m
D) 55 m
E) 65 m

Q5.
An object is thrown vertically upward with an initial speed of 25 m/s from the ground. What is the height of the object 1.0 s before it touches ground?

A) 20 m
B) 9.5 m
C) 11 m
D) 12 m
E) 8.8 m

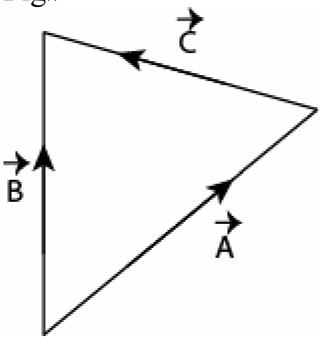
Q6.
A car starts from rest and accelerates at a rate of 2.0 m/s^2 in a straight line until it reaches a speed of 20 m/s. The car then slows down at a constant rate of 1.0 m/s^2 until it stops. How much time elapses (total time) from start to stop?

A) 30 s
B) 20 s
C) 10 s
D) 40 s

E) 50 s

Q7.
In Fig. 3, the unknown vector $\vec{C}$ is given by:

Fig#



A) $\vec{B} - \vec{A}$
B) $\vec{A} - \vec{B}$
C) $\vec{B} + \vec{A}$
D) $\vec{B} \times \vec{A}$
E) $\vec{B} - \frac{1}{2}\vec{A}$

Q8.
Two vectors are given by: $\vec{P} = -1.5\hat{i} + 2.0\hat{j}$, $\vec{Q} = 1.0\hat{j}$. The angle that the vector $2\vec{P} - \vec{Q}$ makes with the **positive** *x*-axis is:

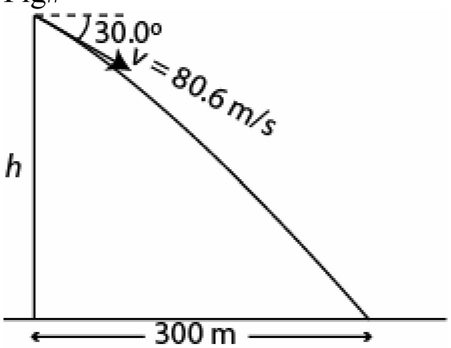
A) 135°
B) 45°
C) 225°
D) -45°
E) 270°

Q9.
A man walks 5.0 km due North, then 13 km 22.6° South of East, and then 12 km due West. The man is finally at:

A) where he started.
B) 2.6 km due East
C) 2.6 km due West
D) 9.9 km south of West
E) 9.9 km south of East

Q10.
A certain airplane has a speed of 80.6 m/s and is diving at an angle of 30.0° below the horizontal when it releases an object. The horizontal distance from the point of release was 300. m as shown in Fig.4. How high was the point of release of the object?

Fig#



A) 264 m
B) 460 m
C) 580 m
D) 625 m
E) 670 m

Q11.
An object is moving on a circular path of radius π meters at a constant speed of 4.0 m/s. The time required for one revolution is:

A) $(\pi^2/2)$ s
B) $(2/\pi^2)$ s
C) $(\pi/2)$ s
D) $(\pi^2/4)$ s
E) $(2/\pi)$ s

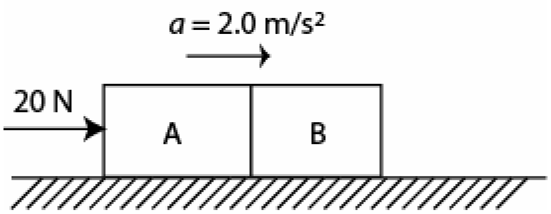
Q12.
Ship *A* travels 40 km/h in a direction of 30° West of North and ship *B* travels 60° East of North at 30 km/h. What is the magnitude of the velocity of ship *A* relative to ship *B*?

A) 50 km/h
B) 60 km/h
C) 70 km/h
D) 10 km/h
E) 20 km/h

Q13.

A constant force *F* of magnitude 20 N is applied to block *A* of mass *m* = 4.0 kg, which pushes block *B* as shown in Fig. 5. The block slides over a frictionless flat surface with an acceleration of 2.0 m/s^2. What is the net force on block *B*?

Fig#



A) 12 N
B) 20 N
C) 8.0 N
D) 28 N
E) 32 N

Q14.
Only two forces act upon a 5.0 kg box. One of the forces is $\vec{F}_1 = (6.0\hat{i} + 8.0\hat{j})\,\text{N}$. If the box moves at a constant velocity of $(1.6\hat{i} + 1.2\hat{j})\,\text{m/s}$, what is the magnitude of the second force?

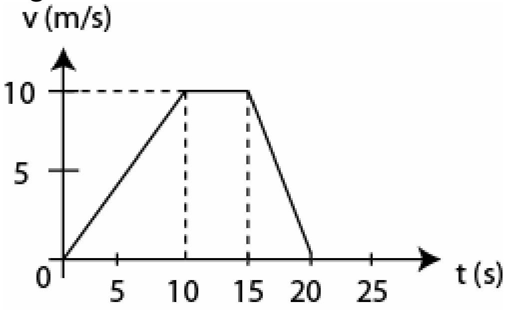
A) 10. N
B) 0.0 N
C) 2.0 N
D) 50. N
E) 60.N

Q15.
An elevator of mass 480 kg is designed to carry a maximum load of 3000 N. What is the tension in the elevator cable at maximum load when the elevator moves down accelerating at 9.8 m/s^2?

A) 0
B) 4800 N
C) 9600 N
D) 2400 N
E) 1200 N

Q16.
A car of mass 1000 kg is initially at rest. It moves along a straight road for 20 s and then comes to rest again. The velocity – time graph for the movement is given in Fig.6. The magnitude of the net force that acts on the car while it is slowing down to stop from t = 15 s to t = 20 s is:

Fig#



A) 2000 N
B) 4000 N
C) 0
D) 1000 N
E) 5000 N

Q17.
A 5.0 kg block is moving with constant velocity down a rough incline plane. The coefficients of static and kinetic friction between the block and the incline are 0.25 and 0.20, respectively. What is the inclination angle of the incline plane?

A) 11°
B) 14°
C) 45°
D) 30°
E) 5.0°

Q18.
A car rounds a flat curved road (radius = 92 m) at a speed of 26 m/s and is on the verge of sliding at this speed. What is the coefficient of static friction between the tires of the car and the road?

A) 0.75
B) 0.25
C) 0.15
D) 0.80
E) 0.10

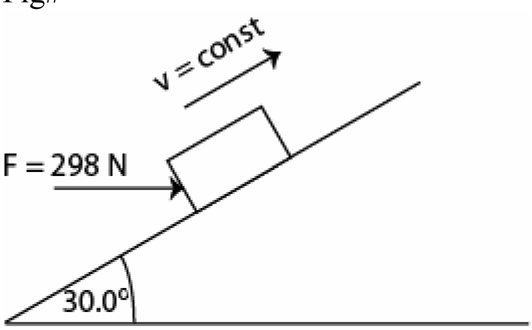
Q19.
A box of mass 40.0 kg is pushed across a rough flat floor at the constant speed of 1.50 m/s. When the force is removed, the box slides a further distance of 1.20 m before coming to rest. Calculate the friction force acting on the box when it slides.

A) 37.5 N
B) 60.0 N

C) 0
D) 18.0 N
E) 67.5 N

Q20.
A 10.0 kg box is pushed up an incline (θ = 30.0°) by a horizontal force of 298 N. The box then moves at a constant velocity as shown in Fig. 7. What is the frictional force on the box?

Fig#



A) 209 N
B) 149 N
C) 49.0 N
D) 0.00 N
E) 258 N