PHYSICS

BOOKS - UNIVERSAL BOOK DEPOT 1960

PHYSICS (HINGLISH)

VECTORS

Exercise

1. The vector projection of a vector $3\hat{i} + 4\hat{k}$ on y-axis is

A. 5

B. 4

C. 3

D. Zero

Answer: D

Watch Video Solution

2. Position of a particle in a rectangular -co-ordinate $(3, 2, 5)$. Then its position vector will be

A. $3\hat{i} + 5\hat{j} + 2\hat{k}$

B. $3\hat{i} + 2\hat{j} + 5\hat{k}$

C. $5\hat{i} + 3\hat{j} + 2\hat{k}$

D. None of these

Answer: B

Watch Video Solution

3. If a particle moves from point $P(2, 3, 5)$ to point $Q(3, 4, 5)$. Its displacement vector be

A. $\hat{i} + \hat{j} + 10\hat{k}$

B. $\hat{i} + \hat{j} + 5\hat{k}$

C. $\hat{i} + \hat{j}$

D. $2\hat{i} + 4\hat{j} + 6\hat{k}$

Answer: C

Watch Video Solution

4. A force of $5N$ acts on a particle along a direction making an angle of 60° with verticle. Its verticel components is

A. $10N$

B. $3N$

C. $4N$

D. $2.5N$

Answer: D

Watch Video Solution

5. If $\vec{A} = 3\hat{i} + 4\hat{j}$ and $\vec{B} = 7\hat{i} + 24\hat{j}$, find a vector having the same magnitude as $\vec{B}$ and parallel and same direction as $\vec{A}$.

A. $5\hat{i} + 20\hat{j}$

B. $15\hat{i} + 10\hat{j}$

C. $20\hat{i} + 15\hat{j}$

D. $15\hat{i} + 20\hat{j}$

Answer: D

Watch Video Solution

6. Vector $\vec{A}$ makes equal angles with x-,y-,and z-axis. Find the value of its components (in terms of magnitude of $\vec{A}$)

A. $\frac{A}{\sqrt{3}}$

B. $\frac{A}{\sqrt{2}}$

C. $\sqrt{3}A$

D. $\frac{\sqrt{3}}{A}$

Answer: A

Watch Video Solution

7. A $\vec{A} = 2\hat{i} + 4\hat{j} - 5\hat{k}$ the direction of cosines of vector $\vec{A}$ are

A. $\frac{2}{\sqrt{145}}, \frac{4}{\sqrt{45}}$ and $\frac{-5}{\sqrt{45}}$

B. $\frac{1}{\sqrt{45}}, \frac{2}{\sqrt{45}}$ and $\frac{3}{\sqrt{45}}$

C. $\frac{4}{\sqrt{45}}, 0$ and $\frac{4}{\sqrt{45}}$

D. $\frac{2}{\sqrt{45}}, \frac{2}{\sqrt{45}}$ and $\frac{5}{\sqrt{45}}$

Answer: A

Watch Video Solution

8. The vector that must be added to the vector $\hat{i} - 3\hat{j} + 2\hat{k}$ and $3\hat{i} + 6\hat{j} + 7\hat{k}$ so that the

resultant vector is a unit vector along the y-axis is

A. $4\hat{i} + 2\hat{j} + 5\hat{k}$

B. $-4\hat{i} - 2\hat{j} + 5\hat{k}$

C. $3\hat{i} + 4\hat{j} + 5\hat{k}$

D. Null vector

Answer: B

Watch Video Solution

9. How many minimum number of coplanar vector having different magnitudes can be added to give zero resultant?

A. 2

B. 3

C. 4

D. 5

Answer: B

Watch Video Solution

10. A hall has the dimensions $10m \times 12m \times 14m$. A fly starting at one corner ends up at a diagonally opposite corner. What is the magnitude of its displacement

A. $17m$

B. $26m$

C. $36,$

D. $20m$

Answer: D

Watch Video Solution

11. 100 coplanar forces each equal to 10 N act on a body. Each force makes angle $\frac{\pi}{50}$ with the preceding force. What is the resultant of the forces

A. $1000N$

B. $500N$

C. $250N$

D. zero

Answer: D

Watch Video Solution

12. The magnitude of a given vector with end points $(4, -4, 0)$ and $(-2, -2, 0)$ must be

A. 6

B. $5\sqrt{2}$

C. 4

D. $2\sqrt{10}$

Answer: D

Watch Video Solution

13. The expression $\left(\frac{1}{\sqrt{2}}\hat{i}+\frac{1}{\sqrt{2}}\hat{j}\right)$ is a

A. Unit vector

B. Null vector

C. Vector of magnitude $\sqrt{2}$

D. Scalar

Answer: A

Watch Video Solution

14. The angle made by the vector $\overrightarrow{A} = 2\hat{i} + 3\hat{j}$ with Y-axis is

A. $\tan^{-1} 3/2$

B. $\tan^{-1} 2/3$

C. $\sin^{-1} 2/3$

D. $\cos^{-1} 2/3$

Answer: B

Watch Video Solution

15. The unit vector along $\hat{i} + \hat{j}$ is

A. $\hat{k}$

B. $\hat{i} + \hat{j}$

C. $\frac{\hat{i} + \hat{j}}{\sqrt{2}}$

D. $\frac{\hat{i} + \hat{j}}{2}$

Answer: C

Watch Video Solution

16. A vector is represented by $3\hat{i} + 2\hat{j} + 2\hat{k}$. Its length in XY plane is

A. 2

B. $\sqrt{13}$

C. $\sqrt{10}$

D. $\sqrt{5}$

Answer: B

Watch Video Solution

17. Five equal forces of $10N$ each are applied at one point and all are lying one plane. If the angles between them are equal, the resultant force will be

A. Zero

B. $10N$

C. $20N$

D. $10\sqrt{2}N$

Answer: A

Watch Video Solution

18. Set the angles made by following vectors with x-axis in the increasing order.

(a) $3\hat{i} + 4\hat{j}$ (b) $4\hat{i} + 3\hat{j}$ (c) $\hat{i} + \hat{j}$

A. 90°

B. 45°

C. 22.5°

D. 30°

Answer: B

Watch Video Solution

19. Any vector in an arbitrary direction can always be replaced by two (or three)-

A. Parallel vectors which have the original vector as their resultant

B. Mutually perpendicular vectors which have the original vector as their resultant

C. Arbitrary vectors which have the original vector as their resultant

D. It is not possible to resolve a vector

Answer: C

Watch Video Solution

20. Angular moment is

A. A scalar

B. A polar vector

C. An axial vector

D. None of these

Answer: C

Watch Video Solution

21. Which of the following is a vector

A. Pressure

B. Surface tension

C. Moment of inertia

D. None of these

Answer: D

Watch Video Solution

22. If $\overrightarrow{P} = \overrightarrow{Q}$ then which of the following is NOT correct?

A. $\widehat{P} = \widehat{Q}$

B. $\left|\overrightarrow{P}\right| = \left|\overrightarrow{Q}\right|$

C. $P\widehat{Q} = Q\widehat{P}$

D. $\overrightarrow{P} + \overrightarrow{Q} = \widehat{P} + \widehat{Q}$

Answer: D

Watch Video Solution

23. The positoin vector of a particle is $\vec{r} = (a\cos\omega t)\hat{i} + (a\sin\omega t)\hat{j}$. The velocity of the paritcle is

A. Parallel to the position vector

B. Perpendicular to the position vector

C. Directed towards the origin

D. Directed away from the origin

Answer: B

Watch Video Solution

24. Which of the following is a scalar quantity

A. Displacement

B. Electric field

C. Acceleration

D. Work

Answer: D

Watch Video Solution

25. If a unit vector is represented by $0.5\hat{i} + 0.8\hat{j} + c\hat{k}$ the value of c is

A. 1

B. $\sqrt{0.11}$

C. $\sqrt{0.01}$

D. $\sqrt{0.39}$

Answer: B

Watch Video Solution

26. A boy walks uniformly along the sides of a rectangular park of size $400m \times 300m$, starting from one corner to the other corner diagonally opposite. Which of the following statements is incorrect?

A. He has travelled a distance of $700m$

B. His displacement is $700m$

C. His displacement is $500m$

D. His velocity is unit throughout the walk

Answer: B

Watch Video Solution

27. The unit vector parallel to the resultant of the vectors $\vec{A} = 4\hat{i} + 3\hat{j} + 6\hat{k}$ and $\vec{B} = -\hat{i} + 3\hat{j} - 8\hat{k}$ is

A. $\frac{1}{7}\left(3\hat{i} + 6\hat{j} - 2\hat{k}\right)$

B. $\frac{1}{7}\left(3\hat{i} + 6\hat{j} + 2\hat{k}\right)$

C. $\frac{1}{49}\left(3\hat{i} + 6\hat{j} - 2\hat{k}\right)$

D. $\frac{1}{49}\left(3\hat{i} - 6\hat{j} + 2\hat{k}\right)$

Answer: A

Watch Video Solution

28. Surface area is

A. Scalar

B. Vector

C. Neither scalar nor vector

D. Both scalar and vector

Answer: A

Watch Video Solution

29. With respect to a rectangular Cartesian coordinate system, three vectors are expressed as

$\overrightarrow{a} = 4\hat{i} - \hat{j}$, $\overrightarrow{b} = -3\hat{i} + 2\hat{j}$ and $\overrightarrow{c} = -\hat{k}$

Where, $\hat{i}$, $\hat{j}$, $\hat{k}$ are unit Vector, along the X, Y and Z-axis respectively. The unit vectors $\hat{r}$ along the direction of sum of these vector is

A. $\hat{r} = \frac{1}{\sqrt{3}}\left(\hat{i} + \hat{j} - \hat{k}\right)$

B. $\hat{r} = \frac{1}{\sqrt{2}}\left(\hat{i} + \hat{j} - \hat{k}\right)$

C. $\hat{r} = \frac{1}{3}\left(\hat{i} - \hat{j} + \hat{k}\right)$

D. $\hat{r} = \frac{1}{\sqrt{2}}\left(\hat{i} + \hat{j} + \hat{k}\right)$

Answer: A

Watch Video Solution

30. The angles between the two vectors $\vec{A} = 3\hat{i} + 4\hat{j} + 5\hat{k}$ and $\vec{B} = 3\hat{i} + 4\hat{j} - 5\hat{k}$ will be

A. 60°

B. Zero

C. 90°

D. None of these

Answer: D

Watch Video Solution

31. The position vector of a particle is given by $\vec{r} = \left(3t^2\hat{i} + 4t^2\hat{j} + 7\hat{k}\right)m$ at a given time t .The net displacement of the particle after $10s$ is

A. $500m$

B. $300m$

C. $150m$

D. $100m$

Answer: A

Watch Video Solution

32. Unit vector parallel to the resultant of vectors $A = 4\hat{i} - 3\hat{j}$ and $B = 8\hat{i} + 8\hat{j}$ will be

A. $\frac{24\hat{i} + 5\hat{j}}{13}$

B. $\frac{12\hat{i} + 5\hat{j}}{13}$

C. $\frac{6\hat{i} + 5\hat{j}}{13}$

D. None of these

Answer: B

Watch Video Solution

33. The component of vector $A = 2\hat{i} + 3\hat{j}$ along the vector $\hat{i} + \hat{j}$ is

A. $\frac{5}{\sqrt{2}}$

B. $10\sqrt{2}$

C. $5\sqrt{2}$

D. 5

Answer: A

Watch Video Solution

34. The angles between the two vectors $\overrightarrow{A} = 3\hat{i} + 4\hat{j} + 5\hat{k}$ and $\overrightarrow{B} = 3\hat{i} + 4\hat{j} - 5\hat{k}$ will be

A. 90°

B. 0°

C. 60°

D. 45°

Answer: A

Watch Video Solution

35. There are two force vectors, one of $5N$ and other of $12N$ at what angle the two vectors be added to get resultant vector of $17N$, $7N$ and $13N$ respectively.

A. 0°, 180° and 90°

B. $0^\circ, 90^\circ$ and 180°

C. $0^\circ, 90^\circ$ ad 90°

D. $180^\circ, 0^\circ$ and 90°

Answer: A

Watch Video Solution

36. If $\vec{A} = 4\hat{i} - 3\hat{j}$ and $\vec{B} = 6\hat{i} + 8\hat{j}$ then magnitude and direction of $\vec{A} + \vec{B}$ will be

A. $5, \tan^{-1}(3/4)$

B. $5\sqrt{5}, \tan^{-1}(1/2)$

C. $10, \tan^{-1}(5)$

D. $25, \tan^{-1}(3/4)$

Answer: B

Watch Video Solution

37. A truck travelling due to north at $20ms^{-1}$ turns west and travels at the same speed. Find the change in its velocity.

A. $40m/sN-W$

B. $20\sqrt{2}m/sN-W$

C. $40m/sS-W$

D. $20\sqrt{2}m/sS-W$

Answer: D

Watch Video Solution

38. If the sum of two unit vectors is a unit vector,then find the magnitude of their differences.

A. $\sqrt{2}$

B. $\sqrt{3}$

C. $\frac{1}{\sqrt{2}}$

D. $\sqrt{5}$

Answer: B

Watch Video Solution

39. $\vec{A} = 2\hat{i} + \hat{j}, B = 3\hat{j} - \hat{k}$ and $\vec{C} = 6\hat{i} - 2\hat{k}$. value of $\vec{A} - 2\vec{B} + 3\vec{C}$ would be

A. $20\hat{i} + 5\hat{j} + 4\hat{k}$

B. $20\hat{i} - 5\hat{j} - 4\hat{k}$

C. $4\hat{i} + 5\hat{j} + 20\hat{k}$

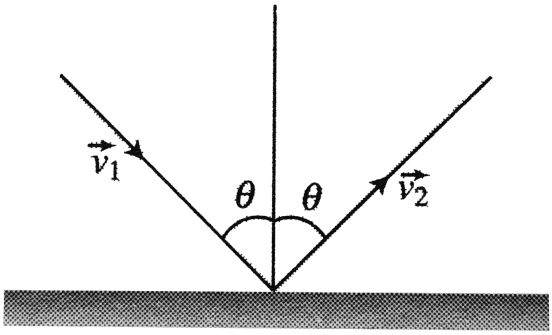
D. $5\hat{i} + 4\hat{j} + 10\hat{k}$

Answer: B

Watch Video Solution

40. An object of m kg with speed of v ms^{-1} strikes a wall at an angle θ and rebounds at the same speed and same angle. Find the

magnitude of change in the momentum of object.



A. $2mv\cos\theta$

B. $2mv\sin\theta$

C. 0

D. $2mv$

Answer: A

 Watch Video Solution

41. For the resultant of the two vectors to be maximum, what must be the angle between them

A. 0°

B. 60°

C. 90°

D. 180°

Answer: A

 Watch Video Solution

42. A particle is simultaneously acted by two forces equal to $4N$ and $3N$. The net force on the particle is

A. $7N$

B. $5N$

C. $1N$

D. Between $1N$ and $7N$

Answer: D

Watch Video Solution

43. Two vectors $\vec{A}$ and $\vec{B}$ lie in plane, another vector $\vec{C}$ lies outside this plane, then the resultant of these three vectors i.e., $\vec{A}+\vec{B}+\vec{C}$

A. Can be zero

B. Cannot be zero

C. Lies in the plane containing $\vec{A}+\vec{B}$

D. Lies in the plane containing $\vec{C}$

Answer: B

Watch Video Solution

44. If the resultant of the two forces has a magnitude smaller than the magnitude of larger force ,then two forces must be

A. Different both in magnitude and direction

B. Mutually perpendicular to one direction

C. Posses extremely small magnitude

D. Point in opposite directions

Answer: D

Watch Video Solution

45. Forces F_1 and F_2 act on a point mass in two mutually perpendicular directions. The resultant force on the point mass will be

A. $F_1 + F_2$

B. $F_1 - F_2$

C. $\sqrt{F_1^2 + F_2^2}$

D. $F_1^2 + F_2^2$

Answer: C

Watch Video Solution

46. If $\left|\vec{A} - \vec{B}\right| = \left|\vec{A}\right| = \left|\vec{B}\right|$, the angle between $\vec{A}$ and $\vec{B}$ is

A. 60°

B. 0°

C. 120°

D. 90°

Answer: A

Watch Video Solution

47. Let the angle between two nonzero vector $\vec{A}$ and $\vec{B}$ is 120° and its resultant be $\vec{C}$.

A. $\vec{C}$ must be equal to $\left|\vec{A} - \vec{B}\right|$

B. $\vec{C}$ must be less than $\left|\vec{A}-\vec{B}\right|$

C. $\vec{C}$ must be greater than $\left|\vec{A}-\vec{B}\right|$

D. $\vec{C}$ may be equal to $\left|\vec{A}-\vec{B}\right|$

Answer: C

Watch Video Solution

48. A magnitude of vector $\vec{A}, \vec{B}$ and $\vec{C}$ are respectively $12, 5$ and 13 units and $\vec{A}+\vec{B}=\vec{C}$ then the angle between $\vec{A}$ and $\vec{B}$ is

A. 0

B. π

C. $\pi/2$

D. $\pi/4$

Answer: C

Watch Video Solution

49. Magnitude of vector which comes on addition of two vectors, $6\hat{i}+7\hat{j}$ and $3\hat{i}+4\hat{j}$ is

A. $\sqrt{136}$

B. $\sqrt{13.2}$

C. $\sqrt{202}$

D. $\sqrt{160}$

Answer: C

Watch Video Solution

50. A particle has displacement of $12m$ towards east and $5m$ towards north then $6m$ vertically upward. The sum of these displacements is-

A. 12

B. $10.04m$

C. 14.31

D. None of these

Answer: C

Watch Video Solution

51. The three vectors $\vec{A} = 3\hat{i} - 2\hat{j} + \hat{k}, \vec{B} = \hat{i} - 3\hat{j} + 5\hat{k}$ and $\vec{C} = 2\hat{i} + \hat{j} - 4\hat{k}$ form

A. An equilateral triangle

B. Isosceles triangle

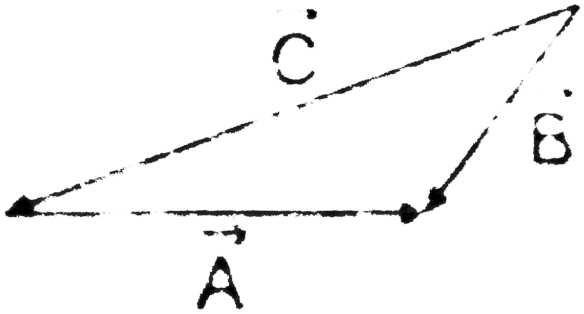
C. A right angled triangle

D. No triangle

Answer: C

Watch Video Solution

52. For the figure shown



A. $\overrightarrow{A} + \overrightarrow{B} = \overrightarrow{C}$

B. $\overrightarrow{B} + \overrightarrow{C} = \overrightarrow{A}$

C. $\overrightarrow{C} + \overrightarrow{A} = \overrightarrow{B}$

D. $\overrightarrow{A} + \overrightarrow{B} + \overrightarrow{C} = 0$

Answer: C

Watch Video Solution

53. Let $\vec{C} = \vec{A} + \vec{B}$

A. $\left|\vec{C}\right|$ is always greater then $\left|\vec{A}\right|$

B. It is possible to have $\left|\vec{C}\right| < \left|\vec{A}\right|$ and $\left|\vec{C}\right| < \left|\vec{B}\right|$

C. C is always equal to $A + B$

D. C is never equal to $A + B$

Answer: B

Watch Video Solution

54. The value of the sum of two vectors $\vec{A}$ and $\vec{B}$ with θ as the angle between them is

A. $\sqrt{A^2 + B^2 + 2AB\cos\theta}$

B. $\sqrt{A^\circ - B^2 + 2AB\cos\theta}$

C. $\sqrt{A^\circ + B^2 - 2AB\sin\theta}$

D. $\sqrt{A^2 + B^2 + 2AB\sin\theta}$

Answer: A

Watch Video Solution

55. The following sets of three vectors act on a body. Whose resultant cannot be zero ?

A. $10, 10, 10$

B. $10, 10, 20$

C. $10, 20, 23$

D. $10, 20, 40$

Answer: D

Watch Video Solution

56. When three forces of $50N, 30N$ and $15N$ act on body, then the boy is

A. At rest

B. Moving with a uniform velocity

C. In equilibrium

D. Moving with an acceleration

Answer: D

Watch Video Solution

57. The sum of two forces at a point is 16N. if their resultant is normal to the smaller force and has a magnitude of 8N, then two forces are

A. $6N$ and $10N$

B. $8N$ and 8N`

C. $4N$ and $12N$

D. $2N$ and $14N$

Answer: A

Watch Video Solution

58. If vector P, Q and R have magnitude 5,12,and 13 units and $\vec{P} + \vec{Q} = \vec{R}$, the angle between Q and R is

A. $\cos^{-1}\frac{5}{12}$

B. $\cos^{-1}\frac{5}{13}$

C. $\cos^{-1}\frac{12}{13}$

D. $\cos^{-1}\frac{7}{13}$

Answer: C

Watch Video Solution

59. The resultant of two vector A and B is at right angles to A and its magnitude is half of B. Find the angle between A and B.

A. 120°

B. 150°

C. 135°

D. None of these

Answer: B

Watch Video Solution

60. What vector must be added to the two vectors $\hat{i} - 2\hat{j} + 2\hat{k}$ and $2\hat{i} + \hat{j} - \hat{k}$, so that the resultant may be a unit vector along x- axis

A. $2\hat{i} + \hat{j} + k$

B. $-2\hat{i} + \hat{j} - \hat{k}$

C. $2\hat{i} - \hat{j} + \hat{k}$

D. $-2\hat{i} - \hat{j} - \hat{k}$

Answer: B

Watch Video Solution

61. What is the angle between $\vec{P}$ and the resultant of $\left(\vec{P}+\vec{Q}\right)$ and $\left(\vec{P}-\vec{Q}\right)$

A. Zero

B. $\tan^{-1}(P/Q)$

C. $\tan^{-1}(Q/P)$

D. $\tan^{-1}(P-Q)/(P+Q)$

Answer: A

Watch Video Solution

62. The resultant of $\overrightarrow{P}$ and $\overrightarrow{Q}$ is perpendicular to $\overrightarrow{P}$. What is the angle between $\overrightarrow{P}$ and $\overrightarrow{Q}$

A. $\cos^{-1}(P/Q)$

B. $\cos^{-1}(-P/Q)$

C. $\sin^{-1}(P/Q)$

D. $\sin^{-1}(-P/Q)$

Answer: B

Watch Video Solution

63. Maximum and minimum magnitudes of the resultant of two vectors of magnitudes P and Q are in the ratio $3:1$. Which of the following relations is true

A. $P = 2Q$

B. $P = Q$

C. $PQ = 1$

D. None of these

Answer: A

View Text Solution

64. The resultant of two vectors $\overrightarrow{P}$ and $\overrightarrow{Q}$ is $\overrightarrow{R}$. If the magnitude of $\overrightarrow{Q}$ is doubled, the new resultant vector becomes perpendicular to $\overrightarrow{P}$. Then, the magnitude of $\overrightarrow{R}$ is equal to

A. P

B. $(P+Q)$

C. Q

D. $(P-Q)$

Answer: C

Watch Video Solution

65. Two forces F_1 and F_2 are acting on a body. One force is double that of the other force and the resultant is equal to the greater force. Then the angle between the two forces is

A. $\cos^{-1}(1/2)$

B. $\cos^{1}(-1/2)$

C. $\cos^{-1}(-1/4)$e

D. $\cos^{-1}(1/4)$

Answer: C

Watch Video Solution

66. Given that $\vec{A} + \vec{B} = \vec{C}$ and that $\vec{C}$ is $\perp$ to $\vec{A}$. Further if $\left|\vec{A}\right| = \left|\vec{C}\right|$, then what is the angle between $\vec{A}$ and $\vec{B}$

A. $\frac{\pi}{4}$ radian

B. $\frac{\pi}{2}$ radian

C. $\frac{3\pi}{4}$ radian

D. π radian

Answer: C

View Text Solution

67. A body is at rest under the action of three forces, two of which are $\vec{F}_1 = 4\hat{i}, \vec{F}_2 = 6\hat{j}$, the third force is

A. $4\hat{i} + 6\hat{j}$

B. $4\hat{i} - 6\hat{j}$

C. $-4\hat{i} + 6\hat{j}$

D. $-4\hat{i} - 6\hat{j}$

Answer: D

68. A plane is revolving around the earth with a speed of 100 km/hr at a constant height, above the surface of earth.The change in velocity as it travels half circle is

A. $200km/hr$

B. $150km/hr$

C. $100\sqrt{2}km/hr$

D. 0

Answer: A

Watch Video Solution

69. What displacement must be added to the displacement $25\hat{i} - 6\hat{j}$m to give a displacement of 7.0 m pointing in the x-direction ?

A. $-18\hat{i} - 6\hat{j}$

B. $32\hat{i} - 13\hat{j}$

C. $-18\hat{i}+6\hat{j}$

D. $-25\hat{i}+13\hat{j}$

Answer: C

Watch Video Solution

70. A body moves due East with velocity $20km/hour$ and then due North with velocity $15km/hour$. The resultant velocity

A. $5km/hour$

B. $15km/hour$

C. $20km/hour$

D. $25km/hour$

Answer: D

Watch Video Solution

71. The magnitudes of vectors $\vec{A}, \vec{B}$ and $\vec{C}$ are 3,4 and 5 units respectively. If $\vec{A} + \vec{B} = \vec{C}$, the angle between $\vec{A}$ and vecB` is

A. $\frac{\pi}{2}$

B. $\cos^{-1}(0.6)$

C. $\tan^{-1}\left(\frac{7}{5}\right)$

D. $\frac{\pi}{4}$

Answer: A

Watch Video Solution

72. While travelling from one station to another , a car travels 75km north , 60km north - east

and $20\mathrm{km}$ east. The minimum distance between the two station is

A. $72km$

B. $112km$

C. $132km$

D. $155km$

Answer: C

Watch Video Solution

73. A scooter going due east at $10ms^{-1}$ turns right through an angle of 90°. If the speed of the scooter remain unchanged in taking turn, the change is the velocity the scooter is

A. $20.0ms$ south eastern direction

B. Zero

C. $10.0ms$ in southern direction

D. $14.14ms$ in south-west direction

Answer: D

Watch Video Solution

74. A person goes $10km$ north and $20km$ east.

What will be displacement from initial point ?

A. $22.36km$

B. $2km$

C. $5km$

D. $20km$

Answer: A

Watch Video Solution

75. Two forces $\vec{F}_1 = 5\hat{i} + 10\hat{j} - 20\hat{k}$ and $\vec{F}_2 = 10\hat{i} - 5\hat{j} - 15\hat{k}$ act on a single point. The angle between $\vec{F}_1$ and $\vec{F}_2$ is nearly

A. 30°

B. 45°

C. 60°

D. 90°

Answer: B

Watch Video Solution

76. Which pair of the following forces will never give resultant force of $2N$?

A. $2N$ and $2N$

B. $1N$ and $1N$

C. $1N$ and $3N$

D. $1N$ and $4N$

Answer: D

Watch Video Solution

77. Two forces $3N$ and $2N$ are at an angle θ such that the resultant is R. The first force is now increased of $6N$ and the resultant become $2R$. The value of θ is

A. 30°

B. 60°

C. 90°

D. 120°

Answer: D

Watch Video Solution

78. Three concurrent force of the same magnitude are in equilibrium. What is the angle between the forces? Also name the triangle formed by the forces as sides.

A. 60° equilateral triangle

B. 120° equilateral triangle

C. $120^\circ, 30^\circ, 30^\circ$ an isosceles triangle

D. 120° an obtuse angled triangle

Answer: A

Watch Video Solution

79. If $\left|\vec{A}+\vec{B}\right|=\left|\vec{A}\right|+\left|\vec{B}\right|$, then angle between $\vec{A}$ and $\vec{B}$ will be

A. 90°

B. 120°

C. 0°

D. 60°

Answer: C

Watch Video Solution

80. The maximum and minimum magnitude of the resultant of two given vectors are 17 units and 7 unit respectively. If these two vectors are at right angles to each other, the magnitude of their resultant is

A. 14

B. 16

C. 18

D. 13

Answer: D

81. The vector sum of two forces is perpendicular to their vector differences. In that case, the forces

A. Are equal to each other in magnitude

B. Are not equal to eachh other in magnitude

C. Cannot be predicted

D. Are equal to eachh other

Answer: A

Watch Video Solution

82. y component of velocity is 20 and x component of velocity is 10. The direction of motion of the body with the horizonatal at this instant is

A. $\tan^{-1}(2)$

B. $\tan^{-1}(1/2)$

C. 45°

D. 0°

Answer: A

Watch Video Solution

83. Two forces of $12N$ and $8N$ act upon a body. The resultant force on the body maximum value of

A. $4N$

B. $0N$

C. $20N$

D. $8N$

Answer: C

 Watch Video Solution

84. Two equal forces (P each) act at a point inclined to each other at an angle of 120°. The magnitude of their resultant is

A. $P/2$

B. $P/4$

C. P

D. $2P$

Answer: C

Watch Video Solution

85. The vectors $5\hat{i} + 8\hat{j}$ and $2i + 7\hat{j}$ are added.

The magnitude of the sum of these vector is

A. $\sqrt{274}$

B. 38

C. 238

D. 560

Answer: A

Watch Video Solution

86. Two vectors $\vec{A}$ and $\vec{B}$ are such that $\vec{A} + \vec{B} = \vec{A} - \vec{B}$. Then

A. $\vec{A} \cdot \vec{B} = 0$

B. $\vec{A} \times \vec{B} = 0$

C. $\vec{A} = 0$

D. $\vec{B} = 0$

Answer: D

Watch Video Solution

87. If a vector $2\hat{i} + 3\hat{j} + 8\hat{j}k$ is perpendicular to the vector $4\hat{j} - 4\hat{i} + \alpha\hat{k}$. Then the value of α is

A. -1

B. $\frac{1}{2}$

C. $-\frac{1}{2}$

D. 1

Answer: C

Watch Video Solution

88. If two vectors $2\hat{i}+3\hat{j}-\hat{k}$ and $-4\hat{i}-6\hat{j}-\lambda\hat{k}$ are parallel to each other then value of λ be

A. 0

B. 2

C. 3

D. 4

Answer: B

89. A body, acted upon by a force off $50N$ is displaced through a distance 10 meter in a

direction making and angle to 60° with the force. The work done by the force be

A. $200J$

B. $100J$

C. 300

D. $250J$

Answer: D

Watch Video Solution

90. A particle moves from position $3\hat{i}+2\hat{j}-6\hat{k}$ to $14\hat{i}+13\hat{j}+9\hat{k}$ due to a uniform force of $\left(4\hat{i}+\hat{j}+3\hat{k}\right)N$. If the displacement in meters then work done will be

A. $100J$

B. $200J$

C. $300J$

D. $250J$

Answer: A

Watch Video Solution

91. If for two vector $\vec{A}$ and $\vec{B}$, sum $\left(\vec{A}+\vec{B}\right)$ is perpendicular to the difference $\left(\vec{A}-\vec{B}\right)$. The ratio of their magnitude is

A. 1

B. 2

C. 3

D. None of these

Answer: A

Watch Video Solution

92. The angle between the vector $\vec{A}$ and $\vec{B}$ is θ. The value of the triple product $\vec{A} . \left(\vec{B} \times \vec{A} \right)$ is

A. $A^2 B$

B. Zero

C. $A^2 B \sin \theta$

D. $A^2 \cos \theta$

Answer: B

Watch Video Solution

Watch Video Solution

93. If $A \times B = B \times A$ then the angle between A and B is

A. $\pi / 2$

B. $\pi / 3$

C. π

D. $\pi / 4$

Answer: C

Watch Video Solution

94. If $\vec{A} = 3\hat{i} + \hat{j} + 2\hat{k}$ and $\vec{B} = 2\hat{i} - 2\hat{j} + 4\hat{k}$ then value of $\left|\vec{A} \times \vec{B}\right|$ will be

A. $8\sqrt{2}$

B. $8\sqrt{3}$

C. $8\sqrt{5}$

D. $5\sqrt{8}$

Answer: B

Watch Video Solution

95. The torque of the force $\vec{F} = \left(2\hat{i} - 3\hat{j} + 4\hat{k}\right)N$ acting at the point $\vec{r} = \left(3\hat{i} + 2\hat{j} + 3\hat{k}\right)m$ about the origin be

A. $6\hat{i} - 6\hat{j} + 12\hat{k}$

B. $17\hat{i} - 6\hat{j} - 13\hat{k}$

C. $-6\hat{i} + 6\hat{j} - 12\hat{k}$

D. $-17\hat{i} + 6\hat{j} + 13\hat{k}$

Answer: B

Watch Video Solution

96. If $\vec{A} \times \vec{B} = \vec{C}$, then which of the followig statements is wrong

A. $\vec{C} \perp \vec{A}$

B. $\vec{A} \perp \vec{B}$

C. $\vec{C} \perp \left(\vec{A} + \vec{B}\right)$

D. $\vec{C} \perp \left(\vec{A} + \vec{B}\right)$

Answer: D

Watch Video Solution

97. If a particle of mass m is moving with constant velocity v parallel to x-axis in $x-y$ plane as shown in fig. Its angular moment with respect to origin at any time t will be

A. $mvb\hat{k}$

B. $-mvb\hat{k}$

C. $mvb\hat{i}$

D. $mv\hat{i}$

Answer: B

Watch Video Solution

98. Consider two vectors $\vec{F}_1 = 2\hat{i} + 5\hat{k}$ and $\vec{F}_2 = 3\hat{j} + 4\hat{k}$. The magnitude to thhe scalar product of these vectors is

A. 20

B. 23

C. $5\sqrt{33}$

D. 26

Answer: D

Watch Video Solution

99. Consider a vector $\vec{F} = 4\hat{i} - 3\hat{j}$. Another vector that is perpendicular to $\vec{F}$ is

A. $4\hat{i} + 3\hat{j}$

B. $6\hat{i}$

C. $7\hat{k}$

D. $3\hat{i} - 4\hat{j}$

Answer: C

Watch Video Solution

100. Two vector $\vec{A}$ and $\vec{B}$ are at right angles to each other, when

A. $\vec{A} + \vec{B} = 0$

B. $\vec{A} - \vec{B} = 0$

C. $\vec{A} \times \vec{B} = 0$

D. $\vec{A} \cdot \vec{B} = 0$

Answer: D

Watch Video Solution

101. If $\left|\overrightarrow{V}_1 + \overrightarrow{V}_2\right| = \left|\overrightarrow{V}_1 - \overrightarrow{V}_2\right|$ and V_2 is finite, then

A. V_1 is parallel to V_2

B. $\overrightarrow{V}_1 = \overrightarrow{V}_2$

C. V_1 and V_2 are mutually perpendicular

D. $\left|\overrightarrow{V}_1\right| = \left|\overrightarrow{V}_2\right|$

Answer: C

Watch Video Solution

102. A force $\vec{F} = \left(5\hat{i} + 3\hat{j}\right)$ Newton is applied over a particle which displaces it from its origin to the point $\vec{r} = \left(2\hat{i} - 1\hat{j}\right)$ metres. The work done on the particle is

A. $-7J$

B. $+13J$

C. $+7J$

D. $+11J$

Answer: C

Watch Video Solution

103. The angle between two vectors $-2\hat{i}+3\hat{j}+k$ and $\hat{i}+2\hat{j}-4\hat{k}$ is

A. 0°

B. 90°

C. 180°

D. None of the above

Answer: B

Watch Video Solution

104. The angle between the vectors $\left(\hat{i}+\hat{j}\right)$ and $\left(\hat{j}+\hat{k}\right)$ is

A. 30°

B. 45°

C. 60°

D. 90°

Answer: C

Watch Video Solution

105. A particle moves with a velocity $6\hat{i} - 4\hat{j} + 3\hat{k}m/s$ under the influence of a constant force $\overrightarrow{F} = 20\hat{i} + 15a\hat{j} - 5\hat{k}N$. The instantaneous power applied to the particle is

A. $35J/s$

B. $45J/s$

C. $25J/s$

D. $195J/s$

Answer: B

Watch Video Solution

106. If $\vec{P} . \vec{Q} = PQ$ then angle between $\vec{P}$ and $\vec{Q}$ is

A. 0°

B. 30°

C. 45°

D. 60°

Answer: A

Watch Video Solution

107. A force $\overrightarrow{F} = 5\hat{i} + 6\hat{j} + 4\hat{k}$ acting on a body, produces a displacement $\overrightarrow{S} = 6\hat{i} - 5\hat{k}$. Work done by the force is

A. 10 units

B. 18 units

C. 11 units

D. 5 units

Answer: A

Watch Video Solution

108. The angle between the two vectors $\vec{A} = 5\hat{i} + 5\hat{j}$ and $\vec{B} = 5\hat{i} - 5\hat{j}$ will be

A. zero

B. 45°

C. 90°

D. 180°

Answer: C

Watch Video Solution

109. The vector $\vec{P} = a\hat{i} + a\hat{j} + 3\hat{j}$ and $\vec{Q} = a\hat{i} - 2\hat{j} - \hat{k}$, are perpendicular to each other. The positive value of a is

A. 3

B. 4

C. 9

D. 13

Answer: A

Watch Video Solution

110. A body, constrained to move in the Y-direction is subjected to a force given by $\overrightarrow{F} = \left(-2\hat{i} + 15\hat{j} + 6\hat{k} \right) N$. What is the work done by this force in moving the body a distance 10 m along the Y-axis

A. $20J$

B. $150J$

C. $160J$

D. $190J$

Answer: B

Watch Video Solution

111. A particle moves in the $x - y$ plane under the action of a force $\vec{F}$ such that the value of its linear momentum $\vec{P}$ at any time $tisP_x = 2\cos t, P_y = 2\sin t.$

The angle θ between vecF and vecP $atagiventime$t` will be:

A. $\theta = 0^\circ$

B. $\theta = 30^\circ$

C. $\theta = 90^\circ$

D. $\theta = 180^\circ$

Answer: C

Watch Video Solution

112. The area of the parallelogram represented by the vectors $\overrightarrow{A} = 2\hat{i} + 3\hat{j}$ and $\overrightarrow{B} = \hat{i} + 4\hat{j}$ is

A. 14 units

B. 7.5 units

C. 10 units

D. 5 units

Answer: D

Watch Video Solution

113. A vector $\overrightarrow{F}_1$ is along the positive X-axis. If its vectors product with another vector $\overrightarrow{F}_2$ is zero then $\overrightarrow{F}_2$ could be

A. $4\hat{j}$

B. $-\left(\hat{i}+\hat{j}\right)$

C. $\left(\hat{j}+\hat{k}\right)$

D. $\left(-4\hat{i}\right)$

Answer: D

Watch Video Solution

114. If for two vectors $\overrightarrow{A}$ and $\overrightarrow{B}$, $\overrightarrow{A}\times\overrightarrow{B}=0$, the vectors

A. Are perpendicular to each other

B. Are parallel to each other

C. Act at an angle of 60°

D. Act at an angle of 30°

Answer: B

Watch Video Solution

115. The angle between $\left(\vec{A} \times \vec{B}\right)$ and $\left(\vec{B} \times \vec{A}\right)$ is (in radian)

A. Zero

B. π

C. $\pi/4$

D. $\pi/2$

Answer: B

Watch Video Solution

116. What is the angle between $\left(\vec{P}+\vec{Q}\right)$ and $\left(\vec{P}\times\vec{Q}\right)$

A. 0

B. $\frac{\pi}{2}$

C. $\frac{\pi}{4}$

D. π radian

Answer: B

 Watch Video Solution

117. The resultant of the two vectors having magnitude 2 and 3 is 1. What is their cross product

A. 6

B. 3

C. 1

D. 0

Answer: D

Watch Video Solution

118. Let $\vec{A} = \hat{i}A\cos\theta + \hat{j}A\sin\theta$, be any vector. Another vector $\vec{B}$ which is normal to $\vec{A}$ is :-

A. $\widehat{B}\cos\theta + jB\sin\theta$

B. $\widehat{B}\sin\theta + jB\cos\theta$

C. $\hat{i}B\sin\theta - iB\cos\theta$

D. $\hat{i}B\cos\theta - iB\sin\theta$

Answer: C

Watch Video Solution

119. The angle between two vectors given by $6\bar{i} + 6\bar{j} - 3\bar{k}$ and $7\bar{i} + 4\bar{j} + 4\bar{k}$ is

A. $\cos^{-1}\left(\frac{1}{\sqrt{3}}\right)$

B. $\cos^{-1}\left(\frac{5}{\sqrt{3}}\right)$

C. $\sin^{-1}\left(\frac{2}{\sqrt{3}}\right)$

D. $\sin^{-1}\left(\frac{\sqrt{5}}{3}\right)$

Answer: D

Watch Video Solution

120. A vector $\vec{A}$ points vertically upward and $\vec{B}$ points towards north. The vector produce

$\overrightarrow{A} \times \overrightarrow{B}$ is

A. Zero

B. Along west

C. Along eash

D. Vertically downwards

Answer: B

Watch Video Solution

121. the angle between the vectors $\left(\hat{i}+\hat{j}\right)$ and $\left(\hat{j}+\hat{k}\right)$ is

A. 90°

B. 0°

C. 180°

D. 60°

Answer: D

Watch Video Solution

122. The position vectors of points A,B,C and D are $A = 3\hat{i} + 4\hat{j} + 5\hat{k}, B = 4hai + 5\hat{j} + 6\hat{k}$, $C = 7\hat{i} + 9\hat{j} + 3\hat{k}$, and $D = 4\hat{i} + 6\hat{j}$, then the displacement vectors AB and CD are

A. Perpendicular

B. Parallel

C. Antiparallel

D. Inclined at an angle of 60°

Answer: B

Watch Video Solution

123. If force $\left(\overrightarrow{F}\right) = 4\hat{i} + 4\hat{j}$ and displacement $\left(\overrightarrow{s}\right) = 3\hat{i} + 6\hat{k}$ then the work done is

A. 4×3

B. 5×6

C. 6×3

D. 4×6

Answer: A

Watch Video Solution

124. if $|\vec{A} \times \vec{B}| = |\vec{A} . \vec{B}|$, then angle between $\vec{A}$ and $\vec{B}$ will be

A. 30°

B. 45°

C. 60°

D. 90°

Answer: B

Watch Video Solution

125. In a clockwise system:

A. $\hat{j} \times \hat{k} = \hat{i}$

B. $\hat{i}.\ \hat{i} = 0$

C. $\hat{j} \times \hat{j} = 1$

D. $\hat{k}.\ \hat{j} = 1$

Answer: A

Watch Video Solution

126. The linear velocity of a rotating body is given by $\overrightarrow{v} = \overrightarrow{\omega} \times \overrightarrow{r}$, where $\overrightarrow{\omega}$ is the angular velocity and $\overrightarrow{r}$ is the radius vector. The angular velocity of a body is $\overrightarrow{\omega} = \hat{i} - 2\hat{j} + 2\hat{k}$ and the radius vector $\overrightarrow{r} = 4\hat{j} - 3\hat{k}$, then $\left|\overrightarrow{v}\right|$ is

A. $\sqrt{29}$ units

B. $\sqrt{31}$ units

C. $\sqrt{37}$ units

D. $\sqrt{41}$ units

Answer: A

Watch Video Solution

127. Three vectors $\vec{a}, \vec{b}$ and $\vec{c}$ satisfy the relation $\vec{a} . \vec{b} = 0$ and $\vec{a} . \vec{c} = 0$. The vector $\vec{a}$ is parallel to

A. $\vec{b}$

B. $\vec{C}$ must be less than $\left|\vec{A} - \vec{B}\right|$

C. $\vec{b} . \vec{c}$

D. $\vec{b} \times \vec{c}$

Answer: D

Watch Video Solution

128. The diagonals of a parallelogram are $2\hat{i}$ and $2\hat{j}$. What is the area of the parallelogram

A. 0.5 units

B. 1 unit

C. 2units

D. 4 units

Answer: C

Watch Video Solution

129. What is the unit vector perpendicular to the following vectors $2\hat{i}+2\hat{j}-\hat{k}$ and $6\hat{i}-3\hat{j}+2\hat{k}$

A. $\frac{\hat{i}+10\hat{j}-18k}{5\sqrt{17}}$

B. $\frac{\hat{i}-10\hat{j}+18\hat{k}}{5\sqrt{17}}$

C. $\frac{\hat{i}-10\hat{j}-18\hat{k}}{5\sqrt{17}}$

D. $\frac{\hat{i}+10\hat{j}+18\hat{k}}{5\sqrt{17}}$

Answer: C

Watch Video Solution

130. The area of the parallelogram whose sides are represented by the vector $\hat{j} + 3\hat{k}$ and $\hat{i} + 2\hat{j} - \hat{k}$ is

A. $\sqrt{61}$ sq. unit

B. $\sqrt{59}$ sq. unit

C. $\sqrt{49}$ sq. unit

D. $\sqrt{52}$ sq. unit

Answer: B

Watch Video Solution

131. The position of a particle is given by $\overrightarrow{r} = \left(\hat{i} + 2\hat{j} - \hat{k}\right)$ and momentum $\overrightarrow{p} = \left(3\hat{i} + 4\hat{j} - 2\hat{k}\right)$. The angular momentum is perpendicular to the

A. x -axis

B. y-axis

C. z-axis

D. Line at equal angles to all the three axes

Answer: A

Watch Video Solution

132. Two vector A and B have equal magnitudes.

Then the vector $A + B$ is perpendicular to

A. $A \times B$

B. $A - B$

C. $3A - 3B$

D. All of these

Answer: A

Watch Video Solution

133. Find the torque of a force $\vec{F} = -3\hat{i} + \hat{j} + 5\hat{k}$ acting at the point $\vec{r} = 7\hat{i} + 3\hat{j} + \hat{k}$

A. $14\hat{i} - 38\hat{i} + 16\hat{k}$

B. $4\hat{i} + 4\hat{j} + 6\hat{k}$

C. $21\hat{i} + 4\hat{j} + 4\hat{k}$

D. $-14\hat{i} + 34\hat{j} - 16\hat{k}$

Answer: A

Watch Video Solution

134. the value of $\left(\vec{A}+\vec{B}\right)\times\left(\vec{A}-\vec{B}\right)$ is

A. 0

B. A^2-B^2

C. $\vec{B}\times\vec{A}$

D. $2\left(\vec{B}\times\vec{A}\right)$

Answer: D

Watch Video Solution

135. If $\vec{A}$ and $\vec{B}$ are perpendicular vectors and vector $\vec{A} = 5\hat{i} + 7\hat{j} - 3\hat{k}$ and $\vec{B} = 2\hat{i} + 2\hat{j} - a\hat{k}$. The value of a is

A. -2

B. 8

C. -7

D. -8

Answer: D

Watch Video Solution

136. A body, under the action of a force $\vec{F} = 6\hat{i} - 8\hat{j} + 10\hat{k}$, acquires an acceleration of $1ms^{-2}$. The mass of this body must be.

A. $10\sqrt{2}$

B. 20

C. $2\sqrt{10}$

D. 10

Answer: A

Watch Video Solution

137. Area of a parallelogram formed by vectors $\left(3\hat{i}-2\hat{j}+\hat{k}\right)m$ and $\left(\hat{i}+2\hat{j}+3\hat{k}\right)$ m as adjacent sides is

A. 8

B. $8\sqrt{3}$

C. $3\sqrt{8}$

D. 192

Answer: B

Watch Video Solution

138. The position vectors of radius are $2\hat{i}+\hat{j}+\hat{k}$ and $2\hat{i}-3\hat{j}+\hat{k}$ while those of linear momentum are $2\hat{i}+3\hat{j}-\hat{k}$. Then the angular momentum is

A. $2\hat{i}-4\hat{j}$

B. $4\hat{i}-8\hat{k}$

C. $2\hat{i}-4\hat{j}+2\hat{k}$

D. $4\hat{i}-8\hat{k}$

Answer: B

Watch Video Solution

139. What is the value of linear velocity, if $\overrightarrow{\omega} = 3\hat{i} - 4\hat{j} + \hat{k}$ and $\overrightarrow{r} = 5\hat{i} - 6\hat{j} + 6\hat{k}$?

A. $6\hat{i} - 2\hat{j} + 3\hat{k}$

B. $6\hat{i} - 2\hat{j} + 8\hat{k}$

C. $4\hat{i} - 13\hat{j} + 6\hat{k}$

D. $-18\hat{i} - 13\hat{j} + 2\hat{k}$

Answer: D

Watch Video Solution

140. Dot product of two mutual perpendicular vector is

A. 0

B. 1

C. ∞

D. None of these

Answer: A

Watch Video Solution

141. When $\vec{A} . \vec{B} = -|A||B|$, then

A. $\vec{A}$ and $\vec{B}$ are perpendicular to each other

B. $\vec{A}$ and $\vec{B}$ act in the same direction

C. $\vec{A}$ and $\vec{B}$ act in the opposite direcrtion

D. $\vec{A}$ and $\vec{B}$ can act in any direction

Answer: C

Watch Video Solution

142. If $\left|\vec{A} \times \vec{B}\right| = \sqrt{3}\vec{A} \cdot \vec{B}$, then the value of $\left|\vec{A} + \vec{B}\right|$ is

A. $\left(A^2 + B^2 + \frac{AB}{\sqrt{3}}\right)^{1/2}$

B. $A + B$

C. $\left(A^2 + B^2 + \sqrt{3}AB\right)^{1/2}$

D. $\left(A^\circ + B^2 + AB\right)^{1/2}$

Answer: D

Watch Video Solution

143. A force $\vec{F} = 3\hat{i} + c\hat{j} + 2\hat{k}$ acting on a particle causes a displacement $\vec{d} = -4\hat{i} + 2\hat{j} - 3\hat{k}$. If the work done is 6 J. then the value of c will be

A. 12

B. 6

C. 1

D. 0

Answer: A

Watch Video Solution

144. A force $\overrightarrow{F} = \left(5\hat{i} + 3\hat{j}\right)N$ is applied over a particle which displaces it from its original position to the point $\overrightarrow{s} = S\left(2\hat{i} - 1\hat{j}\right)m$. The work done on the particle is

A. $+nJ$

B. $+7J$

C. $+13J$

D. $-7J$

Answer: B

Watch Video Solution

145. If a vector $\vec{A}$ is parallel to another vector $\vec{B}$ then the resultant of the vector $\vec{A} \times \vec{B}$ will be equal to

A. A

B. $\vec{A}$ and $\vec{B}$ act in the same direction

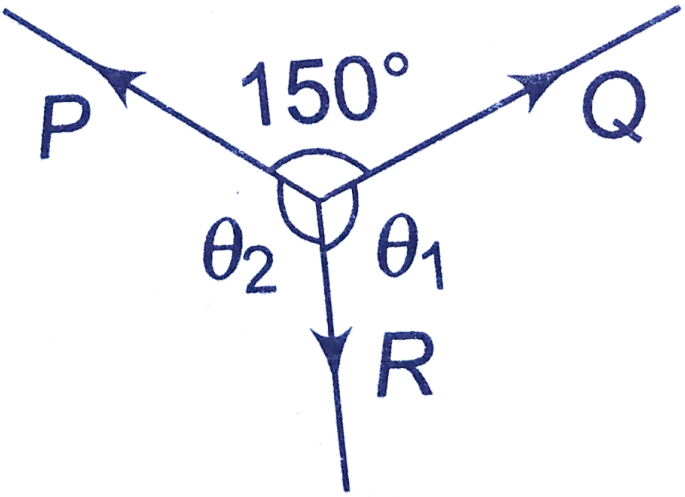
C. Zero vector

D. Zero

Answer: C

Watch Video Solution

146. P, Q and R are three coplanar forces acting at a point and are in equilibrium. Given $P = 1.9318kg - wt$, $\sin\theta_1 = 0.9659$, the value of R is $(\in kg - wt)$



A. 0.9659

B. 2

C. 1

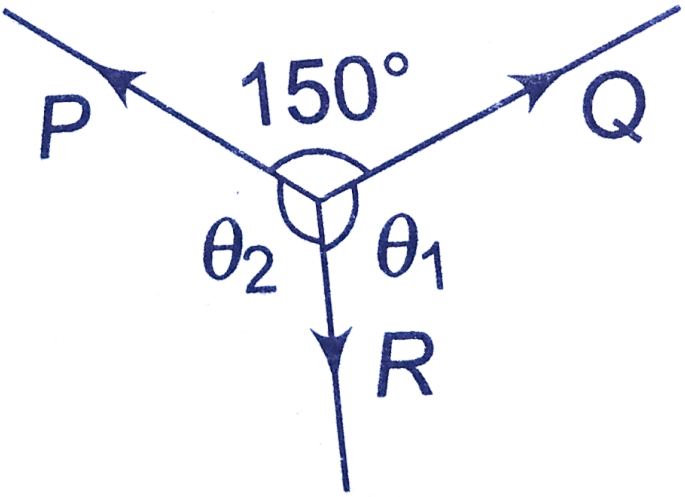
D. $\frac{1}{2}$

Answer: C

Watch Video Solution

147. P, Q and R are three coplanar forces acting at a point and are in equilibrium. Given $P = 1.9318kg - wt, \sin\theta_1 = 0.9659$, the value

of R is ($\in kg - wt$)



A. $\frac{P}{\sin\alpha} = \frac{Q}{\sin\beta} = \frac{R}{\sin\gamma}$

B. $\frac{P}{\cos\alpha} = \frac{Q}{\cos\beta} = \frac{R}{\cos\gamma}$

C. $\frac{P}{\tan\alpha} = \frac{Q}{\tan\beta} = \frac{R}{\tan\gamma}$

D. $\frac{P}{\sin\beta} = \frac{Q}{\sin\gamma} = \frac{R}{\sin\alpha}$

Answer: A

148. If a body is in equiliburium under a set of non-collinear forces, then the minimum number of forces has to be

A. Four

B. Three

C. Two

D. Five

Answer: B

149. How many minimum number of coplanar vector having different magnitudes can be added to give zero resultant?

A. 2

B. 3

C. 4

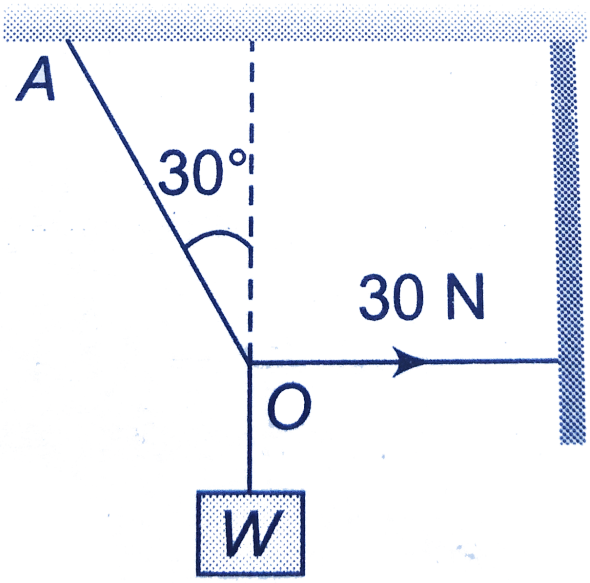
D. 5

Answer: C

Watch Video Solution

150. As shown in figure the tension in the horizontal cord is $30N$. The weight W and

tension in the string OA in Newton are



A. $30\sqrt{3}$, 30

B. $30\sqrt{3}$, 60

C. $60\sqrt{3}$, 30

D. None of these

Answer: B

Watch Video Solution

151. Two cars are moving in the same direction with the same speed $30km/hr$. They are separated by a distance of $5km$, the speed of a car moving in the opposite direction of it meets these two cars at an interval of 4 minutes, will be.

A. $40km/hr$

B. $45km/hr$

C. $30km/hr$

D. $15km/hr$

Answer: B

Watch Video Solution

152. A man standing on a road has to hold his umbrella at 30^0 with the vertical to keep the rain away. The throws the umbrella and starts running at 10 km/h. He finds that raindrops are

hitting his head vertically. Find the speed of raindrops with respect to a. the road, b. the moving man.

A. $10km/hr$

B. $20km/hr$

C. $30km/hr$

D. $40km/hr$

Answer: B

Watch Video Solution

153. A boat is moving with a velocity $3\hat{i} + 4\hat{j}$ with respect to ground. The water in the river is moving with a velocity $-3\hat{i} - 4\hat{j}$ with respect to ground. The relative velocity of the boat with respect to water is.

A. $8j$

B. $-6i - 8j$

C. $6i + 8j$

D. $5\sqrt{2}$

Answer: C

Watch Video Solution

154. A river is flowing from east to west at a speed of $5m/\min$. A man on south bank of river, capable of swimming $10m/\min$ in still water, wants to swim across the river in shortest time. He should swim

A. Due north

B. Due north -east

C. Due north-east with double the speed of river

D. None of these

Answer: A

Watch Video Solution

155. A person aiming to reach the exactly opposite point on the bank of a stream is swimming with a speed of $0.5\frac{m}{s}$ at an angle of 120° with the direction of flow of water. The speed of water in the stream is

A. $1m/s$

B. $0.5m/s$

C. $0.25m/s$

D. $0.433m/s$

Answer: C

Watch Video Solution

156. A moves with $65km/h$ while B is coming back of A with $80km/h$. The relative velocity of B with respect to A is

A. $80km/h$

B. $60km/h$

C. $15km/h$

D. $145km/h$

Answer: C

Watch Video Solution

157. A thief is running away on a straight road in a moving with a speed of $9ms^{-1}$. A policeman chases him on a motor cycle moving at a speed

of $10ms^{-1}$. If the instantaneous separation of the jeep from the motor cycle is $100m$, how long will it take for the policeman to catch the thief ?.

A. 1 second

B. 19 second

C. 90 second

D. 100 second

Answer: D

Watch Video Solution

158. A man can swim with velocity v relative to water. He has to cross a river of width d flowing with a velocity $u(u > v)$. The distance through which he is carried down stream by the river is x. Which of the following statements is correct?

A. If he crosses the river in minimum time $x = \frac{du}{v}$

B. x can not be less than $\frac{du}{v}$

C. For x to be minimum he has to swim in a direction making an angle of

$\frac{\pi}{2} + \sin^{-1}\left(\frac{v}{u}\right)$ with the direction of the flow of water

D. x will be max. if he swims in a directin making an angle of $\frac{\pi}{2} + \frac{\sin^{-1} v}{u}$ with direction of the flow of water

Answer: A::C

Watch Video Solution

159. A man sitting in a bus travelling in a direction from west to east with a speed of

$40km/h$ observes that the rain-drops are falling vertically down. To the another man standing on ground the rain will appear

A. To fall vertically down

B. To fall at an angle going from west to east

C. To fall at an angle going from east to west

D. The information given in insufficient to decide the direction of rain

Answer: B

Watch Video Solution

160. A boat takes two hours to travel 8 km and back in still water. If the velocity of water is 4 km/h, the time taken for going upstream 8 km and coming back is

A. $2h$

B. $2h40$ min

C. $1h20$min

D. cannot be estimated with the information given

Answer: B

Watch Video Solution

161. A 120 m long train is moving towards west with a speed of 10 m/s. A bird flying towards east with a speed of 5 m/s crosses the train. The time taken by the bird to cross the train will be

A. 16 sec

B. 12 sec

C. 10 sec

D. 8 sec

Answer: D

Watch Video Solution

162. A boat crosses a river with a velocity of $8\frac{km}{h}$. If the resulting velocity of boat is $10\frac{km}{h}$ then the velocity of river water is

A. $4km/h$

B. $6km/h$

C. $8km/h$

D. $10km/h$

Answer: B

Watch Video Solution

163. If a vector $\vec{A}$ make angles α, β and γ, respectively , with the X, Y and Z axes , then $\sin^2\alpha + \sin^2\beta + \sin^2\gamma =$

A. 0

B. 1

C. 2

D. 3

Answer: C

Watch Video Solution

164. If the resultant of n forces of different magnitudes acting at a point is zero, then the minimum value of n is

A. 1

B. 2

C. 3

D. 4

Answer: C

165. Can two vectors of different magitudes be combind to give zero resultant ?

A. Yes, when the 2 vectors are same in magnitude and direction

B. No

C. Yes, when the 2 vectors are same in magnitude but opposite in sense

D. Yes, when the 2 vectors are same in magnitude making an angle of $\frac{2\pi}{3}$ with each other

Answer: C

Watch Video Solution

166. The sum of the magnitudes of two forces acting at a point is 18 and the magnitude of their resultant is 12. If the resultant is at 90°

with the force of smaller magnitude, What are the magnitudes of forces?

A. 12,5

B. 14,4

C. 5,13

D. 10,8

Answer: C

Watch Video Solution

167. A vector $\overrightarrow{a}$ is turned without a change in its length through a small angle $d\theta$. Find the value of $\left|\Delta \overrightarrow{a}\right|$ and Δa.

A. $0, ad\theta$

B. $ad\theta, 0$

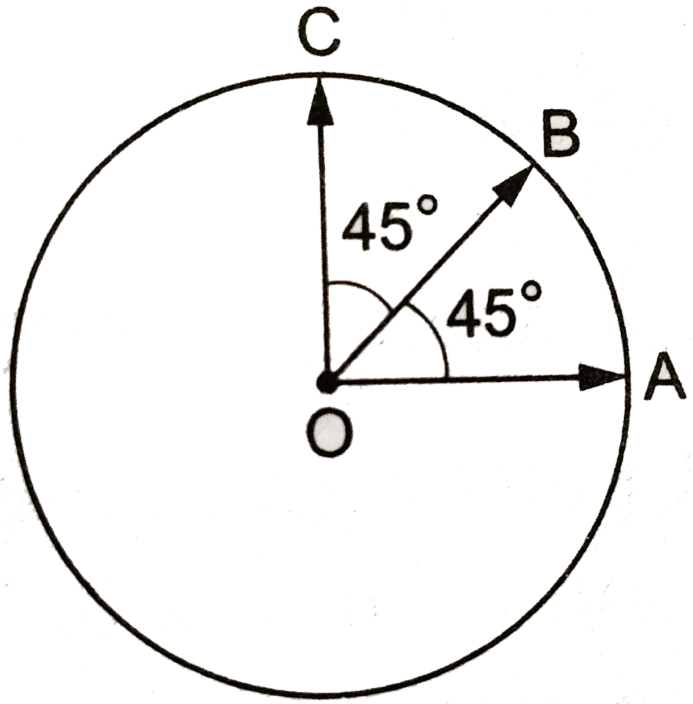
C. $0, 0$

D. None of these

Answer: B

Watch Video Solution

168. Find the resultant of the three vectors $\overrightarrow{OA}, \overrightarrow{OB}$ and $\overrightarrow{OC}$ shown in figure. Radius of the circle is R.



A. $2R$

B. $R\left(1+\sqrt{2}\right)$

C. $R\sqrt{2}$

D. $R\left(\sqrt{2}-1\right)$

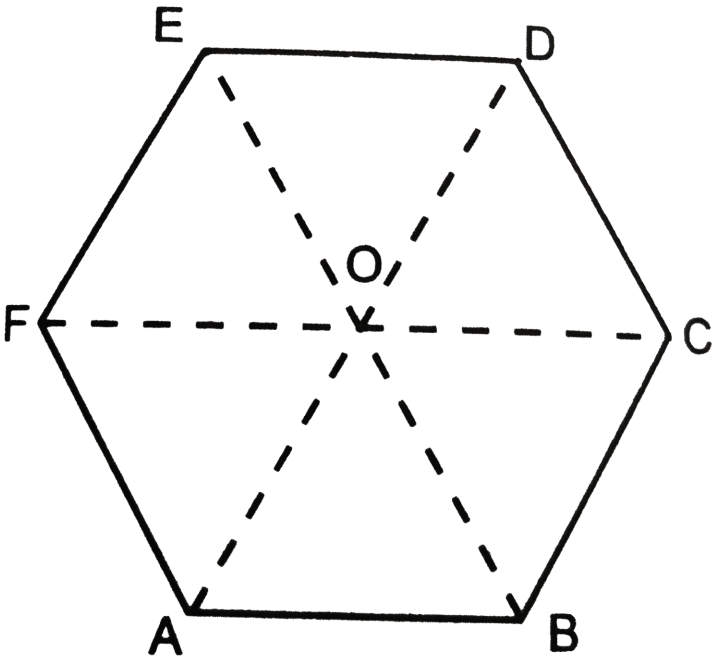
Answer: B

Watch Video Solution

169. $ABCDEF$ is a regular hexagon, Fig. 2 (c)

.65. What is the value of

$\overrightarrow{AB} + \overrightarrow{AC} + \overrightarrow{AD} + \overrightarrow{AE} + \overrightarrow{AF}$?



A. $\overrightarrow{AO}$

B. $2\overrightarrow{AO}$

C. $4\overrightarrow{AO}$

D. $6\overrightarrow{AO}$

Answer: D

Watch Video Solution

170. The length of second's hand in watch is $1cm$. The change in Velocity of its tip in 15 seconds is

A. Zero

B. $\frac{\pi}{30\sqrt{2}} cm/\sec$

C. $\frac{\pi}{30} cm/\sec$

D. $\frac{\pi\sqrt{2}}{30} cm/\sec$

Answer: D

Watch Video Solution

171. A particle moves towards east with velocity $5m/s$. After $10\,\text{sec}onds$ its direction changes towards north with same Velocity. The average acceleration of the particle is

A. Zero

B. $\frac{1}{\sqrt{2}}m/s^2N - W$

C. $\frac{1}{\sqrt{2}}m/s^2N - E$

D. $\frac{1}{\sqrt{2}} m / s^2 S - W$

Answer: B

Watch Video Solution

172. A force $F = -K\left(y\hat{i} + x\hat{j}\right)$ (where K is a positive constant) acts on a particle moving in the x-y plane. Starting from the origin, the particle is taken along the positive x-axis to the point $(a, 0)$, and then parallel to the y-axis to the point (a, a). The total work done by the force F on the particle is

A. $-2Ka^2$

B. $2Ka^2$

C. $-Ka^2$

D. Ka^2

Answer: C

Watch Video Solution

173. The vectors from origin to the points A and B are $\vec{A} = 3\hat{i} - 6\hat{j} + 2\hat{k}$ and

$\overrightarrow{B} = 2\hat{i} + \hat{j} + 2\hat{k}$ respectively. The are of triangle OAB be

A. $\frac{5}{2}\sqrt{17}$ sq. unit

B. $\frac{2}{5}\sqrt{17}$ sq. unit

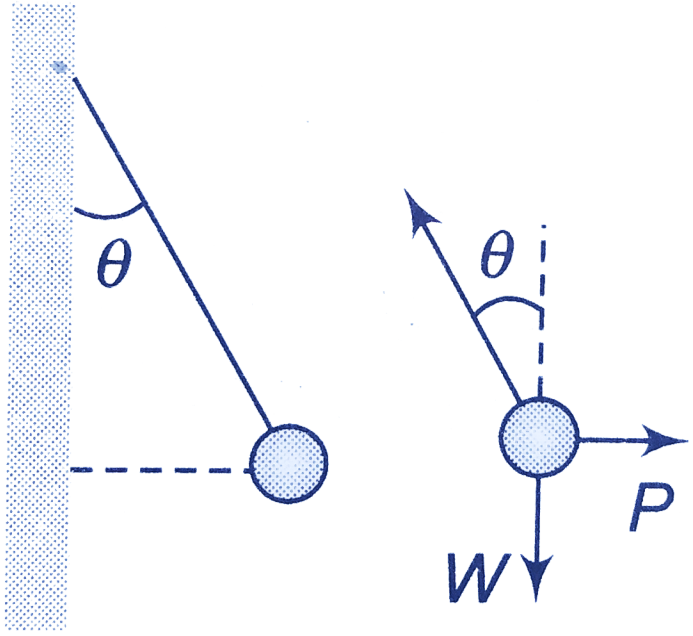
C. $\frac{3}{5}\sqrt{17}$ sq. unit

D. $\frac{5}{3}\sqrt{17}$ sq. unit

Answer: A

Watch Video Solution

174. A metal sphere is hung by a string fixed to a wall. The sphere is pushed away from the wall by a stick. The forces acting on the sphere are shown in the second diagram. Which of the following statements is wrong?



A. $P = W \tan\theta$

B. $\vec{T} + \vec{P} + \vec{W} = 0$

C. $T^2 = P^2 + W^2$

D. $T = P + W$

Answer: D

Watch Video Solution

175. A boat having a speed of $5km/hr.$ in still water, crosses a river of width $1km$ along the

shortest possible path in 15 minutes. The speed of the river in Km/hr.

A. $1km/h$

B. $3km/h$

C. $4km/h$

D. $5km/h$

Answer: B

Watch Video Solution

176. A man crosses a $320m$ wide river perpendicular to the current in 4 min. If in still water he can swim with a speed $5/3$ times that of the current, then the speed of the current, in $m/\ \min$ is

A. 30

B. 40

C. 50

D. 60

Answer: D

Watch Video Solution

177. Assertion: $\vec{A} \times \vec{B}$ is perpendicular to both $\vec{A} + \vec{B}$ as well as $\vec{A} - \vec{B}$.

Reason: $\vec{A} + \vec{B}$ as well as $\vec{A} - \vec{B}$ lie in the plane containing $\vec{A}$ and $\vec{B}$, but $\vec{A} \times \vec{B}$ lies perpendicular to the plane containing $\vec{A}$ and $\vec{B}$

A. If both assetion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion

C. If assertion is true but reason is false

D. If the assertion and reason both are false.

Answer: A

Watch Video Solution

178. Assertion: Angle between $\hat{i}+\hat{j}$ and $\hat{i}$ is 45°.

Reason: $\hat{i} + \hat{j}$ is equally inclined to both $\hat{i}$ and $\hat{j}$ and the angle between $\hat{i}$ and $\hat{j}$ is 90°.

A. If both assetion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion

C. If assertion is true but reason is false

D. If the assertion and reason both are false.

Answer: A

Watch Video Solution

179. Assertion: If θ be the angle between $\vec{A}$ and $\vec{B}$ then $\tan\theta = \frac{\vec{A} \times \vec{B}}{\vec{A} \cdot \vec{B}}$

Reason: $\vec{A} \times \vec{B}$ is perpendicular to $\vec{A} \cdot \vec{B}$

A. If both assetion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion

C. If assertion is true but reason is false

D. If the assertion and reason both are false.

Answer: D

Watch Video Solution

180. Statement-1:If ,$\left|\vec{A}+\vec{B}\right|=\left|\vec{A}-\vec{B}\right|$ then angle between $\vec{A}$ and $\vec{B}$ is 90°

Statement-2 : $\overrightarrow{A} + \overrightarrow{B} = \overrightarrow{B} + \overrightarrow{A}$

A. If both assetion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion

C. If assertion is true but reason is false

D. If the assertion and reason both are false.

Answer: B

Watch Video Solution

181. Assertion: Vector product of two vectors is an axial vector.

Reason: If $\overrightarrow{v}$ = instantaneous Velocity, $\overrightarrow{r}$ = radius vector and $\overrightarrow{\omega}$ = angular velocity, then $\overrightarrow{\omega} = \overrightarrow{v} \times \overrightarrow{r}$.

A. If both assetion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion

C. If assertion is true but reason is false

D. If the assertion and reason both are false.

Answer: C

 Watch Video Solution

182. Assertion: Minimum number of non-equal Vectors in a plane required to give zero

resultant is three.

Reason: If $\vec{A} + \vec{B} + \vec{C} = \vec{0}$, then they must lie in one plane

A. If both assetion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion

C. If assertion is true but reason is false

D. If the assertion and reason both are false.

Answer: B

Watch Video Solution

183. Assertion: Relative velocity of A w.r.t B is greater than the velocity of either, when they are moving in opposite directions.

Reason: Relative velocity of A w.r.t $B = \overrightarrow{v}_A - \overrightarrow{v}_B$

A. If both assetion and reason are true and the reason is the correct explanation of

the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion

C. If assertion is true but reason is false

D. If the assertion and reason both are false.

Answer: A

184. Assertion: Vector addition of two vectors $ved A$ and $\overrightarrow{B}$ is commutative.

Reason: $\overrightarrow{A} + \overrightarrow{B} = \overrightarrow{B} + \overrightarrow{A}$

A. If both assetion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion

C. If assertion is true but reason is false

D. If the assertion and reason both are false.

Answer: B

Watch Video Solution

185. Assertion: $\vec{A} . \vec{B} = \vec{B} . \vec{A}$

Reason: Dot product of two vectors is commutative.

A. If both assetion and reason are true and the reason is the correct explanation of

the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion

C. If assertion is true but reason is false

D. If the assertion and reason both are false.

Answer: A

 Watch Video Solution

186. Assertion: $\overrightarrow{\tau} = \overrightarrow{r} \times \overrightarrow{F}$ and $\overrightarrow{\tau} \neq \overrightarrow{F} \times \overrightarrow{r}$

Reason: Cross product of vectors is commutative.

A. If both assetion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion

C. If assertion is true but reason is false

D. If the assertion and reason both are false.

Answer: C

Watch Video Solution

187. A positive acceleration of a body can be associated with a slowing down` of the body.

Acceleration is a vector quantity.

A. If both assetion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion

C. If assertion is true but reason is false

D. If the assertion and reason both are false.

Answer: B

188. Assertion: A physical quantity cannot be called as a vector if its magnitude is zero.

Reason: A vector has both, magnitude and direction.

A. If both assetion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of

the assertion

C. If assertion is true but reason is false

D. If assertion is false but reason is true.

Answer: D

189. Assertion: The some of two Vectors can be zero.

Reason: The vector cancel each other, when they are equal and opposite.

A. If both assetion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion

C. If assertion is true but reason is false

D. If the assertion and reason both are false.

Answer: A

190. Assertion: Two vectors are said to be like vectors if they have same direction but different magnitude.

Reason: Vector quantities do not have specific direction.

A. If both assetion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of

the assertion

C. If assertion is true but reason is false

D. If the assertion and reason both are false.

Answer: C

191. Assertion: The scalar product of two vectors can be zero

Reason: If two vectors are perpendicular to each other their scalar product will be zero.

A. If both assetion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion

C. If assertion is true but reason is false

D. If the assertion and reason both are false.

Answer: A

192. Assertion: Multiplying any vector by an scalar is meaningful operatons.

Reason: In uniform motion spedd remains constant.

A. If both assetion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of

the assertion

C. If assertion is true but reason is false

D. If the assertion and reason both are false.

Answer: B

193. Assertion: A null Veactor is a vector whose magnitude is zero and directon is arbitrary.

Reason: A null vector does not exist

A. If both assetion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion

C. If assertion is true but reason is false

D. If the assertion and reason both are false.

Answer: C

194. Assertion: If dot product and cross product of $\overrightarrow{A}$ and $\overrightarrow{B}$ are zero, it implies that one of the vector $\overrightarrow{A}$ and $\overrightarrow{B}$ must be a null vector.

Reason: Null vector is a vector with zero magnitude.

A. If both assetion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of

the assertion

C. If assertion is true but reason is false

D. If the assertion and reason both are false.

Answer: B

 Watch Video Solution

195. Assertion: The cross product of a vector with itself is a null vector.

Reason: The cross-product of two vectors results in a vector quantity.

A. If both assetion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion

C. If assertion is true but reason is false

D. If the assertion and reason both are false.

Answer: B

196. Assertion: The minimum number of non-coplanar Vectors whose sum can be zero, is four Reason: The resultant of two vectors of unequal magnitude can be zero.

A. If both assetion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of

the assertion

C. If assertion is true but reason is false

D. If the assertion and reason both are false.

Answer: C

Watch Video Solution

197. Assertion: If $\vec{A} . \vec{B} = \vec{B} . \vec{C}$, then $\vec{A}$ may not always be equal to $\vec{C}$.

Reason: The dot product of two vectors involves consine of the angle between the two vectors.

A. If both assetion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion

C. If assertion is true but reason is false

D. If the assertion and reason both are false.

Answer: A

198. Assertion: Vector addition is commutative.

Reason: $\left(\overrightarrow{A}+\overrightarrow{B}\right) \neq \left(\overrightarrow{B}+\overrightarrow{A}\right)$

A. If both assetion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion

C. If assertion is true but reason is false

D. If the assertion and reason both are false.

Answer: C

Watch Video Solution

199. $0.4\hat{i} + 0.8\hat{j} + c\hat{k}$ represents a unit vector, when c is :-

A. -0.2

B. $\sqrt{0.2}$

C. $\sqrt{0.8}$

D. 0

Answer: A

Watch Video Solution

200. The angles with a vector $\hat{i} + \hat{j} + \sqrt{2\hat{k}}$ makes with X,Y and Z axes respectively are

A. $60^\circ, 60^\circ, 60^\circ$

B. $45^\circ, 45^\circ, 45^\circ$

C. $60^\circ, 60^\circ, 45^\circ$

D. $45^\circ, 45^\circ, 60^\circ$

Answer: A

Watch Video Solution

201. The value of a unit vector in the direction of vector $A = 5\hat{i} - 12\hat{j}$

A. $\hat{i}$

B. $\hat{j}$

C. $\left(\hat{i} + \hat{j}\right)/13$

D. $\left(5\hat{i} - 12\hat{j}\right)/13$

Answer: A

Watch Video Solution

202. Which of the following is independing of the choice of co-ordinate system

A. $\overrightarrow{P} + \overrightarrow{Q} + \overrightarrow{R}$

B. $(P_x + Q_x + R_x)\hat{i}$

C. $P_x\hat{i} + Q_y\hat{j} + R_z\hat{k}$

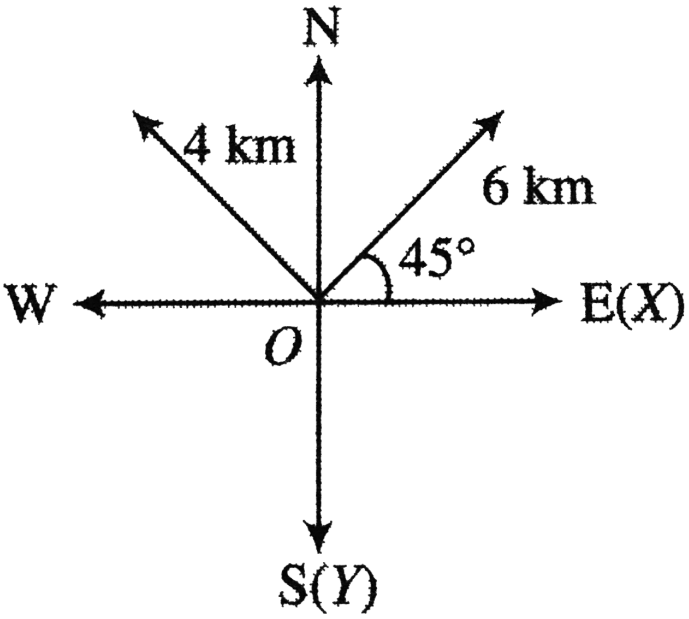
D. None of these

Answer: A

Watch Video Solution

203. A car travles 6km towards north at an angle of 45° to the east and then travles distance of 4km towards north at an angle of 135° to east (figure). How far is the point from the starting point? What angle does the straight line joining its initial and final position

makes with the east?



A. $\sqrt{50}km$ and $\tan^{-1}(5)$

B. $10km$ and $\tan^{-1}(5)$

C. $\sqrt{52}km$ and $\tan^{-1}(5)$

D. $\sqrt{52}km$ and $\tan^{-1}\left(\sqrt{5}\right)$

Answer: A

Watch Video Solution

204. Given that $\vec{A} + \vec{B} + \vec{C} = 0$, out of three vectors two are equal in magnitude and the magnitude of third vector is $\sqrt{2}$ times that of either of two having equal magnitude. Then angle between vectors are given by

A. $30^\circ, 60^\circ, 90^\circ$

B. $45^\circ, 45^\circ, 90^\circ$

C. $45^\circ, 60^\circ, 90^\circ$

D. $90^\circ, 135^\circ, 135^\circ$

Answer: A

Watch Video Solution

205. Two forces $F_1 = 1N$ and $F_2 = 2N$ act along the lines x=0 and y=0, respectively. Then find the resultant of forces.

A. $\hat{i} + 2\hat{j}$

B. $\hat{i} + \hat{j}$

C. $3\hat{i} + 2\hat{j}$

D. $2\hat{i} + \hat{j}$

Answer: A

Watch Video Solution

206. At what angle must the two forces $(x + y)$ and $(x - y)$ act so that the resultant may be $\sqrt{x^2 + y^2}$

A. $\cos^{-1}\left(-\frac{x^2+y^2}{2(x^2-y^2)}\right)$

B. $\cos^{-1}\left(-\frac{2(x^2-y^2)}{x^2+y^2}\right)$

C. $\cos^{-1}\left(-\frac{x^2+y^2}{x^2-y^2}\right)$

D. $\cos^{-1}\left(-\frac{x^2-y^2}{x^2+y^2}\right)$

Answer: A

Watch Video Solution

207. Following forces start acting on a particle at rest at the origin of the co-ordiante system simultaneously

$\vec{F}_1 = 4\hat{i} - 4\hat{j} + 5\hat{k}, vac F_2 = 5\hat{i} + 8\hat{j} + 6\hat{k},$

$\vec{F}_3 = -3\hat{i} + 4\hat{j} - 7\hat{k}$ and

$\vec{F}_4 = 2\hat{i} - 3\hat{j} - 2\hat{k}$ then the particle will move

A. In $x - y$ plane

B. In $y - z$ plane

C. In $x - z$ plane

D. Along x-axis

Answer: A

Watch Video Solution

208. The resultant of $\vec{A} + \vec{B}$ is $\vec{R}_1$. On reversing the vector $\vec{B}$, the resultant becomes $\vec{R}_2$. What is the value of $R_1^2 + R_2^2$?

A. $A^2 + B^2$

B. $A^2 - B^2$

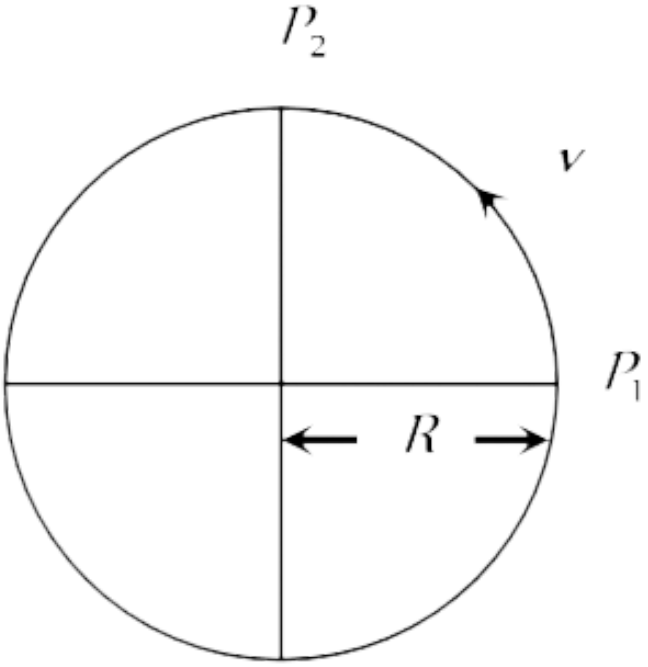
C. $2\left(A^2 + B^2\right)$

D. $2\left(A^2 - B^2\right)$

Answer: A

Watch Video Solution

209. Figure below shows a body of mass M moving with the uniform speed on a circular path of radius, R. What is the change in acceleration in going from P_1 to P_2



A. Zero

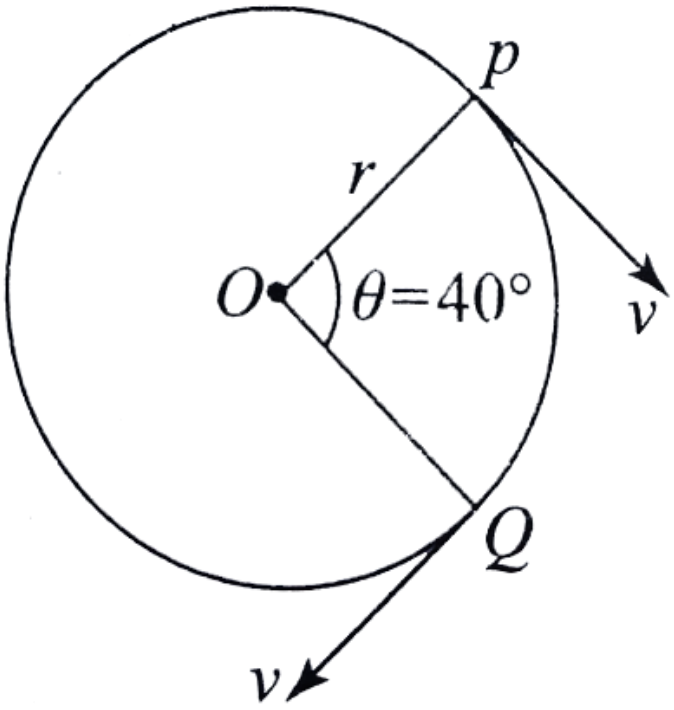
B. $v^2 / 2R$

C. $2v^2 / R$

D. $\frac{v^2}{R} \times \sqrt{2}$

Answer: A

Watch Video Solution



210.

A particle is moving on a circular path of radius r with uniform velocity v. The change in velocity when the particle moves from P to Q is $(\angle POQ = 40^\circ)$

A. $2v\cos 40^\circ$

B. $2v\sin 40^\circ$

C. $2v\sin 20^\circ$

D. $2v\cos 20^\circ$

Answer: A

Watch Video Solution

211. $\vec{A} = 2\hat{i} + 4\hat{j} + 4\hat{k}$ and $\vec{B} = 4\hat{i} + 2\hat{j} - 4\hat{k}$ are two vectors. The angle between them will be

A. 0°

B. 45°

C. 60°

D. 90°

Answer: D

Watch Video Solution

212. If $\vec{A} = 2\hat{i} + 3\hat{j} - \hat{k}$ and $\vec{B} = -\hat{i} + 3\hat{j} + 4\hat{k}$ then projection of $\vec{A}$ on $\vec{B}$ will be

A. $\frac{3}{\sqrt{13}}$

B. $\frac{3}{\sqrt{26}}$

C. $\sqrt{\frac{3}{26}}$

D. $\sqrt{\frac{3}{13}}$

Answer: B

Watch Video Solution

213. Two constant forces $F_1 = 2\hat{i} - 3\hat{j} + 3\hat{k}(N)$ and $F_2 = \hat{i} + \hat{j} - 2\hat{k}(N)$ act on a body and

displace it from the position $r_1 = \hat{i} + 2\hat{j} - 2\hat{k}(m)$ to the position $r_2 = 7\hat{i} + 10\hat{j} + 5\hat{k}(m)$. What is the work done

A. $9J$

B. $41J$

C. $-3J$

D. None of these

Answer: A

Watch Video Solution

214. For the any two vecrtors $\vec{A}$ and $\vec{B}$, if $\vec{A} . \vec{B} = \left| \vec{A} \times \vec{B} \right|$, the magnitude of $\vec{C} = \vec{A} + \vec{B}$ is equal to

A. $\sqrt{A^2 + B^2}$

B. $A + B$

C. $\sqrt{A^2 + B^2 + \frac{AB}{\sqrt{2}}}$

D. $\sqrt{A^2 + B^2 + \sqrt{2} \times AB}$

Answer: D

Watch Video Solution

215. Which of the following is the unit vector perpendicular to $\vec{A}$ and $\vec{B}$

A. $\frac{\hat{A} \times \hat{B}}{Ab \sin \theta}$ e

B. $\frac{\hat{A} \times \hat{B}}{Ab \cos \theta}$

C. $\frac{\vec{A} \times \vec{B}}{Ab \sin \theta}$

D. $\frac{\vec{A} \times \vec{B}}{Ab \cos \theta}$

Answer: A

Watch Video Solution

216. Two vectors $P = 2\hat{i} + b\hat{j} + 2\hat{k}$ and $Q = \hat{i} + \hat{j} + \hat{k}$ will be parallel if

A. $b = 0$

B. $b = 1$

C. $b = 2$

D. $b = -4$

Answer: C

Watch Video Solution

217. Which of the following is not true? If $\vec{A} = 3\hat{i} + 4\hat{j}$ and $\vec{B} = 6\hat{i} + 8\hat{j}$ where A and B are the magnitude of $\vec{A}$ and $\vec{B}$

A. $\vec{A} \times \vec{B} = 0$

B. $\frac{A}{B} = \frac{1}{2}$

C. $\vec{A} . \vec{B} = 50A = 5$

D. $A = -5$

Answer: D

Watch Video Solution

218. The area of the triangle formed by $2\hat{i}+\hat{j}-\hat{k}$ and $\hat{i}+\hat{j}+\hat{k}$ is

A. 3 sq-unit

B. $2\sqrt{3}$ sq. unit

C. $2\sqrt{14}$ sq. unit

D. $\frac{\sqrt{14}}{2}$ sq. unit

Answer: D

Watch Video Solution

219. Two trains along the same straight rails moving the constant speed $60km/hr$ and $30km/hr$ respectively towards each other. If at time $t = 0$, the distance between then is $90km$, the time when they collide is

A. 1 hr

B. 2 hr

C. 3 hr

D. 4 hr

Answer: A

Watch Video Solution

220. A steam boat goes across a lake and comes back : (a) on a quiet day when the water is still and (b) on a rough day when there is a uniform current so as to help the journey onward and to impede the journey backward. If the speed of launch on both days same, in which case will it complete the journey in lesser time?

A. Case (a)

B. Case (b)

C. Same in both

D. Nothing can be predicted

Answer: A

Watch Video Solution

221. To a person, going eastward in a car with a velociyt of $25km/hr$, a train appears to move towards north with a velocity of $25\sqrt{3}km/hr$. The actual velocity of the train will be

A. $25km/hr$

B. $50km/hr$

C. $5km/hr$

D. $5\sqrt{3}km/hr$

Answer: A

Watch Video Solution

222. A swimmer can swim in still water with speed v and the river is flowing with velociyt $v/2$. To cross the river in shortest distance, he should swim making angle θ with the upstream.

What is the ratio of the time taken to swim across the shortest time to that is swimming across over shortest distance

A. $\cos\theta$

B. $\sin\theta$

C. $\tan\theta$

D. $\cot\theta$

Answer: A

Watch Video Solution

223. A bus is moving with a velocity $10ms^{-1}$ on a straight road. A scooterist wishes to overtake the bus in $100s$. If the bus is at a distance of $1km$ from the scooterist, with what velocity should the scooterist chase the bus ?

A. $50m/s$

B. $40m/s$

C. $30m/s$

D. $20m/s$

Answer: A

Watch Video Solution