PHYSICS

BOOKS - CP SINGH PHYSICS (HINGLISH)

VECTORS

Example

1. Two vectors have magnitudes 6 and 8 units, respectively. Find the magnitude of the resultant vector if the angle between vectors is (a) 60° (b) 90° and (c) 120°.

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2. Two vectors acting through a point are in the ratio $3:5$. If the angle between them is 60° and the magnitude of their resultant is 35 , find the magnitude of vectors.

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3. Two forces acting in opposite direction have resultant $10N$ and when acting perpendicularly have resultant $50N$. Find the magnitude of forces.

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4. Two vectors of equal magnitude are acting through a point. The magnitude of resultant is equal to the magnitude of either vectoe. Find the angle between the vectors.

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5. The resultant of two forces,one double the other in magnitude,is perpendicular to the smaller of the two forces.The angle between the two forces is

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6. The resultant of two forces 3P and 2P is R. If the first force is doubled then resultant is also doubled.The angle between the two forces is

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7. 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?

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8. If N-vectors of equal magnitude are acting through a point and angle between the adjacent vectors is $2\pi / N$, find the resultant.

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9. If $\left|\vec{P}+\vec{Q}\right|=\left|\vec{P}-\vec{Q}\right|$, find the angle between $\vec{P}$ and $\vec{Q}$.

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10. A particle is moving along a circle with a uniform speed $10m / s$. At $t=0$, the particle is moving along

east. Find the change in velocity (magnitude and direction) in (a) $1/4th$ revolution , (b) $1/2$ revolution , (c) $3/4th$ revolution and (d) 1 revolution.

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11. A particle is moving along a circle of radius R with a uniform speed v. At $t = 0$, the particle is moving along the east. Find the average acceleration (magnitude and direction) in (a) $1/4th$ revolution and (b) $1/2$ revolution.

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12. A particle is moving along a circle with a uniform speed v. Find (a) change in the magnitude of velocity and (b) the magnitude of change in the velocity when it has rotated an angle θ. $(0 < \theta < 90^\circ)$

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13. In the previous problem ,find the magnitude of change in velocity if (a) $90^\circ < \theta < 180^\circ$, (b) $180^\circ < \theta < 270^\circ$ and (c) $270^\circ < \theta < 360^\circ$.

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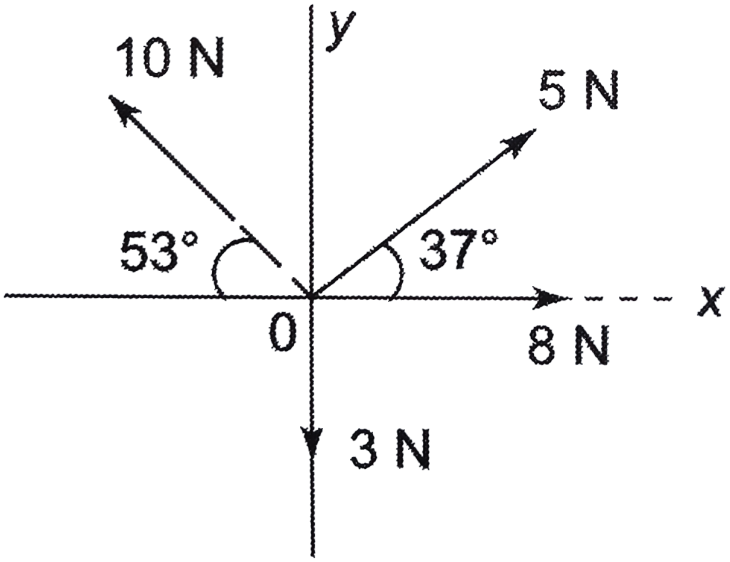
14. Find the resultant of the following forces.

$$\left[\sin 37^\circ = \frac{3}{5}, \cos 37^\circ = \frac{4}{5}, \sin 53^\circ = \frac{4}{5}, \cos 53^\circ = \frac{3}{5}\right]$$



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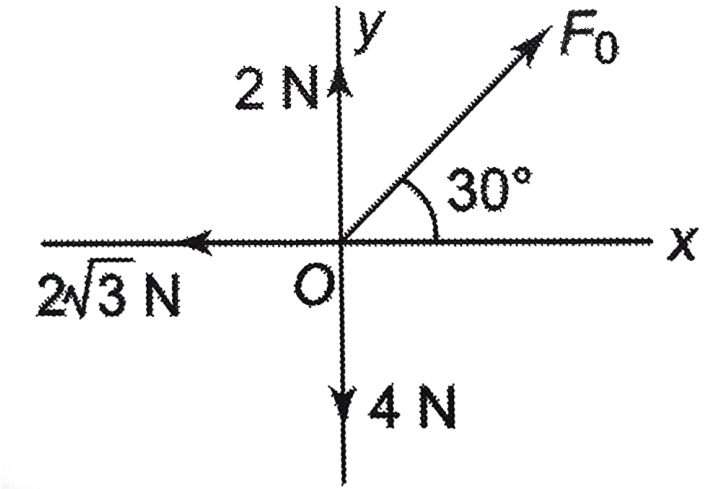
15. If the resultant of the following forces is zero, find the value of F_0.



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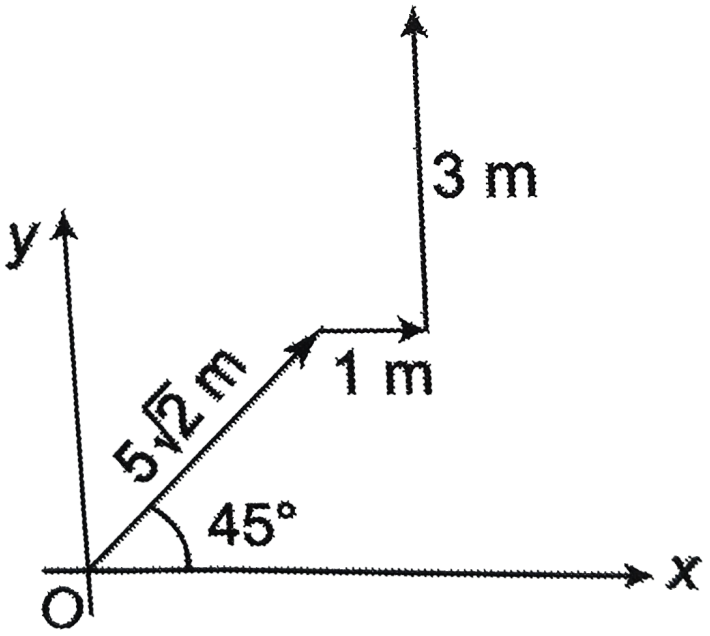
16. Find the resultant of three vectors shown in the figure.



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17. A person moves $30m$ north,, $then$20 m towards east and finally $30\sqrt{2}m$ in south-west direction. The displacement of the person from the origin will be

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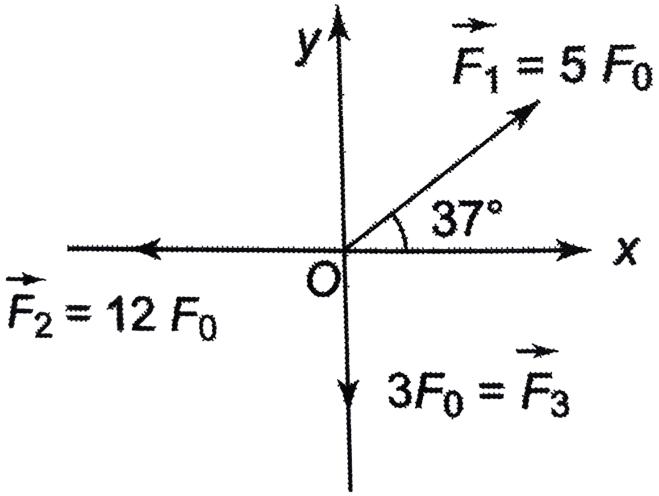
18. Find the resultant of $\overrightarrow{F_1} + \overrightarrow{F_2} - \overrightarrow{F_3}\left(\sin 37^\circ = \frac{3}{5}, \cos 37^\circ = \frac{4}{5}\right)$



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19. A force $3N$ is acting along the NE and another force $4N$ is acting the NW. Find the angle made by the resultant force with north.

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20. A vector is given by $\vec{A} = 3\hat{i} + 4\hat{j} + 5\hat{k}$. Find the magnitude of $\vec{A}$, unit vector along $\vec{A}$ and angles made by $\vec{A}$ with coordinate axes.

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21. Find a unit vector in the direction of $\overrightarrow{AB}$, where $A(1, 2, 3)$ and $B(2, 3, 5)$ are the given points.

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22. Find a vector in the direction of the vector $2\hat{i} - \hat{j} + 4\hat{k}$, which has magnitude $4units$.

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23. If $\vec{a} = \hat{i} + 2\hat{j} + 3\hat{k}$ and $\vec{b} = 2\hat{i} + 3\hat{j} + \hat{k}$, find a unit vector in the direction of $\left(2\vec{a} + \vec{b}\right)$.

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24. If $\vec{a}$ and $\vec{b}$ are two vectors such that $\left|\vec{a}\right| = 4, \left|\vec{b}\right| = 1/2$ and vec(a) . $\vec{b} = -1$, find the angle between $\vec{a}$ and $\vec{b}$.

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25. If $\vec{a} = \hat{i} + \hat{j} + 2\hat{k}$ and $\vec{b} = 3\hat{i} + 2\hat{j} - \hat{k}$, find the value of $\left(\vec{a} + 3\vec{b}\right).\left(2\vec{a} - \vec{b}\right)$.

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26. If vectors $\vec{a} = 3\hat{i} + \hat{j} - 2\hat{k}$ and $\vec{b} = \hat{i} + \lambda(j) - 3\hat{k}$ are perpendicular to each other , find the value of λ.

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27. If $\vec{a} = 5\hat{i} - \hat{j} - 3\hat{k}$ and $\vec{b} = \hat{i} + 3\hat{j} - 5\hat{k}$, find the angle between $\vec{a}$ and $\vec{b}$.

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28. Find the projection of $\vec{a} = 2\hat{i} - \hat{j} + \hat{k}$ on $\vec{b} = \hat{i} - 2\hat{j} + \hat{k}$.

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29. Find the (a) scalar component and (b) vector component of $\vec{A} = 3\hat{i} + 4\hat{j} + 5\hat{k}$ on $\vec{B} = \hat{i} + \hat{j} + \hat{k}$.

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30. If $\vec{a}, \vec{b}$ and $\vec{c}$ be three vectors such that $\vec{a}+\vec{b}+\vec{c}=0$ and $\left|\vec{a}\right|=3, \left|\vec{b}\right|=5, \left|\vec{C}\right|=7$, find the angle between $\vec{a}$ and $\vec{b}$.

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31. If $\vec{a}=2\hat{i}+2\hat{j}+\hat{k}, \vec{b}=-\hat{i}+\hat{j}+2\hat{k}$ and $\vec{c}=3\hat{i}+\hat{j}$ such that $\vec{a}+\lambda\hat{}$(b) is perpendicular to $\vec{c}$, find λ.

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32. If $\vec{a} = 3\hat{i} + \hat{j} - 4\hat{k}$, $\vec{b} = 6\hat{i} + 5\hat{j} - 2\hat{k}$. Find (a) $\vec{a} \times \vec{b}$ and (b) area of a triangle whose adjacent sides are dertermined by $\vec{a}$ and $\vec{b}$.

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33. If $\vec{a} = 2\hat{i} + 6\hat{j} + 3\hat{k}$, $\vec{b} = \hat{i} + \lambda\hat{j} + \mu\hat{k}$. If $\vec{a} \times \vec{b} = 0$, find the value of λ and μ.

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34. Find a unit vector perpendicular to each one of the vectors $\vec{a} = 4\hat{i} - \hat{j} + 3\hat{k}$ and $\vec{b} = 3\hat{i} + 2\hat{j} - \hat{k}$.

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35. If $\left|\vec{a}\right| = \sqrt{2}, \left|\vec{b}\right| = 7$ and $\vec{a} \times \vec{b} = 2\hat{i} + 6\hat{j} + 3\hat{k}$. Find the angle between $\vec{a}$ and $\vec{b}$.

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36. If $\left|\vec{a}\right| = \sqrt{26}, \left|\vec{b}\right| = 7$, and $\left|\vec{a} \times \vec{b}\right| = 35$. Find $\vec{a}$. $Vec(b)$.

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37. If $\vec{a} = 4\hat{i} + 3\hat{j} + 2\hat{k}$ and $\vec{b} = 3\hat{i} + 2\hat{k}$ Find $\left|\vec{b} \times 2\vec{a}\right|$.

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38. If $\vec{a} = 3\hat{i} + 2\hat{k}$, $\vec{b} = 3\hat{j} - \hat{k}$ and $\vec{c} = \hat{i} + \hat{j} + \hat{k}$. Find $\left(\vec{a} \times \vec{b}\right).\vec{c}$.

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39. In the previous problem , find $\left(\vec{b} \times \vec{c}\right).\vec{b}$.

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Excercises

1. A vector is not changed if

A. It is rotated through an arbitrary angle

B. It is multiplied by an arbitrary scalar

C. It is cross - multiplied by a unit vector

D. It is slid parallel to itself

Answer: D

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2. Two forces, each of magnitude F have a resultant of the same magnitude F. The angle between the two forces is

A. 45°

B. 120°

C. 150°

D. 60°

Answer: B

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3. Two vectors acting through a point are in the ratio $3:5$. If the angle between them is 60° and the magnitude of their resultant is 35 , find the magnitude of vectors.

A. $12N, 20N$

B. $15N, 25N$

C. $18N, 30N$

D. $21N, 28N$

Answer: B

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4. The magnitude of vectros $\vec{A}$,$\vec{B}$ and $\vec{C}$ are 12, 5 and 13 units respectively and $\vec{A} + \vec{B} = \vec{C}$, find the angle between $\vec{A}$ and $\vec{B}$.

A. 60°

B. 90°

C. 120°

D. None

Answer: B

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5. If $\vec{A} = \vec{B} + \vec{C}$, and the magnitudes of $\vec{A}, \vec{B}, \vec{C}$ are 5,4, and 3 units, then the angle between $\vec{A}$ and $\vec{C}$ is

A. $\cos^{-1}(3/5)$

B. $\cos^{-1}(4/5)$

C. $\sin^{-1}(3/4)$

D. $\pi/2$

Answer: A

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6. Two forces, while acting on particle in opposite directions,have the resultant of 10N. If they act at right angles to each other, the resultant is found to be 50N. Find the two forces?

A. $40N, 30N$

B. $50N, 40N$

C. $30N, 20N$

D. $35N, 25N$

Answer: A

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7. One of the following forces is double and the other resultant is equal to the greater force. The angle between them is

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

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

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

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

Answer: D

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8. Two vectors of magnitude 4 and 6 are acting through a point. If the magnitude of the resultant is R

A. $4 < R < 6$

B. $4 < R < 10$

C. $2 \leq R \leq 10$

D. $2 \geq R \geq 10$

Answer: C

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9. The resultant of $\vec{A}$ and $\vec{B}$ makes an angle α with $\vec{A}$ and β and $\vec{B}$,

A. $\alpha < \beta$ if $A > B$

B. $\alpha < \beta$ if $A < B$

C. $\alpha = \beta$ if $A < B$

D. $\alpha < \beta$ if $A = B$

Answer: A

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10. Which of the sets given below may represent the magnitudes of three vectors adding to zero?

A. $2, 4, 8$

B. $4, 8, 16$

C. $1, 2, 1$

D. $0.5, 1, 2$

Answer: C

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11. The following sets of three vectors act on a body, whose resultant can be zero. These are :

A. $10, 10, 10$

B. $10, 10, 20$

C. $10, 20, 23$

D. $10, 20, 40$

Answer: D

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12. Three vectors $\vec{P}, \vec{Q}$ and $\vec{R}$ are such that $\left|\vec{P}\right|, \left|\vec{Q}\right|, \left|\vec{R}\right| = \sqrt{2}\left|\vec{P}\right|$ and $\vec{P} + \vec{Q} + \vec{R} = 0$. The angle between $\vec{P}$ and $\vec{Q}$, $\vec{Q}$ and $\vec{R}$ and $\vec{P}$ and $\vec{R}$ are

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

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

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

D. $45^\circ, 135^\circ, 135^\circ$

Answer: A

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13. Three forces $9, 12$ and $15N$ acting at a point are in equilibrium . The angle between $9N$ and $15N$ is

A. $\cos^{-1}(3/5)$

B. $\cos^{-1}(4/5)$

C. $\pi - \cos^{-1}(3/5)$

D. $\pi - \cos^{-1}(4/5)$

Answer: C

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14. 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: D

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

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

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

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16. Forces of 1 and $2units$ act along the lines $x = 0$ and $y = 0$. The equation of the line of action of the resultant is

A. $y - 2x = 0$

B. $2y - x = 0$

C. $y + x = 0$

D. $y - x = 0$

Answer: B

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17. 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

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18. A particle is being acted upon by four forces of $30N$ due east , $20N$ due north , $50N$ due west and $40N$ due south. The resultant force will be

A. $20\sqrt{2}N, 60^\circ$ south to west

B. $20\sqrt{2}N, 45^\circ$ south west

C. $20\sqrt{2}N, 45^\circ$ north to east

D. $20\sqrt{2}N, 45^\circ$ south to east

Answer: B

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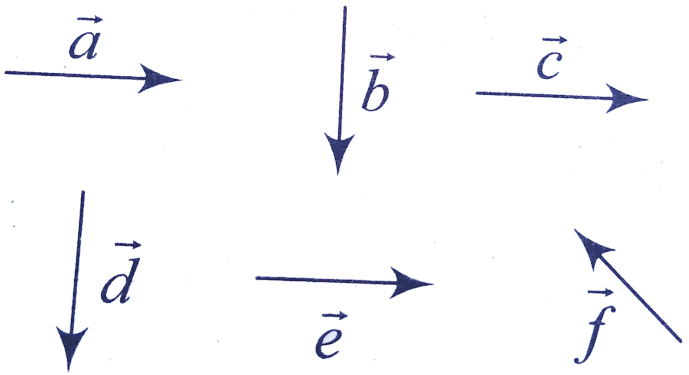
19. Six vector $\vec{a}$ through $\vec{f}$ have the magnitudes and direction indicated in the figure. Which of the following statements is true?



A. $\vec{b} + \vec{€} = \vec{f}$

B. $\vec{b} + \vec{c} = \vec{f}$

C. $\vec{d} + \vec{c} = \vec{f}$

D. $\vec{d} + \vec{e} = \vec{f}$

Answer: D

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20. If N-vectors of equal magnitude are acting through a point and angle between the adjacent vectors is $2\pi / N$, find the resultant.

A. NF

B. $\left(\frac{N+1}{2}\right)F$

C. $\left(\frac{N-1}{2}\right)F$

D. zero

Answer: D

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21. 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

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22. Forces proportional to AB, BC and $2CA$ act along the slides of a triangle ABC in magnitude and direction by

A. CA

B. AC

C. BC

D. CB

Answer: A

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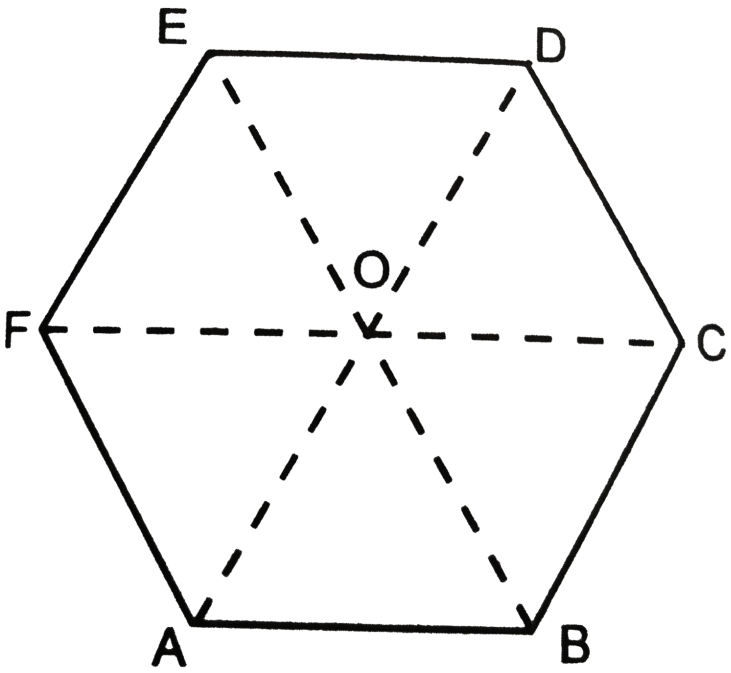
23. $ABCDEF$ is a regular hexagon, Fig. 2 (c) .65. What is the value of

$$\left(\overrightarrow{AB} + \overrightarrow{AC} + \overrightarrow{AD} + \overrightarrow{AE} + \overrightarrow{AF}?\right.$$



A. $\overrightarrow{AO}$

B. $2\overrightarrow{AO}$

C. $4\overrightarrow{AO}$

D. $6\overrightarrow{AO}$

Answer: D

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

A. $40m/sNW$

B. $40m/sSW$

C. $20\sqrt{2}m/sNW$

D. $20\sqrt{2}m/sSW$

Answer: D

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

Answer: B

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

A. Zero

B. $\pi / 30 cm / s$

C. $(\pi / 30)\sqrt{2} cm / s$

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

Answer: C

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27. Aparticle moves with a speed v changes direction by an angle θ, without change in speed.

A. $(i), (ii)$

B. $(i), (iii)$

C. $(i), (ii), (iii)$

D. all

Answer: B

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28. Let the angle between two non - zero vectors $\vec{A}$ and $\vec{B}$ be 120° and its resultant be $\vec{C}$.

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

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

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

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

Answer: B

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29. The component of a vector is

A. Always less than its magnitude

B. Always greater than its magnitude

C. Always equal to its magnitude

D. None of these

Answer: D

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30. One of the two rectangular components of a force is $20N$ and it makes an angle of 30° with the force. The magnitude of the other component is

A. $10/\sqrt{3}$

B. $20/\sqrt{3}$

C. $15/\sqrt{3}$

D. $40/\sqrt{3}$

Answer: D

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31. While travelling from one station to another , a car travels 75km north , 60km north - east and 20km east. The minimum distance between the two station is

A. $72km$

B. $112km$

C. $132km$

D. $155km$

Answer: C

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32. A person moves $30m$ north, then $30mest, then30\sqrt{2}$ south-west. His diaplacement from the original position is

A. $14m \quad \text{south - west}$

B. $28m \quad \text{south}$

C. $10m \quad \text{west}$

D. $15m \quad \text{east}$

Answer: C

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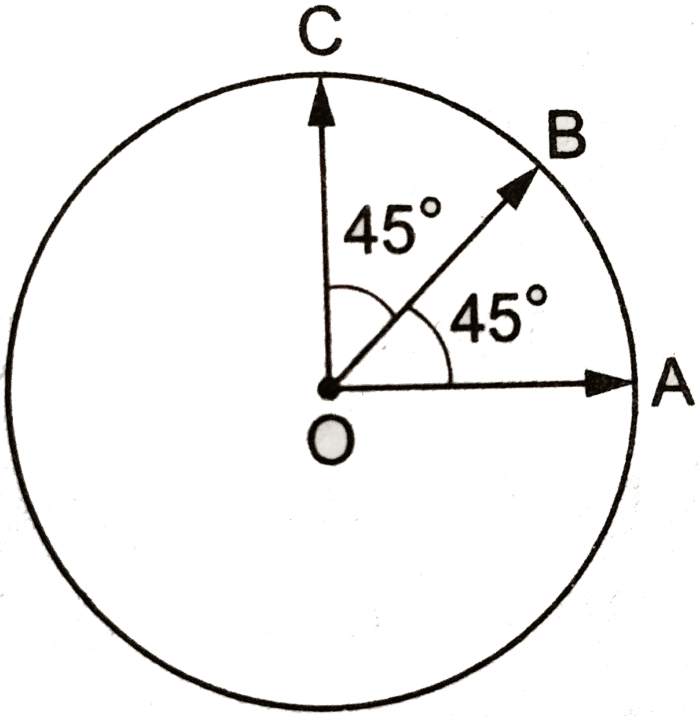
33. Find the resultant of the three vectors $\overrightarrow{OA}, \overrightarrow{OB}$ and $\overrightarrow{OC}$ shown in figure. Radius of the circle is R.



A. $2R$

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

C. $R\sqrt{2}$

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

Answer: B

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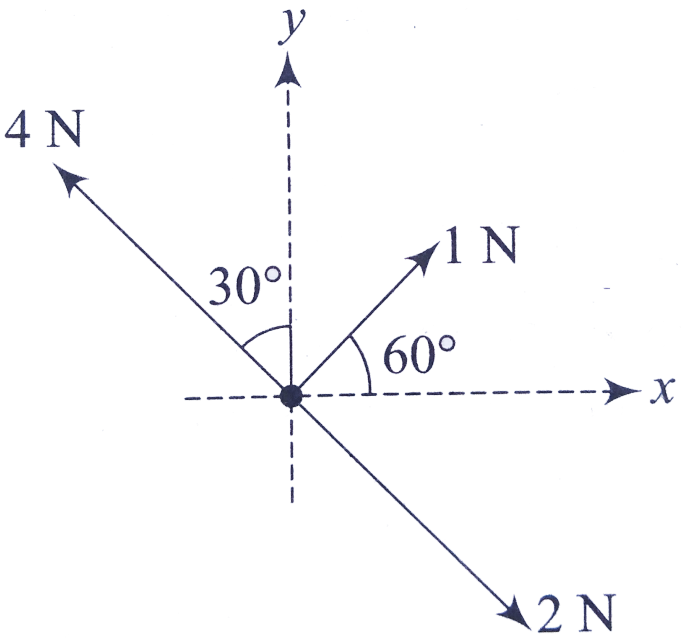
34. Three forces acting on a body are shown in figure. To have the resultant force only along the y-directon, the magnitude of the minimum additional force needed si



A. $\frac{\sqrt{3}}{4}N$

B. $\sqrt{3}N$

C. $0.5N$

D. $1.5N$

Answer: C

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35. The x- component of the resultant of several vectors

(i) is equal to the sum of the x-components of the vectors

(ii) may be smaller than the sum of the magnitudes of

the vectors

(iii) may be greater than the sum of the magnitudes of the vectors

(iv) may be equal to the sum of the magnitudes of the vectors

A. $(i), (ii)$

B. $(i), (ii), (iv)$

C. $(ii), (iii), (iv)$

D. all

Answer: B

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36. 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. $36m$

D. $21m$

Answer: D

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

A. 1

B. $\sqrt{0.11}$

C. $\sqrt{0.01}$

D. $\sqrt{0.39}$

Answer: B

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38. If $\vec{A} = 3\hat{i} - 4\hat{j}$ and $\vec{B} = 2\hat{i} + 16\hat{j}$ then the magnitude and direction of $\vec{A} + \vec{B}$ will be

A. $5, \tan^{-1}(12/5)$

B. $10, \tan^{-1}(5/12)$

C. $13, \tan^{-1}(12/5)$

D. $12, \tan^{-1}(5/12)$

Answer: C

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39. If a particle moves from the point $A(1, 2, 3)$ to the point $B(4, 6, 9)$, its displacement vector be

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

B. $2\hat{i} + 3\hat{j} + 4\hat{k}$

C. $3\hat{i} + 4\hat{j} + 6\hat{k}$

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

Answer: C

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40. The unit vector parallel to the resultant of the vectors $\vec{A} = \hat{i} + 2\hat{j} - \hat{k}$ and $\vec{B} = 2\hat{i} + 4\hat{j} - \hat{k}$ is

A. $\frac{1}{49}\left(7\hat{i} + 6\hat{j} - 2\hat{k}\right)$

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

Answer: B

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41. If $\overrightarrow{A} = 3\hat{i} + 6\hat{j} - 2\hat{k}$, the directions of cosines of the vector $\overrightarrow{A}$ are

A. $\frac{3}{7}, \frac{6}{7}, \frac{2}{7}$

B. $\frac{3}{7}, \frac{6}{7}, \frac{-2}{7}$

C. $\frac{6}{7}, \frac{2}{7}, \frac{3}{7}$

D. $\frac{2}{7}, \frac{3}{7}, \frac{6}{7}$

Answer: B

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42. 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

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43. 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. $1/\sqrt{2}$

D. $\sqrt{5}$

Answer: B

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44. What is the angle between $\vec{A}$ and the esultant of $\left(\vec{A}+\vec{B}\right)$ and $\left(\vec{A}-\vec{B}\right)$

A. Zero

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

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

D. $\frac{\tan^{-1}((A-B))}{(A+B)}$

Answer: A

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45. A paricle starting from the origin (0,0) moves in a straight line in (x, y) plane. Its coordinates at a later time are $\left(\sqrt{3}, 3\right)$. The path of the particle makes with the x-axis an angle of

A. 30°

B. 45°

C. 60°

D. 0°

Answer: C

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

A. 1

B. 2

C. 3

D. None of these

Answer: A

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

A. -1

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

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

D. 1

Answer: B

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48. Which of the following vectors is//are perpendicular to the vector $4I - 3j$?

A. $4i + 3j$

B. $6i$

C. $7k$

D. $3i - 4j$

Answer: C

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49. If $\vec{A} = 2I + j - k, \vec{B} = I + 2j + 3k$, and $\vec{C} = 6i - 2j - 6k$,then the angle between $\left(\vec{A} + \vec{B}\right)$ and $\vec{C}$ will be

A. 30°

B. 45°

C. 60°

D. 90°

Answer: D

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50. Vectors which is perpendicular to $\left(a\cos\theta\hat{i}+b\sin\theta\hat{j}\right)$ is

A. $(1)b\sin\theta\hat{i}-a\cos\theta\hat{j}$

B. $\frac{1}{a}\sin\theta\hat{i}-\frac{1}{b}\cos\theta\hat{j}$

C. $5\hat{k}$

D. All of these

Answer: D

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51. Two vectors $\vec{A}$ and $\vec{B}$ have equal magnitudes.If magnitude of $\left(\vec{A}+\vec{B}\right)$ is equal to n times of the magnitude of $\left(\vec{A}-\vec{B}\right)$ then the angle between $\vec{A}$ and $\vec{B}$ is :-

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

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

C. $\sin^{-1}\left(\frac{n-1}{n+1}\right)$

D. $\sin^{-1}\left(\frac{n^2-1}{n^2+1}\right)$

Answer: B

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52. The position vector of a particle is $\overrightarrow{r} = a\cos\omega t i + a\sin\omega t j$, the velocity of the particle 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

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

A. 5

B. $5/\sqrt{2}$

C. $10\sqrt{2}$

D. $2\sqrt{5}$

Answer: B

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54. The vector component of vector $\vec{A} = 3\hat{i} + 4\hat{j} + 5\hat{k}$ along vector $\vec{B} = \hat{i} + \hat{j} + \hat{k}$ is

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

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

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

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

Answer: C

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

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

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

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

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

Answer: D

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56. The magnitude of the vectors product of two vectors $\left|\overrightarrow{A}\right|$ and $\left|\overrightarrow{B}\right|$ may be

A. greater than AB

B. equal to AB

C. less than AB

D. equal to zero

Answer: A

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57. Three vector $\vec{A}, \vec{B}, \vec{C}$ satisfy the relation $\vec{A} \cdot \vec{B} = 0$ and $\vec{A} . \vec{C} = 0$. The vector $\vec{A}$ is parallel to

A. $\vec{B}$

B. $\vec{C}$

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

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

Answer: D

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58. A vector $\overrightarrow{A}$ is along the positive x- axis . If B is another vector such that $\overrightarrow{A} \times \overrightarrow{B}$ is zero , then B could be

A. $4j$

B. $-4i$

C. $-(i+j)$

D. $(j+k)$

Answer: B

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59. A vector $\overrightarrow{A}$ points verically upward and $\overrightarrow{B}$ points towards north. The vector product $\overrightarrow{A} \times \overrightarrow{B}$ is

A. Zero

B. Along west

C. Along east

D. Vertically downward

Answer: B

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60. The value of $\left(\overrightarrow{A} + \overrightarrow{B}\right) \times \left(\overrightarrow{A} - \overrightarrow{B}\right)$ 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

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61. The scalar product of two vectors is $2\sqrt{3}$ and the magnitude of their vector product is 2. The angle between them is

A. 30°

B. 45°

C. 60°

D. 90°

Answer: A

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62. If $\left|\vec{A} \times \vec{B}\right| = \sqrt{3}\vec{A}.\vec{B}$, 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. $\left(A^2 + B^2 + AB\right)^{1/2}$

Answer: D

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

A. $A^2 B$

B. Zero

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

D. $A^2 B \cos\theta$

Answer: B

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

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

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

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

Answer: C

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65. Two adjacent sides of a parallelogram are respectively by the two vectors $\hat{i} + 2\hat{j} + 3\hat{k}$ and $3\hat{i} - 2\hat{j} + \hat{k}$. What is the area of parallelogram?

A. 8

B. $8\sqrt{3}$

C. $3\sqrt{8}$

D. 192

Answer: B

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66. The minimum number of vectors having different planes which can be added to give zero resultant is

A. 2

B. 3

C. 4

D. 5

Answer: C

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