

Chapter: 2 Vectors:

MCQs: [1 marks each]

- Which of the sets give below may represent the magnitudes of three vectors adding to be zero? a. 2, 4, 8 b. 4, 8, 16 c. 1, 2, 1 d. 0.5, 1, 2
- A vector is not changed if:
 - It is rotated through an arbitrary angle.
 - It is multiplied by an arbitrary scalar
 - It is cross multiplied by a unit vector
 - It is shifted parallel to itself
- If $\vec{P} \cdot \vec{Q} = |\vec{P} \times \vec{Q}|$, the angle between \vec{P} and \vec{Q} is,
 - 0
 - $\pi/2$
 - $\pi/4$
 - π
- The resultant of \vec{A} and \vec{B} makes an angle α with \vec{A} and β with \vec{B} .
 - $\alpha < \beta$
 - $\alpha < \beta$ if $A < B$
 - $\alpha < \beta$ if $A > B$
 - $\alpha < \beta$ if $A = B$
- If $\vec{P} \cdot \vec{Q} = 0$, the angle between \vec{P} and \vec{Q} is
 - 0
 - $\pi/2$
 - $\pi/4$
 - π
- The resultant magnitude of two vector will be maximum, if angle between them is,
 - 0
 - $\pi/2$
 - $\pi/4$
 - π
- What is the angle between $\vec{P} \times \vec{Q}$ and $\vec{Q} \times \vec{P}$
 - 0
 - $\pi/2$
 - $\pi/4$
 - π
- What is the angle between $\vec{P} \times \vec{Q}$ and $\vec{P} + \vec{Q}$
 - 0
 - $\pi/2$
 - $\pi/4$
 - π
- If \vec{A} , \vec{B} and \vec{C} have magnitude 6, 8 and 10 respectively, and $\vec{A} + \vec{B} = \vec{C}$, angle between A and B is,
 - 0
 - 45
 - 90
 - 180
- A force of $(3\hat{i} + 4\hat{j})N$ acts on a body and displaces it by $(3\hat{i} + 4\hat{j})m$. The work done by the forces is,
 - 10 J
 - 12 J
 - 16 J
 - 25 J
- A force $(3\hat{i} + c\hat{j} + 2\hat{k})N$ acting on a particle causes displacement of $(-4\hat{i} + 2\hat{j} + 3\hat{k})m$ in its own direction. If work done is 6 J, then value of 'c' is,
 - 0
 - 1
 - 6
 - 12
- Three vectors satisfy the relation $\vec{A} \cdot \vec{B} = 0$ and $\vec{A} \cdot \vec{C} = 0$, then A is parallel to,
 - $\vec{B} \times \vec{C}$
 - $\vec{B} \cdot \vec{C}$
 - \vec{C}
 - \vec{B}
- The value of $\hat{i} \cdot (\hat{j} \times \hat{k})$ is,
 - 1
 - 0
 - \hat{j}
 - \hat{k}
- Two vectors $\vec{A} = 5\hat{i} + 7\hat{j} - 3\hat{k}$ and $\vec{B} = 2\hat{i} + 2\hat{j} - a\hat{k}$ are perpendicular to each other, then the value of a is,
 - 12
 - 12
 - 8
 - 8
- If $\vec{P} \cdot \vec{Q} = |\vec{P} \times \vec{Q}|$, then $|\vec{P} + \vec{Q}|$,
 - $A + B$
 - $A - B$
 - $\sqrt{A^2 + B^2 + 2AB}$
 - zero
- Two forces of magnitude F have resultant of same magnitude F. Angle between two forces is,
 - 45°
 - 120°
 - 150°
 - 180°

SAQs {5 marks type questions}

- A vector has both magnitude and direction does it mean that anything that has magnitude and direction is necessarily a vector? Explain with example.
 - If $\vec{A} = 4\hat{i} - \hat{j} + 3\hat{k}$ and $\vec{B} = 7\hat{i} + 5\hat{j} + \hat{k}$:
 - Find scalar product (Dot product) of \vec{A} and \vec{B}
 - Find vector product (Cross Product) of \vec{A} and \vec{B}
- If \vec{A} and \vec{B} are non-zero vectors, is it possible for $\vec{A} \cdot \vec{B}$ and $\vec{A} \times \vec{B}$ both to be zero? Explain.
 - A disoriented physics professor drives 3.25 km north, then 4.75 km west and then 1.50 km south. Find the magnitude and direction of the resultant displacement.
- Resultant of two equal forces may have the magnitude equal to one of the forces. At what angle between them the two equal forces this is possible.
 - A rocket fires two engine simultaneously. One produces a thrust of 725N directly forward while the other gives a 513N thrust at 32.4° above the forward direction. Find the magnitude and direction of the resultant force that these engines exert on the rocket.
- The magnitudes of two vectors are equal and the angle between them is θ . Show that their resultant divides angle θ equally.
 - A force vector is given as $\vec{F}_1 = (4\hat{i} + 3\hat{j})N$. Find the vector \vec{F}_2 of magnitude 10N which is perpendicular to \vec{F}_1 .
- The velocity of 20 m/s has its x-component 12 m/s. What is its y-component? Find the angle at which the velocity is inclined with the x-axis.
 - Find the value of λ if the vectors $\vec{A} = 2\hat{i} + \hat{j} + \hat{k}$ and $\vec{B} = \hat{i} + 4\hat{j} + \lambda\hat{k}$ are mutually perpendicular.
 - Is a pressure and electric current are vector quantity?
- If the cross product of two vectors vanishes, what can you say about their directions?
 - State triangle law of vector addition. Obtain the expression for the resultant of two vectors P and Q inclined at an angle θ .
- The magnitudes of two vectors are equal and the angle between them is θ . Show that their resultant divides angle θ equally.
 - State parallelogram law of vector addition. Obtain the expression for the resultant of two vectors P and Q inclined at an angle θ .
- Can the walk of a man be an example of resolution of vector?
 - A spelunker is surveying a cave. She follows a passage 180m straight west, then 210m in a direction 45° east of south, and 280m at 30° east of north. After the fourth unmeasured displacement, find herself back where she started. Find the magnitude and direction of fourth displacement.
- What is the scalar product of a vector with itself? What about vector product?
 - At what angle the two forces $(\vec{P} + \vec{Q})$ and $(\vec{P} - \vec{Q})$ act, so that the resultant is $\sqrt{3P^2 + Q^2}$
- Two vectors \vec{A} and \vec{B} are such that $\vec{A} - \vec{B} = \vec{C}$ and $A - B = C$. Find the angle between them.
 - If B is added to A, under what condition does the resultant vector have a magnitude equal to $A+B$? Under what conditions is the resultant vector equal to zero?