Class 12 Mathematics · Chapter 10: Vector Algebra

Worksheet · 20 marks · about 40 minutes · based on NCERT

Name _____ Class and section _____ Date _____

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1. For P(3, −1, 4) and Q(−2, 5, 1), the scalar component of $\overrightarrow{QP}$ along $\hat{j}$ is [1]

(a) 6 (b) −6
(c) 4 (d) −4

2. A vector has direction cosines $l = \frac{2}{7}$, $m = -\frac{3}{7}$ and n, where $n < 0$. Then n is [1]

(a) $-\frac{6}{7}$ (b) $\frac{6}{7}$
(c) $-\frac{5}{7}$ (d) $-\frac{1}{7}$

3. The vector $\hat{k} \times \hat{i} - \hat{j} \times \hat{k}$ equals [1]

(a) $\hat{i} + \hat{j}$ (b) $\hat{i} - \hat{j}$
(c) $\hat{j} - \hat{i}$ (d) $\vec{0}$

4. $\vec{b}$ is opposite in direction to $\vec{a} = 2\hat{i} - 3\hat{j} + 6\hat{k}$ and $|\vec{b}| = 14$. Then $\vec{a} \cdot \vec{b}$ equals [1]

(a) 98 (b) −98
(c) −14 (d) 0

5. The vectors $2\hat{i} + \lambda\hat{j} - 3\hat{k}$ and $4\hat{i} - \hat{j} + 2\hat{k}$ are perpendicular when λ equals [1]

(a) 2 (b) −2
(c) 14 (d) −14

6. For vectors $\vec{a}$ and $\vec{b}$, $\vec{a} \cdot \vec{b} = 6$ and $|\vec{a} \times \vec{b}| = 6\sqrt{3}$. If $|\vec{a}| = 3$, find the angle between $\vec{a}$ and $\vec{b}$ and $|\vec{b}|$. [2]

7. A, B and C have position vectors $\hat{i} + 2\hat{j} - \hat{k}$, $3\hat{i} - \hat{j} + 2\hat{k}$ and $4\hat{i} + \hat{j} + 5\hat{k}$. Find the position vector of D such that ABCD is a parallelogram. [2]

8. Can a vector make angles of 45°, 60° and 120° with the positive x, y and z-axes? Give a reason. [2]

9. The projection of $\vec{a} = \lambda\hat{i} + \hat{j} + 4\hat{k}$ on $\vec{b} = 2\hat{i} + 6\hat{j} + 3\hat{k}$ is 4 units. Find λ, and then the projection of $\vec{b}$ on $\vec{a}$. [3]

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10. Three vertices of a parallelogram ABCD are A(1, 2, 0), B(3, 1, 2) and D(0, 4, 1). Find the coordinates of C and the area of the parallelogram. [3]

11. Vectors $\vec{a}, \vec{b}, \vec{c}, \vec{d}$ satisfy $\vec{a} \times \vec{b} = \vec{c} \times \vec{d}$ and $\vec{a} \times \vec{c} = \vec{b} \times \vec{d}$. Show that $\vec{a} - \vec{d}$ is parallel to $\vec{b} - \vec{c}$, given $\vec{a} \neq \vec{d}$ and $\vec{b} \neq \vec{c}$. [3]