VECTOR ALGEBRA

ADDITION OF VECTORS

EXERCISE

Q.1 Given two vector $\vec{P} = (2,5)$ and $\vec{Q} = (3,-2)$, determine the magnitude of the resultant vector $\vec{R}$ using their components.

(A) $\sqrt{8}$ (B) $\sqrt{34}$ (C) $\sqrt{16}$ (D) $\sqrt{53}$

Q.2 Given the two vector $\vec{A} = (5,10)$ and $\vec{B} = (4,-5)$ determine the angel of the resultant sum vector $\vec{C}$ using their components.

(A) 29.05° (B) 12.45° (C) 51.08° (D) 34.02°

Q.3 What is the formula for the magnitude of resultant vector of two vectors P and Q?

(A) $|R| = \sqrt{(P^2 + Q^2 - 2PQ\sin\theta)}$ (B) $|R| = \sqrt{(P^2 + Q^2 + 2PQ\sin\theta)}$

(C) $|R| = \sqrt{(P^2 - Q^2 + 2PQ\cos\theta)}$ (D) $|R| = \sqrt{(P^2 + Q^2 + 2PQ\cos\theta)}$

Q.4 The formula for the direction of the resultant vector of two vectors P and Q is

$\beta = \tan - 1\left[\frac{Q\sin\theta}{P + Q\cos\theta}\right]$

(A) True (B) False

Q.5 Find the addition of vector PQ and QR, where PQ = (3, 4) and QR = (2,6)

Q.6 If $\mathbf{a} =< 1,-1 >$ and $\mathbf{b} =< 2,1 >$ then find the unit vector in the direction of addition of vector a, and b.

Q.7 Two vector are given along with their components:

$A = (2,3)$ and $B = (2,-2)$. Calculate the magnitude and the angel of the sum C using their components.

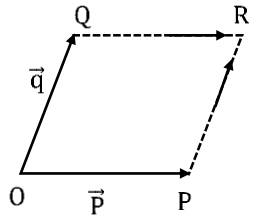
Q.8 Two vectors with magnitudes 2 units and $\sqrt{2}$ units act on a body. The resultant vector has a magnitude of $\sqrt{10}$ units. Find the angle between the two given vectors.

Q.9 Two forces of magnitudes 4N and 7N act on a body and the angle between them is 45°. Determine the magnitude and direction of the resultant vector with the 4N force.

Q.10 Two vectors P = (1, 2) and Q = (2, 4) have an angle of 0° between them. Find the magnitude their sum vector.

Q.11 Two vectors A and B have magnitudes of 4 units and 9 units and make an angle of 30° with each other. Find the magnitude and direction of the resultant sum vector using the triangle law of vector addition formula.

Q.12 Which diagonal represents the sum of the two vectors p and q in the figure below?



ANSWER KEY

1. (B) $\sqrt{34}$

2. (A) 29.05°

3. (D) $|R| = \sqrt{(P^2 + Q^2 + 2PQ\cos\theta)}$

4. (A) True

5. (5,10).

6. The required unit vector is ⟨1,0⟩.

7. Thus the magnitude of the resultant vector $|C| = 4.123$ units (Approximately) and the angel $\phi = 14.04°$

8. Hence the angle between the two vectors is 45°.

9. The magnitude is approximately 12 N and the direction is 28.95°.

10. The magnitude of the sum vector is $3\sqrt{5}$ units.

11. Hence, the magnitude of the resultant vector is 12.623 units and the direction is 20.87°, approximately.

12. p + q = OR.