CBSE | **CLASS 11 | PHYSICS**

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CHAPTER-3 | Motion in a Plane

QUIZ
PART-02

1. Which statement best describes the triangle law of vector addition?
   A. The resultant equals the arithmetic sum of magnitudes.
   B. The third side of a triangle in the same order gives the difference.
   C. If two vectors are represented by two sides of a triangle in the same order, the third side (opposite order) gives the resultant.
   D. The diagonal of a rectangle gives the resultant. (C)
   Explanation : When two vectors are placed head-to-tail as two sides of a triangle in the same order, the third side taken in the opposite order represents the resultant.

2. In the parallelogram law, the resultant of two vectors represented as adjacent sides is:
   A. The shorter side of the parallelogram
   B. Any diagonal
   C. The diagonal of the parallelogram
   D. The side parallel to the larger vector (C)
   Explanation : If two vectors form adjacent sides of a parallelogram, the resultant is completely represented by the diagonal.

3. The polygon law asserts that if several vectors are arranged head-to-tail in order, the resultant is:
   A. The first side of the polygon
   B. The closing side taken in the opposite order
   C. The longest side of the polygon
   D. Zero for any closed polygon (B)
   Explanation : For multiple vectors placed in sequence, the resultant is given by the closing side taken in the opposite order.

4. Which formula gives the magnitude R of the resultant of two vectors P and Q with included angle θ?
   A. $R^2=P^2+Q^2-2PQ\cos\theta$ B. $R=P+Q\cos\theta$
   C. $R^2=P^2+Q^2+2PQ\cos\theta$
   D. $R=\sqrt{(P^2+Q^2-2PQ\sin\theta)}$ (C)
   Explanation : The derivation leads to the law of cosines for vector addition: $R^2=P^2+Q^2+2PQ\cos\theta$.

5. The angle α that the resultant makes with vector P is given by:
   A. $\tan\alpha=P\sin\theta/(Q+P\cos\theta)$
   B. $\tan\alpha=Q\sin\theta/(P+Q\cos\theta)$
   C. $\tan\alpha=Q\cos\theta/(P+Q\sin\theta)$
   D. $\tan\alpha=(P+Q)/\sin\theta$ (B)
   Explanation : The direction formula obtained from the geometric setup is $\tan\alpha=Q\sin\theta/(P+Q\cos\theta)$.

6. If two vectors are in the same direction ($\theta=0°$), the magnitude of the resultant is:
   A. $R=|P-Q|$ B. $R=\sqrt{(P^2+Q^2)}$
   C. $R=P+Q$
   D. $R=\sqrt{(P^2+Q^2+2PQ)}$ (C)
   Explanation : For $\theta=0°$, the cosine term gives $R=P+Q$; the direction angle $\alpha=0°$.

7. Two vectors are perpendicular. Then:
   A. $R=\sqrt{(P^2+Q^2)}$ and $\tan\alpha=Q/P$
   B. $R=P+Q$ and $\alpha=0°$
   C. $R=|P-Q|$ and $\alpha=180°$
   D. $R=\sqrt{(P^2+Q^2-2PQ)}$ and $\tan\alpha=P/Q$ (A)
   Explanation : With $\theta=90°$, $R=\sqrt{(P^2+Q^2)}$ and $\tan\alpha=Q/P$.

8. For two vectors in opposite directions ($\theta=\pi$), which is correct?
   A. $R=P+Q$ and $\alpha=0$
   B. $R=\sqrt{(P^2+Q^2)}$ and $\alpha=90°$
   C. $R=P-Q$ with $\alpha=0$ when $P>Q$, $\alpha=\pi$ when $P<Q$
   D. $R=2PQ$ and $\alpha=\theta$ (C)
   Explanation : Using the cosine form, $R^2=(P-Q)^2 \Rightarrow R=P-Q$ in this setup, with the direction noted by cases on P and Q.

9. Two forces of 3N and 4N act perpendicular to each other. The resultant is:
   A. 9N   B. 16N
   C. 5N   D. 7N   (C)
   Explanation : For perpendicular vectors, $R=\sqrt{(3^2+4^2)}=5N$.

10. Two equal vectors have a resultant equal in magnitude to either vector. The angle between them is:
    A. 90°   B. 0°
    C. 120°   D. 180°   (C)
    Explanation : Let P=Q and R=P. From $R^2=P^2+Q^2+2PQ\cos\theta$, this gives $\cos\theta=-1/2 \Rightarrow \theta=120°$.