1. Which of the following is a scalar quantity?
   A. Force
   B. Displacement
   C. Speed
   D. Velocity (C)

Explanation : Speed has only magnitude and no direction, making it a scalar. Displacement, force, and velocity are vectors.

2. In two-dimensional resolution, if a vector A makes an angle with the x-axis, then its x-component is
   A. A sin θ
   B. A Cos θ
   C. -A sin θ
   D. -A Cos θ (B)

Explanation: The component of a vector along the x-axis is given by Ax=A Cos θ

3. For the same vector in Q2, the y component is
   A. A Cos θ
   B. A Sin θ
   C. -A Cos θ
   D. - A Sin θ (B)

Explanation: The component along the y-axis is Ay = A Sin θ

4. If a vector has components Ax and Ay- its magnitude is
   A. Ax + Ay
   B. $\sqrt{A^2x + A^2y}$
   C. | Ax - Ay |
   D. Ax/Ay (B)

Explanation : By Pythagoras, A= $\sqrt{A^2x + A^2y}$ in 2D resolution

5. The direction of a vector in a plane is given by
   A. Tan θ = Ay/ Ax
   B. Tan θ = Ax/ Ay
   C. Cos θ = Ax/ Ax
   D. Sin θ = Ax/ Ay (A)

Explanation: The angle a vector makes with the x-axis is found using tan θ = Ay/Ax

6. In 3D resolution of a vector, the sum of the squares of the direction cosines always equals
   A. 0
   B. 1
   C. $\sqrt{2}$
   D. 2 (B)

Explanation: For direction cosines cos α, cos β, cos Γ the relation is $\cos^2\alpha + \cos^2\beta + \cos^2\Gamma = 1$

7. The displacement vector between positions (X1, Y1) and (X2, Y2) is
   A. (X1 - Y2) + (Y1 - Y2)
   B. (X2 - X1) + (Y2 - Y1)
   C. (X1 + X2) + (Y1 + Y2)
   D. (X2Y1 - X1Y2) (B)

Explanation: Displacement final-initial position vector = (X2 - X1) + (Y2 - Y1)

8. The magnitude of average velocity in a plane is given by
   A. ▲r/▲t
   B. ▲X + ▲Y/▲t
   C. ▲X.▲y/▲t
   D. ▲X/▲Y (A)

Explanation: Average velocity is displacement per unit time: Vavg = ▲r/▲t

9. The magnitude of a vector resolved in 3D with components AX, Ay, Az is
   A. Az + Ay + AX
   B. $\sqrt{A^2x + A^2y + A^2z}$
   C. $A^2x + A^2y + A^2z$
   D. Ax / AyAz (B)

Explanation: In 3D, the vector's magnitude is the square root of the sum of the squares of its components

10. If vec A =2i +4j -5k then its direction cosines correspond to
    A. (2, 4, -5) with magnitude 1
    B. (2/$\sqrt{45}$, 4/$\sqrt{45}$, -5/$\sqrt{45}$)
    C. (2, 4, 5) with unit sum
    D. (1/2, 1/4, 1/5) (B)

Explanation : Direction cosines are obtained by dividing each component by the magnitude $\sqrt{2^2 + 4^2 + (-5)^2} = \sqrt{45}$