# VECTORS

1. A unit vector in the direction of the vector $\vec{a} = 2\hat{i} - 3\hat{j} + 6\hat{k}$ is

(a) $\left(\hat{i} - \frac{3}{2}\hat{j} + 3\hat{k}\right)$ (b) $\left(\frac{2}{5}\hat{i} - \frac{3}{5}\hat{j} + \frac{6}{5}\hat{k}\right)$

(c) $\left(\frac{2}{7}\hat{i} - \frac{3}{7}\hat{j}\frac{6}{7}\hat{k}\right)$ (d) none of these

2. The direction cosines of the vector $\vec{a} = -2\hat{i} + \hat{j} - 5\hat{k}$ are

(a) $-2, 1, -5$ (b) $\frac{1}{3}, \frac{-1}{6}, \frac{-5}{6}$

(c) $\frac{2}{\sqrt{30}}, \frac{1}{\sqrt{30}}, \frac{5}{\sqrt{30}}$ (d) $\frac{-2}{\sqrt{30}}, \frac{1}{\sqrt{30}}, \frac{-5}{\sqrt{30}}$

3. If A (1, 2, 3) and B (-1, -2, 1) are the and points of a vector $\overrightarrow{AB}$ then the Direction cosines of $\overrightarrow{AB}$ are

(a) $-2, -4, 4$ (b) $\frac{-1}{2}, -1, 1$ (c) $\frac{-1}{3}, \frac{-2}{3}, \frac{2}{3}$ (d) none of these

4. If a vector makes angles $\alpha, \beta \text{ and } \gamma \text{ with the}$ x=axis, y-axis and z-axis respectively

Then the value of $(\sin^2\alpha + \sin^2\beta + \sin^2\gamma)$ is

(a) 1 (b) 2 (c) 0 (d) 3

5. The vector $(\cos\alpha\cos\beta)\hat{i} + (\cos\alpha\sin\beta)\hat{j} + (\sin\alpha)\hat{k}$ is a

(a) null vector (b) unit vector (c) a constant vector (d) none of these

6. What is the angle which the vector $\hat{i} + \hat{j} + \sqrt{2}\hat{k}$ makes with the z-axis?

(a) $\frac{\pi}{4}$ (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{6}$ (d) $\frac{2\pi}{3}$

7. If $\vec{a}$ and $\vec{b}$ the vectors such that $\left|\vec{a}\right| = \sqrt{3}$, $\left|\vec{b}\right| = 2$ and $\vec{a} \bullet \vec{b} = \sqrt{6}$ then the Angle between $\vec{a}$ and $\vec{b}$ is

(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{4}$ (d) $\frac{2\pi}{3}$

8. If $\vec{a}$ and $\vec{b}$ are two vectors such that $\left|\vec{a}\right| = \left|\vec{b}\right| = \sqrt{2}$ and $\vec{a} \bullet \vec{b} = 1$ then the angle Between $\vec{a}$ and $\vec{b}$ is

(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{3}$ (d) $\frac{2\pi}{3}$

9. The angle between the vectors $\vec{a} = \hat{i} - 2\hat{j} + 3\hat{k}$ and $\vec{b} = 3\hat{i} - 2\hat{j} + \hat{k}$ is

(a) $\cos^{-1}\frac{5}{7}$ (b) $\cos^{-1}\frac{3}{5}$ (c) $\cos^{-1}\frac{3}{\sqrt{14}}$ (d) none of these

10. If $\vec{a} = \hat{i} + 2\hat{j} - 3\hat{k}$ and $\vec{b} = 3\hat{i} - \hat{j} + 2\hat{k}$ then the angle between $\vec{a} + \vec{b}$ and $\vec{a} - \vec{b}$ Is

(a) $\frac{\pi}{3}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{2}$ (d) $\frac{2\pi}{3}$

11. If $\vec{a} = \hat{i} + 2\hat{j} - 3\hat{k}$ and $\vec{b} = 3\hat{i} - \hat{j} + 2\hat{k}$ then the angle between $2\vec{a} + \vec{b}$ and $\vec{a} + 2\vec{b}$ is

(a) $\cos^{-1}\frac{21}{40}$ (b) $\cos^{-1}\frac{31}{50}$ (c) $\cos^{-1}\frac{11}{30}$ (d) none of these

12. If $\vec{a} = 2\hat{i} + 4\hat{j} - \hat{k}$ and $\vec{b} = 3\hat{i} - 2\hat{j} + \lambda\hat{k}$ be such that $\vec{a} \perp \vec{b}$ then $\lambda$ =?

(a) 2 (b) -2 (c) 3 (d) -3

13. What is the projection of $\vec{a} = 2\hat{i} - \hat{j} + \hat{k}$ on $\vec{b} = \hat{i} - 2\hat{j} + \hat{k}$

(a) $\frac{2}{\sqrt{3}}$ (b) $\frac{4}{\sqrt{5}}$ (c) $\frac{5}{\sqrt{6}}$ (d) none of these

14. If $\left|\vec{a} + \vec{b}\right| = \left|\vec{a} - \vec{b}\right|$, then

(a) $\left|\vec{a}\right| = \left|\vec{b}\right|$ (b) $\vec{a} \parallel \vec{b}$ (c) $\vec{a} \perp \vec{b}$ (d) none of these

15. If $\vec{a}$ and $\vec{b}$ are mutually perpendicular unit vectors then

$(3\vec{a}+2\vec{b}).(5\vec{a}-6\vec{b}) = ?$

(a) 3 (b) 5 (c) 6 (d) 12

16. If the vectors $\vec{a} = 3\hat{i}+\hat{j}-2\hat{k}$ on $\vec{b} = \hat{i}+\lambda\hat{j}-3\hat{k}$ are perpendicular to each other then $\lambda$ = ?

(a) $-3$ (b) $-6$ (c) $-\theta$ (d) $-1$

17. If $\theta$ is the angle between two unit vectors $\vec{a}$ and $\vec{b}$ then $= \frac{1}{2}\left|\vec{a}-\vec{b}\right|$

(a) $\cos\frac{\theta}{2}$ (b) $\sin\frac{\theta}{2}$ (c) $\tan\frac{\theta}{2}$ (d) none of these

18. If $\vec{a} = \hat{i}-\hat{j}+2\hat{k}$ on $\vec{b} = 2\hat{i}+3\hat{j}-4\hat{k}$ then $\left|\vec{a}\times\vec{b}\right|$ =?

(a) $\sqrt{174}$ (b) $\sqrt{87}$ (c) $\sqrt{93}$ (d) none of these

19. If $\vec{a} = \hat{i}-2\hat{j}+3\hat{k}$ on $\vec{b} = \hat{i}-3\hat{k}$ then $\left|\vec{b}\times 2\vec{a}\right|$ =?

(a) $10\sqrt{3}$ (b) $5\sqrt{17}$ (c) $4\sqrt{19}$ (d) $2\sqrt{23}$

20. If $\left|\vec{a}\right| = 2$, $\left|\vec{b}\right| = -7$ and $\vec{a}\times\vec{b} = 3\hat{i}+2\hat{j}+6\hat{k}$ then the angle between $\vec{a}$ and $\vec{b}$ is

(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{3}$ (c) $\frac{2\pi}{3}$ (d) $\frac{3\pi}{4}$

21. If $\left|\vec{a}\right| = \sqrt{26}$, $\left|\vec{b}\right| = 7$ and $\left|\vec{a}\times\vec{b}\right| = 35$ then $\vec{a}\bullet\vec{b} = ?$

(a) 5 (b) 7 (c) 13 (d) 12

22. Two adjacent sides of a ll gm are represented by the vectors $\vec{a} = 3\hat{i}+\hat{j}+4\hat{k}$ and $\vec{b} = \hat{i}-\hat{j}+\hat{k}$

The area of the ll gm is

(a) $\sqrt{42}$ sq units (b) $6\ sq\ units$ (c) $\sqrt{35} sq\, units$ (d) none of these

23. The diagonals of a ll gm are represented by the vectors $\vec{d_1} = 3\hat{i} + \hat{j} - 2\hat{k}$ and $\vec{d_2} = \hat{i} - 3\hat{j} + 4\hat{k}$. The area of the ll gm is

(a) $7\sqrt{3}$ Sq Units (b) $5\sqrt{3}$ Sq Units (c) $3\sqrt{5}$ Sq Units (d) none of these

24. Two adjacent sides of a triangle are represented by the vectors $\vec{a} = 3\hat{i} + 4\hat{j}$ and $\vec{b} = -5\hat{i} + 7\hat{j}$. The area of the triangle is

(a) 41 sq units (b) 37 sq units (c) $\frac{41}{2}$ Sq Units (d) none of these

25. The unit vector normal to the plane containing $\vec{a} = \hat{i} - \hat{j} - \hat{k}$ and $\vec{b} = \hat{i} + \hat{j} + \hat{k}$ is

(a) $\hat{j} - \hat{k}$ (b) $-\hat{j} + \hat{k}$ (c) $\frac{1}{\sqrt{2}}(-\hat{j} + \hat{k})$ (d) $\frac{1}{\sqrt{2}}(-\hat{i} + \hat{k})$

26. If $\vec{a}, \vec{b}$ and $\vec{c}$ are unit vectors such that $\vec{a} + \vec{b} + \vec{c} = 0$ then $\vec{a} \bullet \vec{b} + \vec{b} \bullet \vec{c} + \vec{c} \bullet \vec{a} = ?$

(a) $\frac{1}{2}$ (b) $-\frac{1}{2}$ (c) $\frac{3}{2}$ (d) $-\frac{3}{2}$

27. If $\vec{a}, \vec{b}$ and $\vec{c}$ are mutually perpendicular unit vectors then $\left|\vec{a} + \vec{b} + \vec{c}\right|$=?

(a) 1 (b) $\sqrt{2}$ (c) $\sqrt{3}$ (d) 2

28. $\left[\hat{i}\ \hat{j}\ \hat{k}\right]$=?

(a) 0 (b) 1 (c) 2 (d) 3

29. If $\vec{a} = 2\hat{i} - 3\hat{j} + 4\hat{k}$, $\vec{b} = \hat{i} + 2\hat{j} - \hat{k}$ and $\vec{c} = 3\hat{i} + 2\hat{j} - 2\hat{k}$ be the coterminous edges of a parallelepiped then its volume is

(a) 21 cubic units (b) 14 cubic units

(c) 7 cubic units (d) none of these

30. If the volume of a parallelepiped having $\vec{a} = 5\hat{i} - 4\hat{j} + \hat{k}$, $\vec{b} = 4\hat{i} + 3\hat{j} + \lambda\hat{k}$ and $\vec{c} = \hat{i} - 2\hat{j} + 7\hat{k}$ as coterminous edges, is 216 Cubic units then the value of $\lambda$ is

(a) $\frac{5}{3}$ (b) $\frac{4}{3}$ (c) $\frac{2}{3}$ (d) $\frac{1}{3}$

31. It is given that the vectors $\vec{a} = 2\hat{i} - 2\hat{k}$, $\vec{b} = \hat{i} + (\lambda + 1)\hat{j}$ and $\vec{c} = 4\hat{i} + 2\hat{k}$ are

Coplanar. Then, the value of $\lambda$ is

(a) $\frac{1}{2}$ (b) $\frac{1}{3}$ (c) 2 (d) 1

32 Which of the following is meaningless?

(a) $\vec{a} \bullet (\vec{b} \times \vec{c})$ (b) $\vec{a} \times (\vec{b} \bullet \vec{c})$ (c) $(\vec{a} \times \vec{b}) \bullet \vec{c}$ (d) none of these

33. $\vec{a} \bullet (\vec{a} \times \vec{b})$ equals

(a) 0 (b) 1 (c) $a^2 b$ (d) meaningless

34. For any three vectors $\vec{a}, \vec{b}$ and $\vec{c}$ the value of $\left[\vec{a} - \vec{b} \quad \vec{b} - \vec{c} \quad \vec{c} - \vec{a}\right]$ is

(a) $2\left[\vec{a} \ \vec{b} \ \vec{c}\right]$ (b) 1 (c) 0 (d) none of these

35. Two vectors $\vec{a}$ and $\vec{b}$ are perpendicular if and only if $\vec{a} \bullet \vec{b}$ is equal to
(a) 0 (b) 1 (c) ab (d) meaningless

36. If $\vec{a} \bullet \vec{b} = \left|\vec{a}\right| \left|\vec{b}\right|$ then $\vec{a}$ and $\vec{b}$ are

(a) Perpendicular (b) Like parallel (c) Unlike parallel (d) coincident

**ANSWERS:VECTORS**

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|---|---|---|---|---|---|---|---|---|---|
| 1. (c) | 2. (d) | 3. (c) | 4. (b) | 5. (b) | 6. (a) | 7. (c) | 8. (d) | 9. (a) | 10. (c) |
| 11. (b) | 12. (b) | 13. (c) | 14. (c) | 15. (a) | 16. (c) | 17. (b) | 18. (c) | 19. (c) | 20.(a) |
| 21. (b) | 22. (a) | 23.(b ) | 24. (c) | 25. (c) | 26. (d) | 27. (c) | 28.(b) | 29. (c) | 30.(a) |
| 31. (d) | 32.(b) | 33. (a) | 34. (c) | 35(a) | 36.(b) | | | | |