

## Modulus of vector, Algebra of vectors

1. The perimeter of a triangle with sides  $3\mathbf{i} + 4\mathbf{j} + 5\mathbf{k}$ ,  $4\mathbf{i} - 3\mathbf{j} - 5\mathbf{k}$  and  $7\mathbf{i} + \mathbf{j}$  is
- (a)  $\sqrt{450}$  (b)  $\sqrt{150}$   
 (c)  $\sqrt{50}$  (d)  $\sqrt{200}$
2. If the position vectors of the vertices of a triangle be  $2\mathbf{i} + 4\mathbf{j} - \mathbf{k}$ ,  $4\mathbf{i} + 5\mathbf{j} + \mathbf{k}$  and  $3\mathbf{i} + 6\mathbf{j} - 3\mathbf{k}$ , then the triangle is
- (a) Right angled (b) Isosceles  
 (c) Equilateral (d) Right angled isosceles
3. If one side of a square be represented by the vector  $3\mathbf{i} + 4\mathbf{j} + 5\mathbf{k}$ , then the area of the square is
- (a) 12 (b) 13  
 (c) 25 (d) 50
4. If  $\mathbf{a} = 2\mathbf{i} + 2\mathbf{j} - \mathbf{k}$  and  $|x\mathbf{a}| = 1$ , then  $x =$
- (a)  $\pm \frac{1}{3}$  (b)  $\pm \frac{1}{4}$   
 (c)  $\pm \frac{1}{5}$  (d)  $\pm \frac{1}{6}$
5. Which of the following is not a unit vector for all values of  $\theta$
- (a)  $(\cos\theta)\mathbf{i} - (\sin\theta)\mathbf{j}$  (b)  $(\sin\theta)\mathbf{i} + (\cos\theta)\mathbf{j}$   
 (c)  $(\sin 2\theta)\mathbf{i} - (\cos 2\theta)\mathbf{j}$  (d)  $(\cos 2\theta)\mathbf{i} - (\sin 2\theta)\mathbf{j}$
6. If  $\mathbf{a} + \mathbf{b}$  bisects the angle between  $\mathbf{a}$  and  $\mathbf{b}$ , then  $\mathbf{a}$  and  $\mathbf{b}$  are
- (a) Mutually perpendicular (b) Unlike vectors  
 (c) Equal in magnitude (d) None of these
7. If  $\mathbf{a} = \mathbf{i} + 2\mathbf{j} + 2\mathbf{k}$  and  $\mathbf{b} = 3\mathbf{i} + 6\mathbf{j} + 2\mathbf{k}$ , then a vector in the direction of  $\mathbf{a}$  and having magnitude as  $|\mathbf{b}|$  is
- (a)  $7(\mathbf{i} + \mathbf{j} + \mathbf{k})$  (b)  $\frac{7}{3}(\mathbf{i} + 2\mathbf{j} + 2\mathbf{k})$   
 (c)  $\frac{7}{9}(\mathbf{i} + 2\mathbf{j} + 2\mathbf{k})$  (d) None of these
8. If  $\mathbf{p} = 7\mathbf{i} - 2\mathbf{j} + 3\mathbf{k}$  and  $\mathbf{q} = 3\mathbf{i} + \mathbf{j} + 5\mathbf{k}$ , then the magnitude of  $\mathbf{p} - 2\mathbf{q}$  is
- (a)  $\sqrt{29}$  (b) 4  
 (c)  $\sqrt{62} - 2\sqrt{35}$  (d)  $\sqrt{66}$
9. Let  $\mathbf{a} = \mathbf{i}$  be a vector which makes an angle of  $120^\circ$  with a unit vector  $\mathbf{b}$ . Then the unit vector  $(\mathbf{a} + \mathbf{b})$  is
- (a)  $-\frac{1}{2}\mathbf{i} + \frac{\sqrt{3}}{2}\mathbf{j}$  (b)  $-\frac{\sqrt{3}}{2}\mathbf{i} + \frac{1}{2}\mathbf{j}$   
 (c)  $\frac{1}{2}\mathbf{i} + \frac{\sqrt{3}}{2}\mathbf{j}$  (d)  $\frac{\sqrt{3}}{2}\mathbf{i} - \frac{1}{2}\mathbf{j}$

10. If the position vectors of the vertices of a triangle be  $6\mathbf{i} + 4\mathbf{j} + 5\mathbf{k}$ ,  $4\mathbf{i} + 5\mathbf{j} + 6\mathbf{k}$  and  $5\mathbf{i} + 6\mathbf{j} + 4\mathbf{k}$ , then the triangle is  
 (a) Right angled (b) Isosceles  
 (c) Equilateral (d) None of these
11. The perimeter of the triangle whose vertices have the position vectors  $(\mathbf{i} + \mathbf{j} + \mathbf{k})$ ,  $(5\mathbf{i} + 3\mathbf{j} - 3\mathbf{k})$  and  $(2\mathbf{i} + 5\mathbf{j} + 9\mathbf{k})$ , is given by  
 (a)  $15 + \sqrt{157}$  (b)  $15 - \sqrt{157}$   
 (c)  $\sqrt{15} - \sqrt{157}$  (d)  $\sqrt{15} + \sqrt{157}$
12. The position vectors of two points A and B are  $\mathbf{i} + \mathbf{j} - \mathbf{k}$  and  $2\mathbf{i} - \mathbf{j} + \mathbf{k}$  respectively. Then  $|\overrightarrow{AB}| =$   
 (a) 2 (b) 3  
 (c) 4 (d) 5
13. The magnitudes of mutually perpendicular forces  $\mathbf{a}$ ,  $\mathbf{b}$  and  $\mathbf{c}$  are 2, 10 and 11 respectively. Then the magnitude of its resultant is  
 (a) 12 (b) 15  
 (c) 9 (d) None
14. The system of vectors  $\mathbf{i}, \mathbf{j}, \mathbf{k}$  is  
 (a) Orthogonal (b) Coplanar  
 (c) Collinear (d) None of these
15. The direction cosines of the resultant of the vectors  $(\mathbf{i} + \mathbf{j} + \mathbf{k})$ ,  $(-\mathbf{i} + \mathbf{j} + \mathbf{k})$ ,  $(\mathbf{i} - \mathbf{j} + \mathbf{k})$  and  $(\mathbf{i} + \mathbf{j} - \mathbf{k})$ , are  
 (a)  $\left(\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{3}}, \frac{1}{\sqrt{6}}\right)$  (b)  $\left(\frac{1}{\sqrt{6}}, \frac{1}{\sqrt{6}}, \frac{1}{\sqrt{6}}\right)$   
 (c)  $\left(-\frac{1}{\sqrt{6}}, -\frac{1}{\sqrt{6}}, -\frac{1}{\sqrt{6}}\right)$  (d)  $\left(\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}\right)$
16. The position vectors of P and Q are  $5\mathbf{i} + 4\mathbf{j} + a\mathbf{k}$  and  $-\mathbf{i} + 2\mathbf{j} - 2\mathbf{k}$  respectively. If the distance between them is 7, then the value of  $a$  will be  
 (a) -5, 1 (b) 5, 1  
 (c) 0, 5 (d) 1, 0
17. A zero vector has  
 (a) Any direction (b) No direction  
 (c) Many directions (d) None of these
18. A unit vector  $\mathbf{a}$  makes an angle  $\frac{\pi}{4}$  with z-axis. If  $\mathbf{a} + \mathbf{i} + \mathbf{j}$  is a unit vector, then  $\mathbf{a}$  is equal to  
 (a)  $\frac{\mathbf{i}}{2} + \frac{\mathbf{j}}{2} + \frac{\mathbf{k}}{\sqrt{2}}$  (b)  $\frac{\mathbf{i}}{2} + \frac{\mathbf{j}}{2} - \frac{\mathbf{k}}{\sqrt{2}}$   
 (c)  $-\frac{\mathbf{i}}{2} - \frac{\mathbf{j}}{2} + \frac{\mathbf{k}}{\sqrt{2}}$  (d) None of these
19. A force is a  
 (a) Unit vector (b) Localised vector  
 (c) Zero vector (d) Free vector
20. If  $\mathbf{a}, \mathbf{b}, \mathbf{c}, \mathbf{d}$  be the position vectors of the points A, B, C and D respectively referred to same origin O such that no three of these points are collinear and  $\mathbf{a} + \mathbf{c} = \mathbf{b} + \mathbf{d}$ , then quadrilateral ABCD is a  
 (a) Square (b) Rhombus

(c) Rectangle

(d) Parallelogram

1	a	2	d	3	d	4	a	5	c
6	c	7	b	8	d	9	c	10	c
11	a	12	b	13	b	14	a	15	d
16	a	17	a	18	c	19	b	20	d

