MATHS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

VECTORS

(VECTORS) Exercise 1 (Topical problems)

1. If G is the centroid of a triangle ABC, prove that $\vec{G}A + \vec{G}B + \vec{G}C = \vec{0}$.

A. 0

B. 3 GA

C. 3 GB

D. 3 GC

Answer: A

Watch Video Solution

2. If the position vector of three points are a - 2b + 3c, 2a + 3b - 4c, - 7b + 10 c, then the three points are

A. collinear

B. non-coplanar

C. non-collinear

D. None of these

Answer: A

Watch Video Solution

3. $ABCD$ is a parallelogram whose diagonals meet at P. If O is a fixed point, then $\overline{OA}+\overline{OB}+\overline{OC}+\overline{OD}$ equals :

A. AB + AC

B. 0

C. 2 (AB + BC)

D. AC + BD

Answer: B

Watch Video Solution

4. Let $\vec{A}D$ be the angle bisector of $\angle A$ of ΔABC such that $\vec{A}D = \alpha\vec{A}B + \beta\vec{A}C$ THEN

A. $\alpha = \frac{|AB|}{|AB| + |AC|}, \beta = \frac{|AC|}{|AB| + |AC|}$

B. $\alpha = \frac{|AB| + |AC|}{|AB|}, \beta = \frac{|AB| + |AC|}{|AC|}$

C. $\alpha = \frac{|AC|}{|AB| + |AC|}, \beta = \frac{|AB|}{|AB| + |AC|}$

D. $\alpha = \frac{|AB|}{|AC|}, \beta = \frac{|AC|}{|AB|}$

Answer: C

Watch Video Solution

5. If in a ΔABC, O and O' are the incentre and orthocentre respectively, then $(O'A + O'B + O'C)$ is equal to

A. O' O

B. O O '

C. 20'0

D. O

Answer: D

Watch Video Solution

6. The position vector of four points A, B, C and D are a,b,c and d respectively . If a- b = 2(d-c) the

A. AB and CD bisects

B. BD and AC bisects

C. AB and CD trisects

D. BD and AC trisects

Answer: D

Watch Video Solution

7. The position vectores of the vertices A,B, C of a $\triangle ABC$ are $\hat{i}-\hat{j}-3\hat{k}, 2\hat{i}+\hat{j}-2\hat{k}$ and $-5\hat{i}+2\hat{j}-6\hat{k}$ respectively. The length of the bisector AD of the angle $\angle BAC$, where D is on the line segments BC, is

A. $\frac{15}{2}$

B. $\frac{11}{2}$

C. $\frac{1}{4}$

D. None of these

Answer: D

Watch Video Solution

8. A vector coplanar with vectores $\hat{i}+\hat{j}$ and $\hat{j}+\hat{k}$ and parallel to the vector $2\hat{i}-2\hat{j}-4\hat{k}$is

A. $\hat{i}-\hat{k}$

B. $\hat{i}-\hat{j}-2\hat{k}$

C. $\hat{i}+\hat{j}-\hat{k}$

D. $3\hat{i}+3\hat{j}-6\hat{k}$

Answer: B

Watch Video Solution

9. If a and b are position vectors of A and B respectively the position vector of a point C on AB produced such that $\overrightarrow{AC}=3\overrightarrow{AB}$ is

A. 3 a -2b

B. 3b -2a

C. 3b +2a

D. 2a - 3b

Answer: B

Watch Video Solution

10. If D, E and F be the middle points of the sides BC,CA and AB of the ΔABC, then $AD + BE + CF$ is

A. 0

B. 0

C. 2

D. None of these

Answer: A

Watch Video Solution

11. Let ABC be a triangle having its centroid its centroid at G. If S is any point in the plane of the triangle, then $\overrightarrow{SA}+\overrightarrow{SB}+\overrightarrow{SC}=$

A. SG

B. 2SG

C. 3SG

D. 0

Answer: C

Watch Video Solution

12. Given that the vectors $\vec{a}$ and $\vec{b}$ are non- collinear, the values of x and y for which the vector equality $2\vec{u}-\vec{v}=\vec{w}$ holds true if $\vec{u}=x\vec{a}+2y\vec{b}, \vec{v}=-2y\vec{a}+3x\vec{b}, \vec{w}=4\vec{a}-2\vec{b}$ are

A. $x = \frac{4}{7}, y = \frac{6}{7}$

B. $x = \frac{10}{7}, y = \frac{4}{7}$

C. $x = \frac{8}{7}, y = \frac{2}{7}$

D. $x = 2, y = 3$

Answer: B

Watch Video Solution

13. Three points with position vectors $\vec{a}, \vec{b}, \vec{c}$ will be collinear if there exist scalars x, y, z such that

A. x a + y b = z c

B. xa + yb + zc = 0

C. xa + yb + zc = 0

D. xa + yb = c

Answer: C

Watch Video Solution

14. If the points $P(a+2b+c), Q(2a+3b), R(b+tc)$ are collinear, where a, b, c are three non-coplanar vectors,the value of t is

A. -2

B. $-1/2$

C. $1/2$

D. 2

Answer: D

Watch Video Solution

15. ABCDEF si a regular hexagon with centre at the origin such that $\overrightarrow{AD}+\overrightarrow{EB}+\overrightarrow{FC}=\lambda\overrightarrow{ED}.\ \ \text{Then,}\ \ \lambda$ equals

A. 2

B. 4

C. 6

D. 3

Answer: B

Watch Video Solution

16. If $\vec{a}, \vec{b}, \vec{c}$ are three non-zero vectors, no two f thich are collinear and the vector $\vec{a}+\vec{b}$ is collinear with $\vec{c}$, $\vec{b}+\vec{c}$ is collinear with $\vec{a}$, $then\ \vec{a}+\vec{b}+\vec{c}=\vec{a}$ b. $\vec{b}$ c. $\vec{c}$ d. none of these

A. A

B. B

C. C

D. 0

Answer: D

Watch Video Solution

17. In a quadrilateral ABCD, the point P divides DC in the ratio 1:2 and Q is the mid-point of AC. If AB+2AD+BC-2 DC=k PQ, then k is equal to

A. -6

B. -4

C. 6

D. 4

Answer: A

Watch Video Solution

18. If m_1, m_2, m_3 and m_4 are respectively the magnitudes of the vectors $a_1 = 2\hat{i} - \hat{j} + \hat{k}$, $a_2 = 3\hat{i} - 4\hat{j} - 4\hat{k}$, $a_3 = \hat{i} + \hat{j} - \hat{k}$ and $a_4 = -\hat{i} + 3\hat{j} + \hat{k}$, then the correct order of m_1, m_2, m_3 and m_4 is

A. $m_3 < m_1 < m_4 < m_2$

B. $m_3 < m_1 < m_2 < m_4$

C. $m_3 < m_4 < m_1 < m_2$

D. $m_3 < m_4 < m_2 < m_1$

Answer: A

Watch Video Solution

19. if a = (2,1,-1) , b= (1,-1,0) , c = (5,-1,1) then unit vector parallel to a + b -c but opposite direction

A. $\frac{1}{3}\left(2\hat{i}-\hat{j}+2\hat{k}\right)$

B. $\frac{1}{2}\left(2\hat{i}-\hat{j}+2\hat{k}\right)$

C. $\frac{1}{3}\left(2\hat{i}-\hat{j}-2\hat{k}\right)$

D. None of these

Answer: A

Watch Video Solution

20. The vectors $a = \hat{i} + \hat{j} + m\hat{k}, b = \hat{i} + \hat{j} + (m+1)\hat{k}$ and $c = \hat{i} - \hat{j} + m\hat{k}$ are coplanar, it m is equal to

A. 1

B. 4

C. 3

D. no value of m for which vectors are coplanar

Answer: D

Watch Video Solution

21. Given $\overrightarrow{P} = 3\hat{i} + 2\hat{j} + 5\hat{k}, \overrightarrow{a} = \hat{i} + \hat{j}, \overrightarrow{b} = \hat{j} + \hat{k}, \overrightarrow{c} = \hat{i} + \hat{k}$ and $\overrightarrow{P} = x\overrightarrow{a} +$

, then x,y,z are respectively

A. $\frac{3}{2}, \frac{1}{2}, \frac{5}{2}$

B. $\frac{1}{2}, \frac{3}{2}, \frac{5}{2}$

C. $\frac{5}{2}, \frac{3}{2}, \frac{1}{2}$

D. $\frac{1}{2}, \frac{5}{2}, \frac{3}{2}$

Answer: B

Watch Video Solution

22. If $2\vec{a} + 3\vec{b} - 5\vec{c} = \vec{0}$, then ratio in which $\vec{c}$ divides $\overrightarrow{AB}$ is

A. 3 : 2 internally

B. 3 : 2 externally

C. 2 : 3 internally

D. 2 : 3 externally

Answer: A

Watch Video Solution

23. If C is the mid-point of AB and P is any point outside AB, then

A. PA + PB = PC

B. PA + PB + 2 PC = 0

C. PA + PB - 2PC = 0

D. PA + PB + PC = 0

Answer: C

Watch Video Solution

24. If a,b and c are three non-zero vectors such that no two of these are collinear. If the vector a+2b is collinear with c and b+3c is collinear with a(λ being some non-zero scalar), then a+2b+6c is equal to

A. $\lambda a(\lambda \neq 0, \text{ a scalar})$

B. $\lambda b(\lambda \neq 0, \text{ a scalar})$

C. $\lambda c(\lambda \neq 0, \text{a scalar})$

D. 0

Answer: C

Watch Video Solution

25. Let $\overrightarrow{a} = \hat{i} + \hat{j} + \hat{k}, \overrightarrow{b} = \hat{i} - \hat{j} + 2\hat{k}$ and $\overrightarrow{c} = x\hat{i} + (x-2)\hat{j} - \hat{k}$. If the vector $\overrightarrow{c}$ lies in the plane of $\overrightarrow{a}$ and $\overrightarrow{b}$ then x equals (A) 0 (B) 1 (C) -4 (D) -2

A. 0

B. 1

C. -2

D. 2

Answer: C

Watch Video Solution

26. A, B, C, D, E, F in that order, are the vertices of a regular hexagon with centre orgin. If the position vectors of the vertices A and B are respectively, $4\hat{i} + 3\hat{j} - \hat{k}$ and $-3\hat{i} + \hat{j} + \hat{k}$, then DE is equal to

A. $7\hat{i} + 2\hat{j} - 2\hat{k}$

B. $-7\hat{i} - 2\hat{j} + 2\hat{k}$

C. $3\hat{i} - \hat{j} - \hat{k}$

D. $-4\hat{i} - 3\hat{j} + 2\hat{k}$

Answer: A

Watch Video Solution

27. If the position vectors of the vertices of ΔABC are $3\hat{i} + \hat{j} + 2\hat{k}$, $\hat{i} - 2\hat{j} + 7\hat{k}$ and $-2\hat{i} + 3\hat{j} + 5\hat{k}$, then the ΔABC is

A. right angled and isosceles

B. right angled, but not isosceles

C. isosceles but not right angled

D. equilateral

Answer: D

Watch Video Solution

28. The non-zero vectors are $\vec{a}, \vec{b}$ and $\vec{c}$ are related by $\vec{a} = 8\vec{b}$ and $\vec{c} = -7\vec{b}$. Then the angle between $\vec{a}$ and $\vec{c}$ is

A. π

B. 0

C. $\frac{\pi}{4}$

D. $\frac{\pi}{2}$

Answer: A

Watch Video Solution

29. The position vectors of P and Q are respectively a and b. If R is a point on PQ such that $PR = 5PQ$, then the position vector of R is

A. 5b - 4a

B. 5b + 4a

C. 4b - 5a

D. 4b + 5a

Answer: A

Watch Video Solution

30. If $ABCDEF$ is a regular hexagon with $\overrightarrow{AB} = \overrightarrow{a}$ and $\overrightarrow{BC} = \overrightarrow{b}$, then $\overrightarrow{CE}$ equals

A. b - a

B. $-b$

C. b - 2a

D. None of these

Answer: C

Watch Video Solution

31. दर्शाइए कि बिंदु $A(1, 2, 7)$, $B(2, 6, 3)$ और $C(3, 10, -1)$ संरेख हैं |

A. collinear

B. coplanar

C. non-collinear

D. None of these

Answer: A

Watch Video Solution

32. find the projection of the vector $\hat{i} + 3\hat{j} = 7\hat{k}$ on the vector $7\hat{i} - \hat{j} + 8\hat{k}$

A. $\frac{60}{\sqrt{122}}$
B. $\frac{30}{\sqrt{144}}$
C. $\frac{60}{\sqrt{114}}$
D. $\frac{60}{\sqrt{111}}$

Answer: C

Watch Video Solution

33. If (a+b). (a-b) = 8 and |a| = 8 |b|, then the values of |a| and |b| are

A. $\frac{16}{3}\sqrt{\frac{2}{7}}, \frac{2}{3}\sqrt{\frac{2}{7}}$
B. $\frac{4}{3}\sqrt{\frac{2}{7}}, \frac{2}{3}\sqrt{\frac{3}{7}}$
C. $\frac{12}{5}\sqrt{\frac{2}{7}}, \frac{4}{3}\sqrt{\frac{2}{7}}$
D. None of these

Answer: A

Watch Video Solution

34. If $a = 2\hat{i} + 2\hat{j} + 3\hat{k}, b = -\hat{i} + 2\hat{j} + \hat{k}$ and $c = 3\hat{i} + \hat{j}$ such that $a + \lambda b$ is perpendicular to c, then the value of λ is

A. 2

B. 4

C. 6

D. 8

Answer: D

Watch Video Solution

35. If the position vectors of the vertices a, B and C of a $Tri\angle ABC$ be $(1, 2, 3), (-1, 0, 0)$ and $(0, 1, 2)$ respectively then find $\angle ABC$.

A. $\frac{\pi}{2}$

B. $\frac{\pi}{4}$

C. $\cos^{-1}\left(\frac{10}{\sqrt{102}}\right)$

D. $\cos^{-1}\left(\frac{1}{3}\right)$

Answer: C

Watch Video Solution

36. If for a unit vector $a.\ (x-a).\ (x+a)=12$, then |x| is equal to

A. 4

B. 2

C. $\sqrt{13}$

D. $\sqrt{11}$

Answer: C

Watch Video Solution

37. For any two non-zero vectors a and b, |a|b+|b|a and |a|b-|b|a are

A. parallel

B. perpendicular

C. non-parallel

D. None of these

Answer: B

Watch Video Solution

38. If a, b, c are three unit vectors such that $a + b + c = 0$. Where 0 is null vector, then $a.\,b + a.\,c + c.\,a$ is

A. 0

B. $-\frac{1}{2}$

C. $-\frac{3}{2}$

D. 2

Answer: C

Watch Video Solution

39. The moment about the point M(-2, 4, -6) of the force represented in magnitude and position AB, where the points A and B have the coordinates (1, 2, -3) and (3, -4, 2) respectively, is

A. $8\hat{i}-9\hat{j}-14\hat{k}$

B. $2\hat{i}-6\hat{j}+5\hat{k}$

C. $-3\hat{i}+2\hat{j}-3\hat{k}$

D. $-5\hat{i}-8\hat{j}-8\hat{k}$

Answer: A

Watch Video Solution

40. Let $\overrightarrow{a}$ and $\overrightarrow{b}$ are unit vectors inclined at an angle α to each other, if $\left|\overrightarrow{a}+\overrightarrow{b}\right|<1$ then

A. $\alpha=\frac{\pi}{2}$

B. $\alpha<\frac{\pi}{3}$

C. $\alpha>\frac{2\pi}{3}$

D. $\frac{\pi}{3}<\alpha<\frac{2\pi}{3}$

Answer: D

Watch Video Solution

41. If $\overrightarrow{a}=\left(\hat{i}+\hat{j}+\hat{k}\right), \overrightarrow{a}.\overrightarrow{b}=1$ and $\overrightarrow{a}\times\overrightarrow{b}=\hat{j}-\hat{k},$ then $\overrightarrow{b}$ is

A. $\hat{i}-\hat{j}+\hat{k}$

B. $2\hat{j}-\hat{k}$

C. $\hat{i}$

D. $2\hat{i}$

Answer: C

Watch Video Solution

42. Let $\overrightarrow{a}=\hat{i}+\hat{j}+\hat{k}, \overrightarrow{b}=\hat{i}-\hat{j}+\hat{k}$ and $\overrightarrow{c}=\hat{i}-\hat{j}-\hat{k}$ be three vectors. A vectors $\overrightarrow{v}$ in the plane of $\overrightarrow{a}$ and $\overrightarrow{b}$, whose projection on $\overrightarrow{c} is \frac{1}{\sqrt{3}}$ is given by

A. $\hat{i}-3\hat{j}+3\hat{k}$

B. $-3\hat{i}-3\hat{j}-\hat{k}$

C. $3\hat{i}-\hat{j}+3\hat{k}$

D. $\hat{i}+3\hat{j}-3\hat{k}$

Answer: C

Watch Video Solution

43. The two variable vectors $3x\hat{i}+y\hat{j}-3\hat{k}$ and $x\hat{i}-4y\hat{j}+4\hat{k}$ are orthogonal to each other, then the locus of (x, y) is

A. hyperbola

B. circle

C. straight line

D. ellipse

Answer: A

Watch Video Solution

44. Two adjacent sides of a parallelogram ABCD are given by $\overrightarrow{AB}=2\hat{i}+10\hat{j}+11\hat{k}$ and $\overrightarrow{AD}=-\hat{i}+2\hat{j}+2\hat{k}$. The side AD is rotated by an acute angle α in the plane of the parallelogram so that AD becomes AD'. If AD' make a right angle withe the side AB then the cosine of the angle α is given by

A. $\frac{8}{9}$

B. $\frac{\sqrt{17}}{9}$

C. $\frac{1}{9}$

D. $\frac{4\sqrt{5}}{9}$

Answer: B

Watch Video Solution

45. If the vectors $\vec{a} = \hat{i} - \hat{j} + 2\hat{k}, \vec{b} = 2\hat{i} + 4\hat{j} + \hat{k}$ and $\vec{c} = \lambda\hat{i} + \hat{j} + \mu\hat{k}$ are mutually orthogonal $then(\lambda, \mu) =$ (A) (-2,3) (B) (3,-2) (C) (-3,2) (D) (2,-3)

A. $(-3, 2)$

B. $(2, -3)$

C. $(-2, 3)$

D. $(3, -2)$

Answer: A

Watch Video Solution

46. If p, q and r are perpendicular to q + r, r + p and p + q respectively and if |p + q| = 6, |q + r| = $4\sqrt{3}$ and |r + p| = 4, then |p + q + r| is

A. $5\sqrt{2}$

B. 10

C. 15

D. 5

Answer: A

Watch Video Solution

47. If the scalar product of the vector $\hat{i} + \hat{j} + 2\hat{k}$ with the unti vector along $m\hat{i} + 2\hat{j} + 3\hat{k}$ is equal to 2, then one of the value of m is

A. 3

B. 4

C. 5

D. 6

Answer: D

Watch Video Solution

48. Which one of the following vectors is a magnitude 6 and perpendicular to both $a = 2\hat{i} + 2\hat{j} + \hat{k}$ and $b = \hat{i} - 2\hat{j} + 2\hat{k}$?

A. $2\hat{i} - \hat{j} - 2\hat{k}$

B. $2\left(2\hat{i} - \hat{j} + 2\hat{k}\right)$

C. $3\left(2\hat{i} - \hat{j} - 2\hat{k}\right)$

D. $2\left(2\hat{i} - \hat{j} - 2\hat{k}\right)$

Answer: D

Watch Video Solution

49. If $|a| = 5, |b| 6$ and $a.\,b = -25$, then $|a \times b|$ is equal to

A. 25

B. $6\sqrt{11}$

C. $11\sqrt{5}$

D. $5\sqrt{11}$

Answer: D

Watch Video Solution

50. Vectors a and b are inclined at an angle $\theta = 120^\circ$. If $|a| = 1, |b| = 2,$ then $[(a + 3b) \times (3a + b)]^2$ is equal to

A. 190

B. 275

C. 300

D. 192

Answer: D

Watch Video Solution

51. If the projection of the vector a on b is $|a \times b|$ and if $3b = \hat{i} + \hat{j} + \hat{k}$, then the angle between a and b is

A. $\frac{\pi}{3}$

B. $\frac{\pi}{2}$

C. $\frac{\pi}{4}$

D. $\frac{\pi}{6}$

Answer: A

Watch Video Solution

52. If $2a + 3b + c = 0, \quad \text{then} \quad a \times b + b \times c + c \times a$ is equal to

A. $6(b \times c)$

B. $3(b \times c)$

C. $2(b \times c)$

D. 0

Answer: B

Watch Video Solution

53. Let $a = 2\hat{i} + \hat{k}, b = \hat{i} + \hat{j} + \hat{k}$ and $c = 4\hat{i} - 3\hat{j} + 7\hat{k}$. If r is a vector such that $r \times b = c \times b$ and $r. a = 0$, then value of r.b is

A. 7

B. -7

C. -5

D. 5

Answer: A

Watch Video Solution

54. Let P, Q, R and S be the points on the plane with position vectors $-2\hat{i}-\hat{j}, 4\hat{i}, 3\hat{i}+3\hat{j}$ and $-3\hat{i}+2\hat{j}$ respectively. The quadrilateral PQRS must be a

A. parallelogram, which is neither a rhombus nor a ractangle

B. square

C. rectangle, but not a square

D. rhombus, but not a square

Answer: A

Watch Video Solution

55. The vectors $\overrightarrow{a} = 3\hat{i} - 2\hat{j} + 2\hat{k}$ and $\overrightarrow{b} = -\hat{i} - 2\hat{k}$ are the adjacent sides of a paralleogram. The angle between its diagonals is....... .

A. $\cos^{-1}\left(\frac{2}{\sqrt{13}}\right)$

B. $\frac{\pi}{3}$

C. $\frac{4\pi}{3}$

D. $\frac{2\pi}{3}$

Answer: B

Watch Video Solution

56. The area of the parallelogram whose diagonals are the vectors $\hat{i} + 3\hat{j} - 2\hat{k}$ and $3\hat{i} + \hat{j} - 4\hat{k}$

A. $3\sqrt{42}$ sq units

B. $\sqrt{42}$ sq untis

C. $2\sqrt{42}$ sq units

D. None of these

Answer: A

Watch Video Solution

57. The area of the parallelogram whose adjacent sides are $\hat{i}-3\hat{j}+\hat{k}$ and $\hat{i}+\hat{j}+\hat{k}$ is

A. $4\sqrt{2}$

B. $-4\sqrt{2}$

C. $4\sqrt{3}$

D. None of these

Answer: B

Watch Video Solution

58. If the vectors of a trianlge are $A\left(\hat{i}+\hat{j}+2\hat{k}\right), B\left(3\hat{i}-\hat{j}+2\hat{i}\right)$ and $C\left(2\hat{i}-\hat{j}+\hat{k}\right)$ the area of triangle is

A. $2\sqrt{3}$ sq units

B. $\sqrt{3}$ sq units

C. $2\sqrt{3}$ sq units

D. 3 sq units

Answer: D

Watch Video Solution

59. If $a=\hat{i}+2\hat{j}+3\hat{k}$ and $b=\hat{i}\times\left(a\times\hat{i}\right)+\hat{j}\times\left(a\times\hat{j}\right)+\hat{k}+\left(a\times\hat{k}\right)$, then length of b is equal to

A. $\sqrt{12}$

B. $2\sqrt{12}$

C. $3\sqrt{14}$

D. $2\sqrt{14}$

Answer: B

Watch Video Solution

60. If a, b and c are unit coplanar vectors, then $[\,2a - b \quad 2b - c \quad 2c - a\,]$ is equal to

A. 1

B. 0

C. $-\sqrt{3}$

D. $\sqrt{3}$

Answer: B

Watch Video Solution

61. $\left[\hat{i} \quad \hat{k} \quad \hat{j}\right] + \left[\hat{k} \quad \hat{j} \quad \hat{i}\right] + \left[\hat{j} \quad \hat{k} \quad \hat{i}\right]$ is equal to

A. 1

B. 3

C. -3

D. -1

Answer: D

Watch Video Solution

62. IF r.a = 0, r. b = 0 and r. c= 0 for some non-zero vector r. Then, the value of [a b c] is

A. 0

B. $\frac{1}{2}$

C. 1

D. 2

Answer: A

Watch Video Solution

63. If a and b are two non-zero, non-collinear vectors, then $2[a \quad b \quad \hat{i}]\hat{i} + 2[a \quad b \quad \hat{j}]\hat{j} + 2[a \quad b \quad \hat{k}]\hat{k}$ is equal to

A. $2(a \times b)$

B. $a \times b$

C. $a + b$

D. None of these

Answer: A

Watch Video Solution

64. If the volume of the parallelopiped with a, b and c as coterminous edges is 40 cubic units, then the volume of the parallelopiped having $b+c, c+a$ and $a+b$ as coterminous edges in cubic units is

A. 80

B. 120

C. 160

D. 40

Answer: A

Watch Video Solution

65. The volume of the tetrahedron having the edges $\hat{i}+2\hat{j}-\hat{k}, \hat{i}+\hat{j}+\hat{k}, \hat{i}-\hat{j}+\lambda\hat{k}$ as coterminous, is $\frac{2}{3}$ cu unit. Then, λ equals

A. 1

B. 2

C. 3

D. 4

Answer: A

Watch Video Solution

66. The vector $\vec{a} = \alpha\hat{i} + 2\hat{j} + \beta\hat{k}$ lies in the plane of vectors $\vec{b} = \hat{i} + \hat{j}$ and $\vec{c} = \hat{j} + \hat{k}$ and bisects the angle between $\vec{b}$ and $\vec{c}$. Then which one of the following gives possible values o α and β? (A) alpha=2, beta=1(B)alpha=1, beta=1(C)alpha=2, beta=1(D)alpha=1, beta=2`

A. $\alpha = 1, \beta = 1$

B. $\alpha = 2, \beta = 2$

C. $\alpha = 1, \beta = 2$

D. $\alpha = 2, \beta = 1$

Answer: A

Watch Video Solution

67. Three vectors $7\hat{i} - 11\hat{j} + \hat{k}, 5\hat{i} + 3\hat{j} - 2\hat{k}$ and $12\hat{i} - 8\hat{j} - \hat{k}$ forms

A. an equilateral triangle

B. an isosceles triangle

C. a right angled triangle

D. collinear

Answer: D

Watch Video Solution

68. If the vectors $2\hat{i} - 3\hat{j} + 4\hat{k}$ and $\hat{i} + 2\hat{j} - \hat{k}$ and $m\hat{i} - \hat{j} + 2\hat{k}$ are coplanar, then the value of m is

A. $\frac{5}{8}$

B. $\frac{8}{5}$

C. $-\frac{7}{4}$

D. $\frac{2}{3}$

Answer: B

Watch Video Solution

69. If the volume of parallelopiped with coterminous edges $4\hat{i} + 5\hat{j} + \hat{k}, \ -\hat{j} + \hat{k}$ and $3\hat{i} + 9\hat{j} + p\hat{k}$ is 34 cu units, then p is equal to

A. 4

B. -13

C. 13

D. 6

Answer: B

Watch Video Solution

70. If $a.\ \hat{i} = 4$ then $\left(a \times \hat{j}\right).\ \left(2\hat{j} - 3\hat{k}\right)$ is equal to

A. 12

B. 2

C. 0

D. -12

Answer: D

Watch Video Solution

71. The value of λ, for which the four points $2\hat{i} + 3\hat{j} - \hat{k},\ \hat{i} - 2\hat{j} + 3\hat{k},\ 3\hat{i} + 4\hat{j} - 2\hat{k},\ \hat{i} - 6\hat{j} + \lambda\hat{k}$ are coplanar, is

A. 2

B. 4

C. 6

D. 8

Answer: C

Watch Video Solution

72. If a is perpedicular to b and $c|a| = 2, |b| = 3|c| = 4$ and the angle between b and c is $\frac{2\pi}{3}$, then $[a, b, c]$ is equal to

A. $4\sqrt{3}$

B. $6\sqrt{3}$

C. $12\sqrt{3}$

D. $18\sqrt{3}$

Watch Video Solution

Watch Video Solution

73. If the point whose position vectors are $2\hat{i}+\hat{j}+\hat{k}, 6\hat{i}-\hat{j}+2\hat{k}$ and $12\hat{i}-5\hat{j}+p\hat{k}$ are collinear, then the value of p is

A. 2

B. 4

C. 6

D. 8

Answer: B

Watch Video Solution

74. The volume (in cubic unit) of the tetrahedron with edges $\hat{i}+\hat{j}+\hat{k}, \hat{i}-\hat{j}+\hat{k}$ and $\hat{i}+2\hat{j}-\hat{k}$, is

A. 4

B. $\frac{2}{3}$

C. $\frac{1}{6}$

D. $\frac{1}{3}$

Answer: B

Watch Video Solution

75. If $|a| = 10, |b| = 2 \text{ and } a.b = 12,$ then value of $|a \times b|$ is

A. 5

B. 10

C. 14

D. 16

Answer: D

Watch Video Solution

76. The angle between two vectors a and b with magnitudes $\sqrt{3}$ and 2 respectively, having $a.\ b = \sqrt{6}$ is

A. $\frac{\pi}{4}$

B. $\frac{\pi}{2}$

C. $\frac{\pi}{6}$

D. $\frac{\pi}{3}$

Answer: A

Watch Video Solution

77. Find a vector $\overrightarrow{r}$ of magnitude $3\sqrt{2}$ units which makes an angle of $\frac{\pi}{4}$ and $\frac{\pi}{2}$ with y and z-axis respectively.

A. $r = \pm 3\hat{i} + 3\hat{j}$

B. $r = 3\hat{i} + 3\hat{j}$

C. $r = \pm 3\hat{i} + 3\hat{j}$

D. None of these

Answer: A

Watch Video Solution

78. If a and b are unit vectors, then what is the angle between a and b for $\sqrt{3}a - b$ to be a unit vector?

A. 30°

B. 45°

C. 60°

D. 90°

Answer: A

Watch Video Solution

79. The value of $[a-bb-cc-a]$ is equal to

A. 0

B. 1

C. 2

D. 3

Answer: A

Watch Video Solution

80. The points $a-2b+3c, 2a+3b-4c, \ -7b+10c$ are

A. collinear

B. non-collinear

C. can't say

D. None of these

Answer: A

Watch Video Solution

81. If $a+b+c=0$ and $|a|=\sqrt{37}, |b|=3, |c|=4$ then the angle between b and c is

A. 30°

B. 45°

C. 60°

D. 90°

Answer: C

Watch Video Solution

82. If a, b and c are the three vectors mutually perpendicular to each other to form a right handed system and $|a|=1, |b|=3$ and $|c|=5,$

then $[a - 2bb - 3cc - 4a]$ is equal to

A. 0

B. -24

C. 3600

D. -215

Answer: C

Watch Video Solution

83. If $\overrightarrow{a}$ and $\overrightarrow{b}$ are unit vectors inclined to x-axis at angle 30° and 120° then $\left|\overrightarrow{a} + \overrightarrow{b}\right|$ equals

A. $\sqrt{\frac{2}{3}}$

B. $\sqrt{2}$

C. $\sqrt{3}$

D. 2

Answer: C

Watch Video Solution

84. Find the sine of the angle between the vectors $\overrightarrow{a} = 3\hat{i} + \hat{j} + 2\hat{k}$ and $\overrightarrow{b} = 2\hat{i} - 2\hat{j} + 4\hat{k}$

A. $\sqrt{\frac{2}{7}}$

B. $\frac{2}{\sqrt{7}}$

C. $\frac{\sqrt{2}}{7}$

D. None of these

Answer: B

Watch Video Solution

85. If G is the centroid of a triangle ABC, then GA + GB + GC equals to

A. 0

B. 3 GA

C. 3 GB

D. 3 GC

Answer: A

View Text Solution

86. If the position vector of three points are a - 2b + 3c, 2a + 3b - 4c, - 7b + 10 c, then the three points are

A. collinear

B. non-coplanar

C. non-collinear

D. None of these

Answer: A

View Text Solution

87. If ABCD is a rombus whose diagonals cut at the origin O, then OA + OB + OC + OD equals to

A. AB + AC

B. O

C. 2 (AB + BC)

D. AC + BD

Answer: B

View Text Solution

88. Let AD be the angle bisector of $\angle A$ of ΔABC such that $AD = \alpha AB + \beta AC$, then

A. $\alpha = \dfrac{|AB|}{|AB| + |AC|}, \beta = \dfrac{|AC|}{|AB| + |AC|}$

B. $\alpha = \frac{|AB| + |AC|}{|AB|}, \beta = \frac{|AB| + |AC|}{|AC|}$

C. $\alpha = \frac{|AC|}{|AB| + |AC|}, \beta = \frac{|AB|}{|AB| + |AC|}$

D. $\alpha = \frac{|AB|}{|AC|}, \beta = \frac{|AC|}{|AB|}$

Answer: C

View Text Solution

89. If O and O' denote respectively the circumcente and orthocentre of ΔABC, then$O'A + O'B + O'C$ is equal orthocentre of delta ABC, then $O'A + O'B + O'C$ is equal to

A. O' O

B. O O '

C. 20'0

D. O

Answer: D

View Text Solution

90. The position vector of four points A, B, C and D are a,b,c and d respectively . If a- b = 2(d-c) the

A. AB and CD bisects

B. BD and AC bisects

C. AB and CD trisects

D. BD and AC trisects

Answer: D

View Text Solution

91. The position vectores of the vertices A,B, C of a delta ABC are $\hat{i}-\hat{j}-3\hat{k}, 2\hat{i}+\hat{j}-2\hat{k}$ and $-5\hat{i}+2\hat{j}-6\hat{k}$ respectively. The length of the bisector AD of the angle $\angle BAC$, where D is on the line segments BC, is

A. $\frac{15}{2}$

B. $\frac{11}{2}$

C. $\frac{1}{4}$

D. None of these

Answer: D

View Text Solution

92. A vector coplanar with vectores $\hat{i}+\hat{j}$ and $\hat{j}+\hat{k}$ and parallel to the vector $2\hat{i}-2\hat{j}-4\hat{k}$is

A. $\hat{i}-\hat{k}$

B. $\hat{i}-\hat{j}-2\hat{k}$

C. $\hat{i}+\hat{j}-\hat{k}$

D. $3\hat{i}+3\hat{j}-6\hat{k}$

Answer: B

View Text Solution

93. If a and b are the position vectors of A and B respectively and C is a point on AB producted such that AC = 3 AB, then the position vector of C is

A. 3 a -2b

B. 3b -2a

C. 3b +2a

D. 2a - 3b

Answer: B

View Text Solution

94. Let D, E and F be the middle points of the sides BC,CA and AB respectively of a triangle ABC. Then, AD + BE + CF equals to

A. 0

B. 0

C. 2

D. None of these

Answer: A

View Text Solution

95. Let ABC be a triangle having its centroid at G. If S is any point in the plane of the triangle then SA + SB + SC is equal to

A. SG

B. 2SG

C. 3SG

D. 0

Answer: C

View Text Solution

96. Given that the vectors a and b are non-collinear, the values of x and y for which the vector equality 2u - v = w holds true if

u = xa + 2y b, v = - 2y a + 3xb, w = 4a - 2b are

A. $x = \frac{4}{7}, y = \frac{6}{7}$

B. $x = \frac{10}{7}, y = \frac{4}{7}$

C. $x = \frac{8}{7}, y = \frac{2}{7}$

D. $x = 2, y = 3$

Answer: B

View Text Solution

97. Three points with position vectors a, b and c will be collinear, if there exist scalars x, y and z such that (where x + y + z = 0)

A. x a + y b = z c

B. xa + yb + zc = 0

C. xa + yb + zc = 0

D. xa + yb = c

Answer: C

View Text Solution

98. If the points P(a + 2b + c), Q(2a + 3b), R (b + tc) are collinear, where a, b and c are three non-coplanar vectors, the value of t is

A. -2

B. $-1/2$

C. $1/2$

D. 2

Answer: D

View Text Solution

99. ABCDEF is a regular hexagon with centre at the origin such that AD + EB + FC = λ ED. Then, λ is equal to

A. 2

B. 4

C. 6

D. 3

Answer: B

View Text Solution

100. A, B and C are three non-zero vectors, no two of them are parallel. If A + B is collinear to C and B + C is collinear to A, then A + B + C is equal to

A. A

B. B

C. C

D. 0

Answer: D

View Text Solution

101. In a quadrilateral ABCD, the point P divides DC in the ratio 1:2 and Q is the mid-point of AC. If AB+2AD+BC-2 DC=k PQ, then k is equal to

A. -6

B. -4

C. 6

D. 4

Answer: A

View Text Solution

102. If m_1, m_2, m_3 and m_4 are respectively the magnitudes of the vectors $a_1 = 2\hat{i} - \hat{j} + \hat{k}$, $a_2 = 3\hat{i} - 4\hat{j} - 4\hat{k}$, $a_3 = \hat{i} + \hat{j} - \hat{k}$ and $a_4 = -\hat{i} + 3\hat{j} + \hat{k}$, then the correct order of m_1, m_2, m_3 and m_4 is

A. $m_3 < m_1 < m_4 < m_2$

B. $m_3 < m_1 < m_2 < m_4$

C. $m_3 < m_4 < m_1 < m_2$

D. $m_3 < m_4 < m_2 < m_1$

Answer: A

View Text Solution

103. If $a = (2, 1, -1)$, $b = (1, -1, 0)$, $c = (5, -1, 1)$, then unit vector parallel to a + b - c but in opposite direction is

A. $\frac{1}{3}\left(2\hat{i} - \hat{j} + 2\hat{k}\right)$

B. $\frac{1}{2}\left(2\hat{i}-\hat{j}+2\hat{k}\right)$

C. $\frac{1}{3}\left(2\hat{i}-\hat{j}-2\hat{k}\right)$

D. None of these

Answer: A

View Text Solution

104. The vectors $a=\hat{i}+\hat{j}+m\hat{k}, b=\hat{i}+\hat{j}+(m+1)\hat{k}$ and $c=\hat{i}-\hat{j}+m\hat{k}$ are coplanar, it m is equal to

A. 1

B. 4

C. 3

D. no value of m for which vectors are coplanar

Answer: D

View Text Solution

105. Given, $p = 3\hat{i} + 2\hat{j} + 4\hat{k}, a = \hat{i} + \hat{j}, b = \hat{j} + \hat{k}, c = \hat{i} + \hat{k}$ and P = xa + yb + zc, then x, y, z are respectively

A. $\frac{3}{2}, \frac{1}{2}, \frac{5}{2}$

B. $\frac{1}{2}, \frac{3}{2}, \frac{5}{2}$

C. $\frac{5}{2}, \frac{3}{2}, \frac{1}{2}$

D. $\frac{1}{2}, \frac{5}{2}, \frac{3}{2}$

Answer: B

View Text Solution

106. If 2a + 3b - 5c = 0, then ratio in which c divides AB is

A. 3 : 2 internally

B. 3 : 2 externally

C. 2 : 3 internally

D. 2 : 3 externally

Answer: A

View Text Solution

107. If C is the mid-point of AB and P is any point outside AB, then

A. PA + PB = PC

B. PA + PB + 2 PC = 0

C. PA + PB - 2PC = 0

D. PA + PB + PC = 0

Answer: C

View Text Solution

108. Let a, b, c be three non-zero vectors such that no two of these are collinear. If the vector a + 2b is collinear with c, then a + 2b + 6 c equals

A. $\lambda a(\lambda \neq 0, \text{a scalar})$

B. $\lambda b(\lambda \neq 0, \text{a scalar})$

C. $\lambda c(\lambda \neq 0, \text{a scalar})$

D. 0

Answer: C

View Text Solution

109. If $a=\hat{i}+\hat{j}+\hat{k}, b=\hat{i}-\hat{j}+2\hat{k}$ and $c=x\hat{i}+(x-2)\hat{j}-\hat{k}$ and if the vector c lies in the plane of vectors a and b, then x equals

A. 0

B. 1

C. -2

D. 2

Answer: C

View Text Solution

110. A, B, C, D, E, F in that order, are the vertices of a regular hexagon with centre orgin. If the position vectors of the vertices A and B are respectively, $4\hat{i} + 3\hat{j} - \hat{k}$ and $-3\hat{i} + \hat{j} + \hat{k}$, then DE is equal to

A. $7\hat{i} + 2\hat{j} - 2\hat{k}$

B. $-7\hat{i} - 2\hat{j} + 2\hat{k}$

C. $3\hat{i} - \hat{j} - \hat{k}$

D. $-4\hat{i} - 3\hat{j} + 2\hat{k}$

Answer: A

View Text Solution

111. If the position vectors of the vertices of ΔABC are $3\hat{i}+\hat{j}+2\hat{k}$, $\hat{i}-2\hat{j}+7\hat{k}$ and $-2\hat{i}+3\hat{j}+5\hat{k}$, then the ΔABC is

A. right angled and isosceles

B. right angled, but not isosceles

C. isosceles but not right angled

D. equilateral

Answer: D

View Text Solution

112. The non-zero vectors a, b and c are related by a = 8b and c = - 7b. Then the angle between a and c is

A. π

B. 0

C. $\frac{\pi}{4}$

D. $\frac{\pi}{2}$

Answer: A

View Text Solution

113. The position vectors of P and Q are respectively a and b. If R is a point on PQ such that PR = 5PQ, then the position vector of R is

A. 5b - 4a

B. 5b + 4a

C. 4b - 5a

D. 4b + 5a

Answer: A

View Text Solution

114. If ABCDEF is a regular hexagon with AB = a and BC = b, then CE equals

A. b - a

B. $-b$

C. b - 2a

D. None of these

Answer: C

View Text Solution

115. The points A(1, 2, 7), B(2, 6, 3) and C(3, 10, -1) are

A. collinear

B. coplanar

C. non-collinear

D. None of these

Answer: A

View Text Solution

116. The projection of the vector $\hat{i} + 3\hat{j} + 7\hat{k}$ on the vector $7\hat{i} - \hat{j} + 8\hat{k}$ is

A. $\frac{60}{\sqrt{122}}$

B. $\frac{30}{\sqrt{144}}$

C. $\frac{60}{\sqrt{114}}$

D. $\frac{60}{\sqrt{111}}$

Answer: C

View Text Solution

117. If (a+b). (a-b) = 8 and |a| = 8 |b|, then the values of |a| and |b| are

A. $\frac{16}{3}\sqrt{\frac{2}{7}}, \frac{2}{3}\sqrt{\frac{2}{7}}$

B. $\frac{4}{3}\sqrt{\frac{2}{7}}, \frac{2}{3}\sqrt{\frac{3}{7}}$

C. $\frac{12}{5}\sqrt{\frac{2}{7}}, \frac{4}{3}\sqrt{\frac{2}{7}}$

D. None of these

Answer: A

View Text Solution

118. If $a = 2\hat{i} + 2\hat{j} + 3\hat{k}, b = -\hat{i} + 2\hat{j} + \hat{k}$ and $c = 3\hat{i} + \hat{j}$ such that $a + \lambda b$ is perpendicular to c, then the value of λ is

A. 2

B. 4

C. 6

D. 8

Answer: D

View Text Solution

119. If the vertices A, B, C of a ΔABC have position vectors (1, 2, 3), (-1, 0, 0), (0, 1, 2) respectively, then $\angle ABC \angle ABC$ is the angle between the vectors BA and BC), is equal to

A. $\frac{\pi}{2}$

B. $\frac{\pi}{4}$

C. $\cos^{-1}\left(\frac{10}{\sqrt{102}}\right)$

D. $\cos^{-1}\left(\frac{1}{3}\right)$

Answer: C

View Text Solution

120. If for a unit vector $a.\ (x-a).\ (x+a) = 12$, then |x| is equal to

A. 4

B. 2

C. $\sqrt{13}$

D. $\sqrt{11}$

Answer: C

View Text Solution

121. For any two non-zero vectors a and b, |a|b+|b|a and |a|b-|b|a are

A. parallel

B. perpendicular

C. non-parallel

D. None of these

Answer: B

View Text Solution

122. If $\vec{a}, \vec{b}, and \vec{c}$ are unit vectors such that $\vec{a} + \vec{b} + \vec{c} = 0$, then find the value of $\vec{a} \dot{\vec{b}} + \vec{b} \dot{\vec{c}} + \vec{\cdot} \vec{a}.$

A. 0

B. $-\frac{1}{2}$

C. $-\frac{3}{2}$

D. 2

Answer: C

Watch Video Solution

123. The moment about the point M(-2, 4, -6) of the force represented in magnitude and position AB, where the points A and B have the coordinates (1, 2, -3) and (3, -4, 2) respectively, is

A. $8\hat{i} - 9\hat{j} - 14\hat{k}$

B. $2\hat{i} - 6\hat{j} + 5\hat{k}$

C. $-3\hat{i}+2\hat{j}-3\hat{k}$

D. $-5\hat{i}-8\hat{j}-8\hat{k}$

Answer: A

View Text Solution

124. Let a and b be unit vectors inclined at an angle $2\alpha(0 \leq \alpha \leq \pi)$ each other, then (a+b) $<$ 1, if

A. $\alpha = \frac{\pi}{2}$

B. $\alpha < \frac{\pi}{3}$

C. $\alpha > \frac{2\pi}{3}$

D. $\frac{\pi}{3} < \alpha < \frac{2\pi}{3}$

Answer: D

View Text Solution

125. If $a = \left(\hat{i} + \hat{j} + \hat{k}\right)$, $a.\,b = 1$ and $a \times b = \hat{j} - \hat{k}$, then b is

A. $\hat{i} - \hat{j} + \hat{k}$

B. $2\hat{j} - \hat{k}$

C. $\hat{i}$

D. $2\hat{i}$

Answer: C

View Text Solution

126. Let $a = \hat{i} + \hat{j} + \hat{k}, b = \hat{i} - \hat{j} + \hat{k}$ and $c = \hat{i} - \hat{j} - \hat{k}$ be three vectors. A vector v in the plane of a and b, whose projection on c is $\frac{1}{\sqrt{3}}$, is given by

A. $\hat{i} - 3\hat{j} + 3\hat{k}$

B. $-3\hat{i} - 3\hat{j} - \hat{k}$

C. $3\hat{i} - \hat{j} + 3\hat{k}$

D. $\hat{i} + 3\hat{j} - 3\hat{k}$

Answer: C

View Text Solution

127. The two variable vectors $3x\hat{i} + y\hat{j} - 3\hat{k}$ and $x\hat{i} - 4y\hat{j} + 4\hat{k}$ are orthogonal to each other, then the locus of (x, y) is

A. hyperbola

B. circle

C. straight line

D. ellipse

Answer: A

View Text Solution

128. Two adjacent sides of a parallelogram ABCD are given by $AB = 2\hat{i} + 10\hat{j} + 11\hat{k}$ and $AD = -\hat{i} + 2\hat{j} + 2\hat{k}$. The side AD is rotated by an acute angle α in the plane of the parallelogram so that AD becomes AD'. If AD' makes a right angle with the sides AB, then the cosine of the angle α is given by

A. $\frac{8}{9}$

B. $\frac{\sqrt{17}}{9}$

C. $\frac{1}{9}$

D. $\frac{4\sqrt{5}}{9}$

Answer: B

View Text Solution

129. If the vectors $a = \hat{i} - \hat{j} + 2\hat{k}$, $b = 2\hat{i} + 4\hat{j} + \hat{k}$ and $c = \lambda\hat{i} + \hat{j} + \mu\hat{k}$ are mutually orthogonal, then (λ, μ) is equal to

A. $(-3, 2)$

B. $(2, -3)$

C. $(-2, 3)$

D. $(3, -2)$

Answer: A

View Text Solution

130. If p, q and r are perpendicular to q + r, r + p and p + q respectively and if |p + q| = 6, |q + r| = $4\sqrt{3}$ and |r + p| = 4, then |p + q + r| is

A. $5\sqrt{2}$

B. 10

C. 15

D. 5

Answer: A

View Text Solution

131. If the scalar product of the vector $\hat{i}+\hat{j}+2\hat{k}$ with the unti vector along $m\hat{i}+2\hat{j}+3\hat{k}$ is equal to 2, then one of the value of m is

A. 3

B. 4

C. 5

D. 6

Answer: D

View Text Solution

132. Which one of the following vectors is a magnitude 6 and perpendicular to both $a=2\hat{i}+2\hat{j}+\hat{k}$ and $b=\hat{i}-2\hat{j}+2\hat{k}$?

A. $2\hat{i}-\hat{j}-2\hat{k}$

B. $2\left(2\hat{i} - \hat{j} + 2\hat{k}\right)$

C. $3\left(2\hat{i} - \hat{j} - 2\hat{k}\right)$

D. $2\left(2\hat{i} - \hat{j} - 2\hat{k}\right)$

Answer: D

View Text Solution

133. If $|a| = 5, |b|6 \text{ and } a.b = -25$, then $|a \times b|$ is equal to

A. 25

B. $6\sqrt{11}$

C. $11\sqrt{5}$

D. $5\sqrt{11}$

Answer: D

View Text Solution

134. Vectors a and b are inclined at an angle $\theta = 120^{\circ}$. If $|a| = 1, |b| = 2,$ then $[(a + 3b) \times (3a + b)]^2$ is equal to

A. 190

B. 275

C. 300

D. 192

Answer: D

View Text Solution

135. If the projection of the vector a on b is $|a \times b|$ and if $3b = \hat{i} + \hat{j} + \hat{k},$ then the angle between a and b is

A. $\frac{\pi}{3}$

B. $\frac{\pi}{2}$

C. $\frac{\pi}{4}$

D. $\frac{\pi}{6}$

Answer: A

View Text Solution

136. If $2a + 3b + c = 0, \quad \text{then} \quad a \times b + b \times c + c \times a$ is equal to

A. $6(b \times c)$

B. $3(b \times c)$

C. $2(b \times c)$

D. 0

Answer: B

View Text Solution

137. Let $a = 2\hat{i} + \hat{k}$, $b = \hat{i} + \hat{j} + \hat{k}$ and $c = \hat{i} - 3\hat{j} + 7\hat{k}$. If r is a vector such that $r \times b = c \times b$ and $r.\,a - 0$, then value of r.b is

A. 7

B. -7

C. -5

D. 5

Answer: A

View Text Solution

138. Let P, Q, R and S be the points on the plane with position vectors $-2\hat{i} - \hat{j}$, $4\hat{i}$, $3\hat{i} + 3\hat{j}$ and $-3\hat{i} + 2\hat{j}$ respectively. The quadrilateral PQRS must be a

A. parallelogram, which is neither a rhombus nor a ractangle

B. square

C. rectangle, but not a square

D. rhombus, but not a square

Answer: A

View Text Solution

139. If AB $= 3\hat{i} - 2\hat{j} + 2\hat{k}$ and $BC = -\hat{j} - 2\hat{k}$ are adjacent sides of a parallelogram, then angle its diagonals can be

A. $\cos^{-1}\left(\frac{2}{\sqrt{13}}\right)$

B. $\frac{\pi}{3}$

C. $\frac{4\pi}{3}$

D. $\frac{2\pi}{3}$

Answer: B

View Text Solution

140. The area of the parallelogram whose diagonals are the vectors $\hat{i}+3\hat{j}-2\hat{k}$ and $3\hat{i}+\hat{j}-4\hat{k}$

A. $3\sqrt{42}$ sq units

B. $\sqrt{42}$ sq untis

C. $2\sqrt{42}$ sq units

D. None of these

Answer: A

View Text Solution

141. The area of the parallelogram whose adjacent sides are $\hat{i}-3\hat{j}+\hat{k}$ and $\hat{i}+\hat{j}+\hat{k}$ is

A. $4\sqrt{2}$

B. $-4\sqrt{2}$

C. $4\sqrt{3}$

D. None of these

Answer: B

View Text Solution

142. If the vectors of a trianlge are $A\left(\hat{i}+\hat{j}+2\hat{k}\right), B\left(3\hat{i}-\hat{j}+2\hat{i}\right)$ and $C\left(2\hat{i}-\hat{j}+\hat{k}\right)$ the area of triangle is

A. $2\sqrt{3}$ sq units

B. $\sqrt{3}$ sq units

C. $2\sqrt{3}$ sq units

D. 3 sq units

Answer: D

View Text Solution

143. If $a=\hat{i}+2\hat{j}+3\hat{k}$ and $b=\hat{i}\times\left(a\times\hat{i}\right)+\hat{j}\times\left(a\times\hat{j}\right)+\hat{k}+\left(a\times\hat{k}\right)$, then length of b is equal to

A. $\sqrt{12}$

B. $2\sqrt{12}$

C. $3\sqrt{14}$

D. $2\sqrt{14}$

Answer: B

View Text Solution

144. If a, b and c are unit coplanar vectors, then $[2a-b, 2b-c, 2c-a]$ is equal to

A. 1

B. 0

C. $-\sqrt{3}$

D. $\sqrt{3}$

Answer: B

View Text Solution

145. $\left[\hat{i}\hat{k}\hat{j}\right]+\left[\hat{k}\hat{j}\hat{i}\right]+\left[\hat{j}\hat{k}\hat{i}\right]$ is equal to

A. 1

B. 3

C. -3

D. -1

Answer: D

View Text Solution

146. IF r.a = 0, r. b = 0 and r. c= 0 for some non-zero vector r. Then, the value of [a b c] is

A. 0

B. $\frac{1}{2}$

C. 1

D. 2

Answer: A

View Text Solution

147. If a and b are two non-zero, non-collinear vectors, then $2\left[ab\hat{i}\right]\hat{i}+2\left[ab\hat{j}\right]\hat{j}+2\left[ab\hat{k}\right]\hat{k}+[abc]$ is equal to

A. $2(a\times b)$

B. $a\times b$

C. $a+b$

D. None of these

Answer: A

View Text Solution

148. If the volume of the parallelopiped with a, b and c as coterminous edges is 40 cu units, then the volume of the parallelopiped having $b+c, c+a$ and $a+b$ as coterminous edges in cubic units is

A. 80

B. 120

C. 160

D. 40

Answer: A

View Text Solution

149. The volume of the tetrahedron having the edges $\hat{i}+2\hat{j}-\hat{k}$, $\hat{i}+\hat{j}+\hat{k}$, $\hat{i}-\hat{j}+\lambda\hat{k}$ as coterminous, is $\frac{2}{3}$ cu unit. Then, λ equals

A. 1

B. 2

C. 3

D. 4

Answer: A

View Text Solution

150. The vector $a=\alpha\hat{i}+2\hat{j}+\beta\hat{k}$ lies in the plane of the vectors $b=\hat{i}+\hat{j}$ and $c=\hat{j}+\hat{k}$ and bisects the angle between b and c. Then, which one of the following gives possible value of α and β?

A. $\alpha=1, \beta=1$

B. $\alpha=2, \beta=2$

C. $\alpha = 1, \beta = 2$

D. $\alpha = 2, \beta = 1$

Answer: A

View Text Solution

151. Three vectors $7\hat{i} - 11\hat{j} + \hat{k}, 5\hat{i} + 3\hat{j} - 2\hat{k}$ and $12\hat{i} - 8\hat{j} - \hat{k}$ forms

A. an equilateral triangle

B. an isosceles triangle

C. a right angled triangle

D. collinear

Answer: D

View Text Solution

152. If the vectors $2\hat{i}-3\hat{j}+4\hat{k}$ and $\hat{i}+2\hat{j}-\hat{k}$ and $m\hat{i}-\hat{j}+2\hat{k}$ are coplanar, then the value of m is

A. $\frac{5}{8}$

B. $\frac{8}{5}$

C. $-\frac{7}{4}$

D. $\frac{2}{3}$

Answer: B

View Text Solution

153. If the volume of parallelopiped with coterminous edges $4\hat{i}+5\hat{j}+\hat{k}$, $-\hat{j}+\hat{k}$ and $3\hat{i}+9\hat{j}+p\hat{k}$ is 34 cu units, then p is equal to

A. 4

B. -13

C. 13

D. 6

Answer: B

View Text Solution

154. If $a.\ \hat{i} = 4$ then $\left(a \times \hat{j}\right).\ \left(2\hat{j} - 3\hat{k}\right)$ is equal to

A. 12

B. 2

C. 0

D. -12

Answer: D

View Text Solution

155. The value of λ, for which the four points $2\hat{i}+3\hat{j}-\hat{k}$, $\hat{i}+3\hat{k}$, $2\hat{i}+4\hat{j}-2\hat{k}$, $\hat{i}-6\hat{j}+\lambda\hat{k}$ are coplanar, is

A. 2

B. 4

C. 6

D. 8

Answer: C

View Text Solution

156. If a is perpendicular to b and c, $|a|=2$, $|b|=3$, $|c|=4$ and the angle between b and c is $\frac{2\pi}{3}$, then $[a, b, c]$ is equal to

A. $4\sqrt{3}$

B. $6\sqrt{3}$

C. $12\sqrt{3}$

D. $18\sqrt{3}$

View Text Solution

157. If the point whose position vectors are $2\hat{i} + \hat{j} + \hat{k}, 6\hat{i} - \hat{j} + 2\hat{k}$ and $12\hat{i} - 5\hat{j} + p\hat{k}$ are collinear, then the value of p is

A. 2

B. 4

C. 6

D. 8

Answer: B

View Text Solution

158. The volume (in cubic unit) of the tetrahedron with edges $\hat{i}+\hat{j}+\hat{k}, \hat{i}-\hat{j}+\hat{k}$ and $\hat{i}+2\hat{j}-\hat{k}$, is

A. 4

B. $\frac{2}{3}$

C. $\frac{1}{6}$

D. $\frac{1}{3}$

Answer: B

View Text Solution

159. If $|a|=10, |b|=2$ and $a.b=12$, then value of $|a\times b|$ is

A. 5

B. 10

C. 14

D. 16

Answer: D

View Text Solution

160. The angle between two vectors a and b with magnitudes $\sqrt{3}$ and 2 respectively, having $a.\,b = \sqrt{6}$ is

A. $\frac{\pi}{4}$

B. $\frac{\pi}{2}$

C. $\frac{\pi}{6}$

D. $\frac{\pi}{3}$

Answer: A

View Text Solution

161. A vector r of magnitude $3\sqrt{2}$ units which makes an angle of $\frac{\pi}{4}$ and $\frac{\pi}{2}$ with y and z-axis, respectively is

A. $r = \pm 3\hat{i} + 3\hat{j}$

B. $r = 3\hat{i} + 3\hat{j}$

C. $r = \pm 3\hat{i} + 3\hat{j}$

D. None of these

Answer: A

View Text Solution

162. If a and b are unit vectors, then what is the angle between a and b for $\sqrt{3}a - b$ to be a unit vector?

A. 30°

B. 45°

C. 60°

D. 90°

Answer: A

View Text Solution

163. The value of $[a-bb-cc-a]$ is equal to

A. 0

B. 1

C. 2

D. 3

Answer: A

View Text Solution

164. The points $a-2b+3c, 2a+3b-4c, \ -7b+10c$ are

A. collinear

B. non-collinear

C. can't say

D. None of these

Answer: A

View Text Solution

165. If $a+b+c=0$ and $|a|=\sqrt{37}, |b|=3, |c|=4$ then the angle between b and c is

A. 30°

B. 45°

C. 60°

D. 90°

Answer: C

View Text Solution

166. If a, b and c are the three vectors mutually perpendicular to each other to form a right handed system and $|a| = 1, |b| = 3$ and $|c| = 5,$ then $[a - 2b b - 3c c - 4a]$ is equal to

A. 0

B. -24

C. 3600

D. -215

Answer: C

View Text Solution

167. If a and b are two unit vectors inclined to X-axis at angles 30° and 120°, then $|a + b|$ is equal to

A. $\sqrt{\frac{2}{3}}$

B. $\sqrt{2}$

C. $\sqrt{3}$

D. 2

Answer: C

View Text Solution

168. The sine of the angle between the vectors $a = 3\hat{i} + \hat{j} + 2\hat{k}$ and $b = 2\hat{i} - 2\hat{j} + 4\hat{k}$ is

A. $\sqrt{\frac{2}{7}}$

B. $\frac{2}{\sqrt{7}}$

C. $\frac{\sqrt{2}}{7}$

D. None of these

Answer: B

View Text Solution

1. A vector of magnitude $\sqrt{2}$ coplanar with the vectors $\vec{a} = \hat{i} + \hat{j} + 2\hat{k}$ and $\vec{b} = \hat{i} + \hat{j} + \hat{k}$, and perpendicular to the vector $\vec{c} = \hat{i} + \hat{j} + \hat{k}$ is

A. $-\hat{j} + \hat{k}$

B. $\hat{i} - \hat{k}$

C. $\hat{i} - \hat{j}$

D. $\hat{i} - 2\hat{j} + \hat{k}$

Answer: A

Watch Video Solution

2. If θ is the angle between the vectors $a = 2\hat{i} + 2\hat{j} - \hat{k}$ and $b = 6\hat{i} - 3\hat{j} + 2\hat{k}$, then

A. $\cos^{-1}. \frac{3}{11}$

B. $\cos^{-1}.\ \frac{2}{11}$

C. $\cos^{-1}.\ \frac{4}{21}$

D. $\cos^{-1}.\ \frac{3}{22}$

Answer: C

Watch Video Solution

3. If $\vec{a}, and \vec{b}$ are unit vectors , then find the greatest value of $\left|\vec{a}+\vec{b}\right|+\left|\vec{a}-\vec{b}\right|$.

A. 2

B. 4

C. $2\sqrt{2}$

D. $\sqrt{2}$

Answer: C

Watch Video Solution

4. If a,b,c ar enon-coplanar vectors and λ is a real number, then the vectors $a+2b+3c$, $\lambda b+4c$ and $(2\lambda-1)c$ are non-coplanar for

A. no value of λ

B. all except one value of λ

C. all except two value of λ

D. all values of λ

Answer: C

Watch Video Solution

5. Vectors a and b are such that $|a|=1$, $|b|=4$ and $a.b=2$. If $c=2a\times b-3b$, then the angle between b and c is

A. $\dfrac{\pi}{6}$

B. $\frac{5\pi}{6}$

C. $\frac{\pi}{3}$

D. $\frac{2\pi}{3}$

Answer: B

Watch Video Solution

6. Three vectors $a = \hat{i} + \hat{j} - \hat{k}, b = -\hat{i} + 2\hat{j} + \hat{k} \text{ and } c = -\hat{i} + 2\hat{j} - \hat{k}$, then the unit vector perpendicular to both $a + b$ and $b + c$ is

A. $\frac{\hat{i}}{\sqrt{3}}$

B. $6\hat{k}$

C. $\frac{\hat{k}}{\sqrt{3}}$

D. $\frac{\hat{i} + \hat{j} + \hat{k}}{\sqrt{3}}$

Answer: B

Watch Video Solution

7. Given a parallelogram $ABCD$. If $\left|\overrightarrow{AB}\right| = a, \left|\overrightarrow{AD}\right| = b \& \left|\overrightarrow{AC}\right| = c$, then $\overrightarrow{DB}. \overrightarrow{AB}$ has the value

A. $\frac{1}{2}(a^2 + b^2 + c^2)$

B. $\frac{1}{2}(a^2 - b^2 + c^2)$

C. $\frac{1}{4}(a^2 + b^2 - c^2)$

D. $\frac{1}{3}(b^2 + c^2 - a^2)$

Answer: A

Watch Video Solution

8. Let $a = a_1\hat{i} + a_3\hat{k}, b = b_1\hat{i} + b_3\hat{k}, c = c_1\hat{i} + c_2\hat{j} + c_3\hat{k}.$ If $|c| = 1$ and $(a \times b) \times c = 0$, then $\begin{vmatrix} a_1 & a_2 & a_2 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{vmatrix}$ is equal to

A. 0

B. 1

C. $|a|^2|b|^2$

D. $|a \times b|^2$

Answer: D

Watch Video Solution

9. If $\overrightarrow{u}$ and $\overrightarrow{v}$ are unit vectors and θ is the acute angle between them, then $2u\overrightarrow{u} \times 3\overrightarrow{v}$ is a unit vector for

A. exactly two value of θ

B. more than two values of θ

C. no value of θ

D. exactly one value of θ

Answer: D

Watch Video Solution

10. If sum of two unit vectors is a unit vector; prove that the magnitude of their difference is $\sqrt{3}$

A. $\sqrt{2}$

B. $\sqrt{3}$

C. $\sqrt{5}$

D. $\sqrt{7}$

Answer: B

Watch Video Solution

11. The three vectors a, b and c with magnitude 3, 4 and 5 respectively and $a+b+c=0,$ then the value of $a.\ b+b.\ c+c.\ a$ is

A. -23

B. -25

C. 30

D. 26

Answer: B

Watch Video Solution

12. The vectors $(a, a+1, a+2)(a+3, a+4, a+5)(a+6, a+7, a+8)$ are coplanar for

A. $\forall a \in R$

B. $\forall a \notin R$

C. $a = \sqrt{-3}$

D. None of these

Answer: A

Watch Video Solution

13. If $a = \hat{i} + 2\hat{k} + 3\hat{k}, b = \; - \hat{i} + 2\hat{j} = \hat{k}$ and $c = 3\hat{i} + \hat{j}$, then p such that $a + pb$ is at right angle to c will be

A. 7

B. 9

C. 3

D. 5

Answer: D

Watch Video Solution

14. Let $\overrightarrow{a} = \hat{i} + 2\hat{j} + \hat{k}, \overrightarrow{b} = \hat{i} - \hat{j} + \hat{k}$ and $\overrightarrow{c} = \hat{\hat{j}} - \hat{k}$ A vector in the plane of $\overrightarrow{a}$ and $\overrightarrow{b}$ whose projections on $\overrightarrow{c} is 1/\sqrt{3}$ is

A. $\hat{i} + \hat{j} - 2\hat{k}$

B. $3\hat{i} + \hat{j} - 3\hat{k}$

C. $4\hat{i} - \hat{j} + 4\hat{k}$

D. $4\hat{i} + \hat{j} - 4\hat{k}$

Answer: C

Watch Video Solution

15. If

$a = \lambda\hat{i} + 2\hat{j} - 3\hat{k}, b = 2\hat{i} + \lambda\hat{j} - \hat{k}, c = \hat{i} + 2\hat{j} + \hat{k} \text{ and } [abc] = 6,$

then λ is equal to

A. $-8 \text{ or } 3$

B. $-9 \text{ or } 3$

C. $-3 \text{ or } +9$

D. $8 \text{ or } 5$

Answer: A

Watch Video Solution

16. Three point A, B and C with position vectors $a_1 = 3\hat{i} - 2\hat{j} - \hat{k}$, $a_2 = \hat{i} + 3\hat{j} + 4\hat{k}$ and $a_3 = 2\hat{i} + \hat{j} - 2\hat{k}$ relative to an origin O. The distance of A from the plane OBC is (magnitude)

A. 5

B. $\sqrt{3}$

C. 3

D. $2\sqrt{3}$

Answer: C

Watch Video Solution

17. If a and b are two vectos such that $a.\ b < 0$ and $|a.\ b| = |a \times b|$, then the angle between a and b is

A. $\frac{3\pi}{4}$

B. $\frac{2\pi}{3}$

C. $\frac{\pi}{4}$

D. $\frac{\pi}{3}$

Answer: A

Watch Video Solution

18. If the position vectors off A,B,C and D are $2\hat{i}+\hat{j}$, $\hat{i}-3\hat{j}$, $3\hat{i}+2\hat{j}$ and $\hat{i}+\lambda\hat{j}$, respectively and $AB \mid \mid CD$, then λ will be

A. -7

B. 7

C. -6

D. None of these

Answer: C

Watch Video Solution

19. The vectors $a = 2\hat{i} + \hat{j} - 2\hat{k}, b = \hat{i} + \hat{j}$. If c is a vector such that $a.\, c = |c|$ and $|c - a| = 2\sqrt{2}$, angle between $a \times b$ and c is 45°, then $|(a \times b) \times c|$ is

A. 3

B. $\frac{\sqrt{3}}{2}$

C. $\frac{3\sqrt{2}}{2}$

D. None of these

Answer: C

Watch Video Solution

20. If $[a \times b \quad b \times c \quad c \times a] = \lambda [a \quad b \quad c]^2$, then λ is equal to

A. 1

B. 2

C. 3

D. 0

Answer: A

Watch Video Solution

21. The vectors $\overrightarrow{AB} = 3\hat{i} + 4\hat{k}$ and $\overrightarrow{AC} = 5\hat{i} - 2\hat{j} + 4\hat{k}$ are the sides of a triangle ABC. The length of the median through A is (A) $\sqrt{72}$ (B) $\sqrt{33}$ (C) $\sqrt{2880}$ (D) $\sqrt{18}$

A. $\sqrt{18}$

B. $\sqrt{72}$

C. $\sqrt{33}$

D. $\sqrt{45}$

Answer: C

Watch Video Solution

22. Let $\widehat{a}$ and $\hat{b}$ be two unit vectors. If the vectors $\overrightarrow{c}=\widehat{a}+2\hat{b}$ and $\overrightarrow{d}=5\widehat{a}-4\hat{b}$ are perpendicular to each other then the angle between $\widehat{a}$ and $\hat{b}$ is (A) $\frac{\pi}{2}$ (B) $\frac{\pi}{3}$ (C) $\frac{\pi}{4}$ (D) $\frac{\pi}{6}$

A. $\frac{\pi}{6}$

B. $\frac{\pi}{2}$

C. $\frac{\pi}{3}$

D. $\frac{\pi}{4}$

Answer: C

Watch Video Solution

23. If $\overrightarrow{a}=\frac{1}{\sqrt{10}}\left(3\hat{i}+\hat{k}\right), \overrightarrow{b}=\frac{1}{7}\left(2\hat{i}+3\hat{j}-6\hat{k}\right)$, then the value of $\left(2\overrightarrow{a}-\overrightarrow{b}\right).\left\{\left(\overrightarrow{a}\times\overrightarrow{b}\right)\times\left(\overrightarrow{a}+2\overrightarrow{b}\right)\right\}$ is

A. -3

B. 5

C. 3

D. -5

Answer: D

Watch Video Solution

24. If the vectots $p\hat{i} + \hat{j} + \hat{k}$, $\hat{i} + q\hat{j} + \hat{k}$ and $\hat{i} + \hat{j} + r\hat{k}(p \neq q \neq r \neq 1)$ are coplanar, then the value of $pqr - (p + q + r)$, is

A. -2

B. 2

C. 0

D. -1

Answer: A

Watch Video Solution

25. Let a,b and c be three non-zero vectors which are pairwise non-collinear. If a+3b is collinear with c and b+2c is collinear with a, then a+3b+6c is

A. $a+c$

B. a

C. c

D. $\overrightarrow{0}$

Answer: D

Watch Video Solution

26. Let $\overrightarrow{a}=\hat{j}-\hat{k}$ and $\overrightarrow{c}=\hat{i}-\hat{j}-\hat{k}$. Then the vector $\overrightarrow{b}$ satisfying $\overrightarrow{a}\times\overrightarrow{b}+\overrightarrow{c}=\overrightarrow{0}$ and $\overrightarrow{a}.\overrightarrow{b}=3$ is

A. $-\hat{i}+\hat{j}-2\hat{k}$

B. $2\hat{i}-\hat{j}+2\hat{k}$

C. $\hat{i}-\hat{j}-2\hat{k}$

D. $\hat{i}+\hat{j}-2\hat{i}$

Answer: A

Watch Video Solution

27. If the vectors $\vec{a}=\hat{i}-\hat{j}+2\hat{k}, \vec{b}=2\hat{i}+4\hat{j}+\hat{k}$ and $\vec{c}=\lambda\hat{i}+\hat{j}+\mu\hat{k}$ are mutually orthogonal $then(\lambda, \mu)=$ (A) (-2,3) (B) (3,-2) (C) (-3,2) (D) (2,-3)

A. $(-3, 2)$

B. $(2, -3)$

C. $(-2, 3)$

D. $(3, -2)$

Answer: A

Watch Video Solution

28. Let $\overrightarrow{a} = \hat{i} + \hat{j} + \hat{k}, \overrightarrow{b} = \hat{i} - \hat{j} + 2\hat{k}$ and $\overrightarrow{c} = x\hat{i} + (x-2)\hat{j} - \hat{k}$. If the vector $\overrightarrow{c}$ lies in the plane of $\overrightarrow{a}$ and $\overrightarrow{b}$ then x equals (A) 0 (B) 1 (C) -4 (D) -2

A. 0

B. 1

C. -4

D. -2

Answer: D

Watch Video Solution

29. The value of 'a' for which the points A, B,C with position vectors $2\hat{i} - \hat{j} + \hat{k}$, $\hat{i} + 2\hat{k}$, $\hat{i} - 3\hat{j} - 5\hat{k}$ and $a\hat{i} - 3\hat{j} + \hat{k}$ respectively are the vertices of a right angled triangle with $C = \pi/2$, are

A. $-2 \text{ and } -1$

B. $-2 \text{ and } 1$

C. $2 \text{ and } -1$

D. 2 and 1

Answer: D

Watch Video Solution

30. For any vector $\vec{a}$ the value of $\left(\vec{a} \times \hat{i}\right)^2 + \left(\vec{a} \times \hat{j}\right)^2 + \left(\vec{a} \times \hat{k}\right)^2$ is equal to (A) $4\vec{a}^2$ (B) $2\vec{a}^2$ (C) $\vec{a}^2$ (D) $3\vec{a}^2$

A. $4a^2$

B. $2a^2$

C. a^2

D. $3a^2$

Answer: B

Watch Video Solution

31. Let $\vec{a} = \hat{i} - \hat{k}, \vec{b} = x\hat{i} + \hat{j} + (1 - x)\hat{k}$ and $\vec{c} = y\hat{i} + x\hat{j} + (1 + x - y)\hat{k}$, then $\left[\vec{a}\,\vec{b}\,\vec{c}\right]$ depends on

A. Only x

B. Only y

C. Both x and y

D. Neither x nor y

Answer: D

Watch Video Solution

32. Let a, b, c be distinct non-negative numbers. If the vectors $a\hat{i} + a\hat{j} + c\hat{k}, \hat{i} + \hat{k}$ and $c\hat{i} + c\hat{j} + b\hat{k}$ lies in a plane then c is

A. the harmonic mean of a and b

B. equal to zero

C. the arithmetic mean of a and b

D. the geometric mean of a and b

Answer: D

Watch Video Solution

33. If $\bar{a}, \bar{b}, \bar{c}$ are non coplanar vectors and λ is a real number then $\left[\lambda(\bar{a} + \bar{b})\lambda^2\bar{b}\lambda\bar{c}\right] = \left[\bar{a}\bar{b} + \bar{c}\bar{b}\right]$ for

A. exactly two values of λ

B. exactly three values of λ

C. no volue of λ

D. exactly one value of λ

Answer: C

Watch Video Solution

34. If a,b and c are three non-zero vectors such that no two of these are collinear. If the vector a+2b is collinear with c and b+3c is collinear with a(λ being some non-zero scalar), then a+2b+6c is equal to

A. λa

B. λb

C. λc

D. 0

Answer: D

Watch Video Solution

35. A paticle acted on by constant forces $4\hat{i} = \hat{j} - 3\hat{k}$ and $3\hat{i} + \hat{j} - \hat{k}$ is displaced from the point $\hat{i} + 2\hat{j} + 3\hat{k} \to 5\hat{i} + 4\hat{j} + \hat{k}$. Find the work done

A. 40 units

B. 30 units

C. 25 units

D. 15 units

Answer: A

Watch Video Solution

36. Let $\vec{u}, \vec{v} and \vec{w}$ be such that $|\vec{u}| = 1, |\vec{v}| = 2 and |\vec{w}| = 3$. If the projection of $\vec{v}$ along $\vec{u}$ is equal to that of $\vec{w}$ along $\vec{u}$ and vectors $\vec{v} and \vec{w}$ are perpendicular to each other, then $|\vec{u} - \vec{v} + \vec{w}|$ equals 2 b. $\sqrt{7}$ c. $\sqrt{14}$ d. 14

A. 2

B. $\sqrt{7}$

C. $\sqrt{14}$

D. 14

Answer: C

Watch Video Solution

37. The value of $[\,a-b \quad b-c \quad c-a\,]$ is equal to

A. 0

B. 1

C. 2[a b c]

D. 2

Answer: A

Watch Video Solution

38. If $\hat{i}+\hat{j}, \hat{j}+\hat{k}, \hat{i}+\hat{k}$ are the position vectors of the vertices of a ΔABC taken in order, then $\angle A$ is equal to

A. $\frac{\pi}{2}$

B. $\frac{\pi}{5}$

C. $\frac{\pi}{6}$

D. $\frac{\pi}{3}$

Answer: D

Watch Video Solution

39. If a, b and c are three non-zero vectors such that each one of them being perpendicular to the sum of the other two vectors, then the value of $|a+b+c|^2$ is

A. $|a|^2+|b|^2+|c|^2$

B. $|a|+|b|+|c|$

C. $2\left(|a|^2+|b|^2+|c|^2\right)$

D. $\frac{1}{2}\left(|a|^2+|b|^2+|c|^2\right)$

Answer: A

Watch Video Solution

40. Let $\vec{a}=\hat{i}+\hat{j}+\hat{k}, \vec{b}=\hat{i}-\hat{j}+\hat{k} and \vec{c}=\hat{i}-\hat{j}-\hat{k}$ be three vectors. A vector $\vec{v}$ in the plane of $\vec{a} and \vec{b}$, whose projection on $\vec{c}$ is $\frac{1}{\sqrt{3}}$ is given by $\hat{i}-3\hat{j}+3\hat{k}$ b. $-3\hat{i}-3\hat{j}+3\hat{k}$ c. $3\hat{i}-\hat{j}+3\hat{k}$ d. $\hat{i}+3\hat{j}-3\hat{k}$

A. $3\hat{i}+\hat{j}-3\hat{k}$

B. $3\hat{i}-\hat{j}+3\hat{k}$

C. $3\hat{i}+\hat{j}+3\hat{k}$

D. $-3\hat{i}+\hat{j}+3\hat{k}$

Answer: B

Watch Video Solution

41. If $\overrightarrow{r}.\overrightarrow{a}=\overrightarrow{r}.\overrightarrow{b}=\overrightarrow{r}.\overrightarrow{c}=0$ where a, b, c are non-coplanar, then

A. coplanar with a, b, c

B. parallel to $a+b+c$

C. parallel to $b\times c+c\times a+a\times b$

D. parallel to $(a\times b)\times c$

Answer: C

Watch Video Solution

42. If $\left|\overrightarrow{a}\right|=3$ and $-1\leq k\leq 2$, then $\left|k\overrightarrow{a}\right|$ lies in the interval

A. [0, 6]

B. [-3, 6]

C. [3, 6]

D. [1, 2]

Answer: B

Watch Video Solution

43. If ABCDEF is a regular hexagon then $\overrightarrow{AD}+\overrightarrow{EB}+\overrightarrow{FC}$ equals :

A. 0

B. 2AB

C. 3AB

D. 4AB

Answer: D

Watch Video Solution

44. If $a = \hat{i} + \hat{j} + \hat{k}, b = \hat{i} + 3\hat{j} + 5\hat{k}$ and $c = 7\hat{i} + 9\hat{j} + 11\hat{k}$, then the area of the parallelogram having diagonals $a + b$ and $b + c$ is

A. $4\sqrt{6}$

B. $\frac{1}{2}\sqrt{21}$

C. $\frac{\sqrt{6}}{2}$

D. $\sqrt{6}$

Answer: B

Watch Video Solution

45. A vector of magnitude $\sqrt{2}$ coplanar with $\hat{i} + \hat{j} + 2\hat{i}$ and $\hat{i} + 2\hat{j} + \hat{k}$ and perpendicular to $\hat{i} + \hat{j} + \hat{k}$ is

A. $-\hat{j} + \hat{k}$

B. $\hat{i} - \hat{k}$

C. $\hat{i} - \hat{j}$

D. $\hat{i} - 2\hat{j} + \hat{k}$

Answer: A

View Text Solution

46. The angle between the vectors

$a = 2\hat{i} + 2\hat{j} - \hat{k}$

and $b = 6\hat{i} - 3\hat{j} + 2\hat{k}$ is

A. $\cos^{-1}. \frac{3}{11}$

B. $\cos^{-1}. \frac{2}{11}$

C. $\cos^{-1}. \frac{4}{21}$

D. $\cos^{-1}. \frac{3}{22}$

Answer: C

View Text Solution

47. If a and b are unit vectors, then the greatest value of $|a+b|+|a-b|$ is

A. 2

B. 4

C. $2\sqrt{2}$

D. $\sqrt{2}$

Answer: C

View Text Solution

48. If a, b and c are non-coplanar vectors and r is a real number, then the vectors $a+2b+3c, \lambda b+4c \text{ and } (2\lambda-1)c$ are non-coplanar for

A. no value of λ

B. all except one value of λ

C. all except two value of λ

D. all values of λ

Answer: C

View Text Solution

49. Vectors a and b are such that $|a| = 1, |b| = 4$ and $a.b = 2$. If $c = 2a \times b - 3b$, then the angle between b and c is

A. $\frac{\pi}{6}$

B. $\frac{5\pi}{6}$

C. $\frac{\pi}{3}$

D. $\frac{2\pi}{3}$

Answer: B

View Text Solution

50. Three vectors $a = \hat{i} + \hat{j} - \hat{k}, b = -\hat{i} + 2\hat{j} + \hat{k}$ and $c = -\hat{i} + 2\hat{j} - \hat{k}$, then the unit vector perpendicular to both $a + b$ and $b + c$ is

A. $\frac{\hat{i}}{\sqrt{3}}$

B. $6\hat{k}$

C. $\frac{\hat{k}}{\sqrt{3}}$

D. $\frac{\hat{i} + \hat{j} + \hat{k}}{\sqrt{3}}$

Answer: B

View Text Solution

51. If a parallelogram ABCD, $|AB| = a, |AD| = b$ and $|AC| = C$, then DA. AB is equal to

A. $\frac{1}{2}(a^2 + b^2 + c^2)$

B. $\frac{1}{2}(a^2 - b^2 + c^2)$

C. $\frac{1}{4}(a^2 + b^2 - c^2)$

D. $\frac{1}{3}(b^2 + c^2 - a^2)$

Answer: A

View Text Solution

52. Let $a = a_1\hat{i} + a_3\hat{k}, b = b_1\hat{i} + b_3\hat{k}, c = c_1\hat{i} + c_2\hat{j} + c_3\hat{k}.$ If $|c| = 1$ and $(a \times b) \times c = 0$, then $\begin{vmatrix} a_1 & a_2 & a_2 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{vmatrix}$ is equal to

A. 0

B. 1

C. $|a|^2|b|^2$

D. $|a \times b|^2$

Answer: D

View Text Solution

53. If $\widehat{u}$ and $\hat{v}$ are unit vectors and θ is the acute angle between them, then $2\widehat{u} \times 3\hat{v}$ is a unit vector for

A. exactly two value of θ

B. more than two values of θ

C. no value of θ

D. exactly one value of θ

Answer: D

View Text Solution

54. If the sum of two unit vectors is a unit vector, then the magnitude of their diffierence is

A. $\sqrt{2}$

B. $\sqrt{3}$

C. $\sqrt{5}$

D. $\sqrt{7}$

Answer: B

View Text Solution

55. The three vectors a, b and c with magnitude 3, 4 and 5 respectively and $a+b+c=0$, then the value of $a.\, b+b.\, c+c.\, a$ is

A. -23

B. -25

C. 30

D. 26

Answer: B

View Text Solution

56. The vectors $(a, a+1, a+2)(a+3, a+4, a+5)(a+6, a+7, a+8)$ are coplanar for

A. $\forall a \in R$

B. $\forall a \notin R$

C. $a = \sqrt{-3}$

D. None of these

Answer: A

View Text Solution

57. If $a = \hat{i} + 2\hat{k} + 3\hat{k}$, $b = -\hat{i} + 2\hat{j} = \hat{k}$ and $c = 3\hat{i} + \hat{j}$, then p such that $a + pb$ is at right angle to c will be

A. 7

B. 9

C. 3

D. 5

Answer: D

View Text Solution

58. Let $a = \hat{i} + 2\hat{j} + \hat{k}, b = \hat{i} - \hat{j} + \hat{k}$ and $c = \hat{i} + \hat{j} - \hat{k}$. A vector in the plane a and b whose projection on c is $\frac{1}{\sqrt{3}}$, is

A. $\hat{i} + \hat{j} - 2\hat{k}$

B. $3\hat{i} + \hat{j} - 3\hat{k}$

C. $4\hat{i} - \hat{j} + 4\hat{k}$

D. $4\hat{i} + \hat{j} - 4\hat{k}$

Answer: C

View Text Solution

59. If

$a = \lambda\hat{i} + 2\hat{j} - 3\hat{k}, b = 2\hat{i} + \lambda\hat{j} - \hat{k}, c = \hat{i} + 2\hat{j} + \hat{k}$ and $[abc] = 6,$

then λ is equal to

A. -8 or 3

B. -9 or 3

C. -3 or $+9$

D. 8 or 5

Answer: A

View Text Solution

60. Three point A, B and C with position vectors $a_1 = 3\hat{i} - 2\hat{j} - \hat{k}, a_2 = \hat{i} + 3\hat{j} + 4\hat{k}$ and $a_3 = 2\hat{i} + \hat{j} - 2\hat{k}$ relative to an origin O. The distance of A from the plane OBC is (magnitude)

A. 5

B. $\sqrt{3}$

C. 3

D. $2\sqrt{3}$

Answer: C

View Text Solution

61. If a and b are two vectos such that $a.\ b < 0$ and $|a.\ b| = |a \times b|$, then the angle between a and b is

A. $\frac{3\pi}{4}$

B. $\frac{2\pi}{3}$

C. $\frac{\pi}{4}$

D. $\frac{\pi}{3}$

Answer: A

View Text Solution

62. If the position vectors of P, Q, R and S are $2\hat{i}+\hat{j}, \hat{i}-3\hat{j}, 3\hat{i}+2\hat{j}$ and $\hat{i}\mu+\hat{j}$ respectively and $PQ||RS$, then the value of μ is

A. -7

B. 7

C. -6

D. None of these

Answer: C

View Text Solution

63. The vectors $a=2\hat{i}+\hat{j}-2\hat{k}, b=\hat{i}+\hat{j}$. If c is a vector such that $a.\,c=|c|$ and $|c-a|=2\sqrt{2}$, angle between $a\times b$ and c is 45°, then $|(a\times b)\times c|$ is

A. 3

B. $\dfrac{\sqrt{3}}{2}$

C. $\dfrac{3\sqrt{2}}{2}$

D. None of these

Answer: C

View Text Solution

64. If $[a \times bb \times cc \times a] = \lambda[abc]^2$, then λ is euqual to

A. 1

B. 2

C. 3

D. 0

Answer: A

View Text Solution

65. If the vectors $AB = 3\hat{i} + 4\hat{k}$ and $AC = \left(5\hat{i} - 2\hat{j} + 4\hat{k}\right)$ are the sides of a ΔABC, then the length of the median through A is

A. $\sqrt{18}$

B. $\sqrt{72}$

C. $\sqrt{33}$

D. $\sqrt{45}$

Answer: C

View Text Solution

66. Let $\widehat{a}$ and $\hat{b}$ be two unit vectors. If the vectors $c = \widehat{a} + 2\hat{b}$ and $d = \widehat{a} - 4\hat{b}$ are perpendicular to each other, then the angle between $\widehat{a}$ and hatb` is

A. $\frac{\pi}{6}$

B. $\frac{\pi}{2}$

C. $\frac{\pi}{3}$

D. $\frac{\pi}{4}$

Answer: C

View Text Solution

67. If $a = \frac{1}{\sqrt{10}}\left(3\hat{i} + \hat{k}\right)$ and $b = \frac{1}{7}\left(2\hat{i} + 3\hat{j} - 6\hat{k}\right)$, then the value of $(2a - b).\left[(a \times b) \times (a + 2b)\right]$ is

A. -3

B. 5

C. 3

D. -5

Answer: D

View Text Solution

68. If the vectors $p\hat{i}+\hat{j}+\hat{k}, \hat{i}, q\hat{j}+\hat{k}$ and $\hat{i}+\hat{j}+r\hat{k}(p \neq q \neq r \neq 1)$ are coplanar, then the value of $pqr-(p+q+r)$ is

A. -2

B. 2

C. 0

D. -1

Answer: A

View Text Solution

69. Let a, b and c be three non-zero vectors which are pairwise non-collinear. If $a+3b$ is collinear with c and $b+2c$ is collinear with a then $a+3b+6c$ is

A. $a+c$

B. a

C. c

D. $\overrightarrow{0}$

Answer: D

View Text Solution

70. Let $a = \hat{j} - \hat{k}$ and $c = \hat{i} - \hat{j} - \hat{k}$, the vector b satisfying $a \times b + c = \overrightarrow{0}$ and a.b=3, is

A. $-\hat{i} + \hat{j} - 2\hat{k}$

B. $2\hat{i} - \hat{j} + 2\hat{k}$

C. $\hat{i} - \hat{j} - 2\hat{k}$

D. $\hat{i} + \hat{j} - 2\hat{i}$

Answer: A

View Text Solution

71. If the vectors $a = \hat{i} - \hat{j} + 2\hat{k}$, $b = 2\hat{i} + 4\hat{j} + \hat{k}$ and $c = \lambda\hat{i} + \hat{j} + \mu\hat{k}$ are mutually orthogonal, then (λ, μ) is equal to

A. $(-3, 2)$

B. $(2, -3)$

C. $(-2, 3)$

D. $(3, -2)$

Answer: A

View Text Solution

72. Let $a = \hat{i} + \hat{j} + \hat{k}$, $b = \hat{i} - \hat{j} + 2\hat{k}$ and $c = x\hat{i} + (x-2)\hat{j} - \hat{k}$. If the vector c lies in the plane of a and b, then x equal to

A. 0

B. 1

C. -4

D. -2

Answer: D

View Text Solution

73. The value of a, for which the points A, B and C with position vectors $2\hat{i}-\hat{j}+\hat{k}$, $\hat{i}-3\hat{j}-5\hat{k}$ and $a\hat{i}-3\hat{j}+\hat{k}$ respectively are the vertices of a right angled triangle with $C=\frac{\pi}{2}$ are

A. $-2 \text{ and } -1$

B. $-2 \text{ and } 1$

C. $2 \text{ and } -1$

D. 2 and 1

Answer: D

View Text Solution

74. For any vector a, then the value of

$\left(a \times \hat{i}\right)^2 + \left(a \times \hat{j}\right)^2 + \left(a \times \hat{k}\right)^2$ is

A. $4a^2$

B. $2a^2$

C. a^2

D. $3a^2$

Answer: B

View Text Solution

75. If $a = \hat{i} - \hat{k}, b = x\hat{i} + \hat{j} = (1 - x)\hat{k}$ and $c = y\hat{i} + x\hat{j} + (1 + x - y)\hat{k}$. Then, [a b c] depends on

A. Only x

B. Only y

C. Both x and y

D. Neither x nor y

Answer: D

View Text Solution

76. Let a, b and c be distinct non-negative numbers. If the vectors $a\hat{i} + a\hat{j} + c\hat{k}$, $\hat{i} + \hat{k}$ and $c\hat{i} + c\hat{j} + b\hat{k}$ lie in a plane, then c is

A. the harmonic mean of a and b

B. equal to zero

C. the arithmetic mean of a and b

D. the geometric mean of a and b

Answer: D

View Text Solution

77. If a, b, c are non-coplanar vectors and λ is a real number, then $\left[\lambda(A+b)\lambda^2 b\lambda c\right] = [a(b+c)b]$ for

A. exactly two values of λ

B. exactly three values of λ

C. no volue of λ

D. exactly one value of λ

Answer: C

View Text Solution

78. Let a, b and c be three non-zero vectors such that no two of these are collinear. If the vector $a+2b$ is collinear with c and $b+3c$ is collinear with a (λ being some non-zero scalar), then $a+2b+6c$ equals to

A. λa

B. λb

C. λc

D. 0

Answer: D

View Text Solution

79. A particle is acted upon by constant forces $4\hat{i} + \hat{j} - 3\hat{k}$ and $3\hat{i} + \hat{j} - \hat{k}$ which displace it from a point $\hat{i} + 2\hat{j} + 3\hat{k}$ to the point $5\hat{i} + 4\hat{j} + \hat{k}$. The work done in standard units by the forces is given by

A. 40 units

B. 30 units

C. 25 units

D. 15 units

Answer: A

View Text Solution

View Text Solution

80. Let u, v and w be such that

$|u| = 1, |v| = 2, |w| = 3$

If the projection v along u is equal to that of w along u and v, w are perpendicular to each other, then $|u - v + w|$ is equal to

A. 2

B. $\sqrt{7}$

C. $\sqrt{14}$

D. 14

Answer: C

View Text Solution

81. The value of $[(a-b)(b-c)(c-a)]$ is equal to

A. 0

B. 1

C. 2[a b c]

D. 2

Answer: A

View Text Solution

82. If $\hat{i}+\hat{j}, \hat{j}+\hat{k}, \hat{i}+\hat{k}$ are the position vectors of the vertices of a ΔABC taken in order, then $\angle A$ is equal to

A. $\frac{\pi}{2}$

B. $\frac{\pi}{5}$

C. $\frac{\pi}{6}$

D. $\frac{\pi}{3}$

Answer: D

View Text Solution

83. If a, b and c are three non-zero vectors such that each one of them being perpendicular to the sum of the other two vectors, then the value of $|a+b+c|^2$ is

A. $|a|^2+|b|^2+|c|^2$

B. $|a|+|b|+|c|$

C. $2\left(|a|^2+|b|^2+|c|^2\right)$

D. $\frac{1}{2}\left(|a|^2+|b|^2+|c|^2\right)$

Answer: A

View Text Solution

84. Let $a=\hat{i}+\hat{j}+\hat{k}, b=\hat{i}-\hat{j}+\hat{k}$ and $c=\hat{i}-\hat{j}-\hat{k}$ be three vectors. A vector v in the plane of a and b whose projection on c is $\frac{1}{\sqrt{3}}$, is given by

A. $3\hat{i} + \hat{j} - 3\hat{k}$

B. $3\hat{i} - \hat{j} + 3\hat{k}$

C. $3\hat{i} + \hat{j} + 3\hat{k}$

D. $-3\hat{i} + \hat{j} + 3\hat{k}$

Answer: B

View Text Solution

85. If r $a = r.b = r.c = 1$ where a, b, c are any three non-coplanar vectors, then r is

A. coplanar with a, b, c

B. parallel to $a + b + c$

C. parallel to $b \times c + c \times a + a \times b$

D. parallel to $(a \times b) \times c$

Answer: C

View Text Solution

86. If $|a| = 3$ and $-1 \leq k \leq 2$, then $|ka|$ lies in the interval

A. [0, 6]

B. [-3, 6]

C. [3, 6]

D. [1, 2]

Answer: B

View Text Solution

87. If ABCDEF is regular hexagon, then $AD + EB + FC$ is equal to

A. 0

B. 2AB

C. 3AB

D. 4AB

Answer: D

View Text Solution

88. If $a=\hat{i}+\hat{j}+\hat{k}, b=\hat{i}+3\hat{j}+5\hat{k}$ and $c=7\hat{i}+9\hat{j}+11\hat{k}$, then the area of the parallelogram having diagonals $a+b$ and $b+c$ is

A. $4\sqrt{6}$

B. $\frac{1}{2}\sqrt{21}$

C. $\frac{\sqrt{6}}{2}$

D. $\sqrt{6}$

Answer: B

View Text Solution

1. If $a = \hat{i} + \hat{j} - 2\hat{k}$, $b = 2\hat{i} - \hat{j} + \hat{k}$ and $c = 3\hat{i} - \hat{k}$ and $c = ma + nb$, then $m + n$ is equal to

A. 0

B. 1

C. 2

D. -1

Answer: C

Watch Video Solution

2. If M and N are the mid-points of the diagonals AC and BD respectively of a quadrilateral ABCD, then the of $\overrightarrow{AB} + \overrightarrow{AD} + \overrightarrow{CB} + \overrightarrow{CD}$ equals

A. 2 MN

B. 2NM

C. 4 MN

D. 4 NM

Answer: C

Watch Video Solution

3. If $G(\bar{g})$, $H(\bar{h})$ and $P(\bar{p})$ are centroid, orthocenter and circumcenter of a triangle and $x\bar{p} + y\bar{h} + z\bar{g} = 0$ then $(x, y, z) =$

A. 1, 1, -2

B. 2, 1, -3

C. 1, 3, -4

D. 2, 3, -5

Answer: B

Watch Video Solution

4. If $a = \hat{i} + \hat{j} + \hat{k}, b = 2\hat{i} + \lambda\hat{j} + \hat{k}, c = \hat{i} - \hat{j} + 4\hat{k}$ and $a.(b \times c) = 10$, then λ is equal to

A. 6

B. 7

C. 9

D. 10

Answer: A

Watch Video Solution

5. If the position vectors of the vertices A, B and C are 6i, 6j and k respectively w.r.t origin O, then the volume of the tetrahedron OABC is

A. 6 cu units

B. 3 cu units

C. $\frac{1}{6}$ cu units

D. $\frac{1}{3}$ cu units

Answer: A

Watch Video Solution

6. If three vectors $2\hat{i} - \hat{j} - \hat{k}, \hat{i} + 2\hat{j} - 3\hat{k}$ and $3\hat{i} + \lambda\hat{j} + 5\hat{k}$ are coplanar, then the value of λ is

A. -4

B. -2

C. -1

D. -8

Answer: D

Watch Video Solution

7. Find a vector of magnitude 9, which is perpendicular to both vectors $4\hat{i}-\hat{j}+3\hat{k} and -2\hat{i}+\hat{j}-2\hat{k}$.

A. $3\hat{i}+6\hat{j}-6\hat{k}$

B. $3\hat{i}-6\hat{j}+6\hat{k}$

C. $-3\hat{i}+6\hat{j}+6\hat{k}$

D. None of these

Answer: C

Watch Video Solution

8. If in a ΔABC, O and O' are the incentre and orthocentre respectively, then $(O'A+O'B+O'C)$ is equal to

A. $2O'O$

B. $O'O$

C. OO'

D. $2OO'$

Answer: A

Watch Video Solution

9. If $a+b+c=0$ and $|a|=5, |b|=3$ and $|c|=7$, then angle between a and b is

A. $\frac{\pi}{2}$

B. $\frac{\pi}{3}$

C. $\frac{\pi}{4}$

D. $\frac{\pi}{6}$

Answer: B

Watch Video Solution

10. If $\overrightarrow{u}=\overrightarrow{a}-\overrightarrow{b}, \overrightarrow{v}=\overrightarrow{a}+\overrightarrow{b}$ and $\left|\overrightarrow{a}\right|=\left|\overrightarrow{b}\right|=2,$ then $\left|\overrightarrow{u}\times\overrightarrow{v}\right|$ is equal to

A. $2\sqrt{16-(a.b)^2}$

B. $\sqrt{16-(a.b)^2}$

C. $2\sqrt{4-(a.b)^2}$

D. $2\sqrt{4+(a.b)^2}$

Answer: A

Watch Video Solution

11. If a, b, c are linearly independent vectors and $\delta=\begin{vmatrix} a & b & c \\ a.a & a.b & a.c \\ a.c & b.c & c.c \end{vmatrix}$ then (a)$\delta=0$ (b) $\delta=1$ (C) A=any non-zero volue (d)None of these

A. 1

B. 0

C. -1

D. None of these

Answer: B

Watch Video Solution

12. If $\vec{a}, \vec{b}, \vec{c}$ are three non- coplanar vectors and $\vec{p}, \vec{q}, \vec{r}$ are vectors defined by the relations $\vec{p} = \frac{\vec{b} \times \vec{c}}{\left[\vec{a}\vec{b}\vec{c}\right]}, \vec{q} = \frac{\vec{c} \times \vec{a}}{\left[\vec{a}\vec{b}\vec{c}\right]}, \vec{r} = \frac{\vec{a} \times \vec{b}}{\left[\vec{a}\vec{b}\vec{c}\right]}$, then the value of expression $\left(\vec{a} + \vec{b}\right).\vec{p} + \left(\vec{b} + \vec{c}\right).\vec{q} + \left(\vec{c} + \vec{a}\right).\vec{r}$ is equal to

A. 0

B. 1

C. 2

D. 3

Answer: B

Watch Video Solution

13. The volume of a parallelopiped whose coterminous edges are $2\vec{a}, 2\vec{b}, 2\vec{c}$, is

A. $2[a \quad b \quad c]$

B. $4[a \quad b \quad c]$

C. $8[a \quad b \quad c]$

D. $[a \quad b \quad c]$

Answer: C

Watch Video Solution

14. The position vectors of vertices of a ΔABC are $4\hat{i}-2\hat{j}$, $\hat{i}-3\hat{k}$ and $-\hat{i}+5\hat{j}+\hat{k}$ respectively, then $\angle ABC$ is equal to

A. $\frac{\pi}{6}$

B. $\frac{\pi}{4}$

C. $\frac{\pi}{3}$

D. $\frac{\pi}{2}$

Answer: D

Watch Video Solution

15. Given $p = 3\hat{i} + 2\hat{j} + 4\hat{k}, a = \hat{i} + \hat{j}, b = \hat{j} + \hat{k}, c = \hat{i} + \hat{k}$ and $p = xa + yb + zc$, then x, y and z are respectively

A. $\frac{3}{2}, \frac{1}{2}, \frac{5}{2}$

B. $\frac{1}{2}, \frac{3}{2}, \frac{5}{2}$

C. $\frac{5}{2}, \frac{3}{2}, \frac{1}{2}$

D. $\frac{1}{2}, \frac{5}{2}, \frac{3}{2}$

Answer: B

Watch Video Solution

16. Volume of the parallelopiped having vertices at $O \equiv (0, 0, 0), A \equiv (2, -2, 1), B \equiv (5, -4, 4), \text{ and } C = (1, -2, 4)$ is

A. 5 cu units

B. 10 cu units

C. 15 cu units

D. 20 cu units

Answer: B

Watch Video Solution

17. If $2\vec{a} + 3\vec{b} - 5\vec{c} = \vec{0}$, then ratio in which $\vec{c}$ divides $\overrightarrow{AB}$ is

A. $3:2$ internally

B. $3:2$ externally

C. $2:3$ internally

D. $2:3$ externally

Answer: B

Watch Video Solution

18. If the constant forces $2\hat{i}-5\hat{j}+6\hat{k}$ and $-\hat{i}+2\hat{j}-\hat{k}$ act on a particle due to which it is displaced from a point A (4,-3,-2) to a point B (6,1,-3), then the work done by the forces is

A. 10 units

B. -10 units

C. -15 units

D. -9 units

Answer: A

Watch Video Solution

19. If the vectors $\hat{i}-3\hat{j}+2\hat{k},\ -\hat{i}+2\hat{j}$ represent the diagonals of a parallelogram, then its area will be

A. $\sqrt{21}$

B. $\frac{\sqrt{21}}{2}$

C. $2\sqrt{21}$

D. $\frac{\sqrt{21}}{4}$

Answer: C

Watch Video Solution

20. If $\left|\overrightarrow{a}\right|=2, \left|\overrightarrow{b}\right|=3$ and $\overrightarrow{a}, \overrightarrow{b}$ are mutually perpendicular, then the area of the triangle whose vertices are $\overrightarrow{0}, \overrightarrow{a}+\overrightarrow{b}, \overrightarrow{a}-\overrightarrow{b}$ is

A. 5

B. 1

C. 6

D. 8

Answer: B

Watch Video Solution

21. $a \times [a \times (a \times b)]$ is equal to

A. $(a \times a).(b \times a)$

B. $a.(b \times a) - b(a \times b)$

C. $[a.(a \times b)]a$

D. $(a.a)(b \times a)$

Answer: C

Watch Video Solution

22. If the vectors $a+\lambda b+3c, \; -2a+3b-4c$ and $a-3b+5c$ are coplanar and a, b, c are non-coplanar, then the value of λ is

A. 2

B. -1

C. 1

D. -2

Answer: D

Watch Video Solution

23. If the vectors $a=\hat{i}+a\hat{j}+a^2\hat{k}, b=\hat{i}+b\hat{j}+b^2\hat{k}$ and $c=\hat{i}+c\hat{j}+c^2\hat{k}$ are three non-coplanar vectors and $\begin{vmatrix} a & a^2 & 1+a^3 \\ b & b^2 & 1+b^3 \\ c & c^2 & 1+c^3 \end{vmatrix}=0$, then the value of abc is

A. 0

B. 1

C. 2

D. -1

Answer: D

Watch Video Solution

24. Let $\overrightarrow{a} = 2\hat{i} - \hat{j} + \hat{k}, \overrightarrow{b} = \hat{i} + 2\hat{j} = \hat{k} and \overrightarrow{c} = \hat{i} + \hat{j} - 2\hat{k}$ be three vectors. A vector in the plane of $\overrightarrow{b} and \overrightarrow{c}$, whose projection on $\overrightarrow{a}$ is of magnitude $\sqrt{2/3}$, is $2\hat{i} + 3\hat{j} - 3\hat{k}$ b. $2\hat{i} - 3\hat{j} + 3\hat{k}$ c. $-2\hat{i} - \hat{j} + 5\hat{k}$ d. $2\hat{i} + \hat{j} + 5\hat{k}$

A. $2\hat{i} + 3\hat{j} - 3\hat{k}$

B. $2\hat{i} + 3\hat{j} + 3\hat{k}$

C. $2\hat{i} - 5\hat{j} + 5\hat{k}$

D. $2\hat{i} + \hat{j} + 5\hat{k}$

Answer: A

Watch Video Solution

25. $\dfrac{a.\,(b\times c)}{b.\,(c\times a)}+\dfrac{b.\,(axb)}{a.\,(b\times c)}$ is equal to

A. 1

B. 2

C. 0

D. ∞

Answer: B

Watch Video Solution

26. If $|a|=|b|=1$ and $|a+b|=\sqrt{3}$, then the value of $(3a-4b)(2b+5b)$ is

A. -21

B. $-\frac{21}{2}$

C. 21

D. $\frac{21}{2}$

Answer: B

Watch Video Solution

27. If a is perpedicular to b and $c|a| = 2, |b| = 3|c| = 4$ and the angle between b and c is $\frac{2\pi}{3}$, then $[a, b, c]$ is equal to

A. $4\sqrt{3}$

B. $6\sqrt{3}$

C. $12\sqrt{3}$

D. $18\sqrt{3}$

Answer: C

Watch Video Solution

28. If $\bar{a}, \bar{b}$ and $\bar{c}$ are perpendicular ,$\bar{c}+\bar{a}, \bar{b}+\bar{c}$ and $\bar{a}+\bar{b}$ +respectively and if $|\bar{a}+\bar{b}|=6, |\bar{b}+\bar{c}|=8$ and $|\bar{c}+\bar{a}|=10$, then $|\bar{a}+\bar{b}+\bar{c}|$ is equal to

A. $5\sqrt{2}$

B. 50

C. $10\sqrt{2}$

D. 10

Answer: D

Watch Video Solution

29. If vector $\hat{i}+\hat{j}+\hat{k}, \hat{i}-\hat{j}+\hat{k}$ and $2\hat{i}+3\hat{j}+\lambda\hat{k}$ are coplanar, then λ is equal to

A. -2

B. 3

C. 2

D. -3

Answer: C

Watch Video Solution

30. Given $a \perp b, |a| = 1$ and if $(a+3b).(2a-b) = -10$, then $|b|$ is equal to

A. 1

B. 2

C. 3

D. 4

Answer: C

Watch Video Solution

31. $[a+b \quad b+c \quad c+a] = [a \quad b \quad c]$, then

A. $[a \quad b \quad c] = 1$

B. a, b, c are coplanar

C. $[a \quad b \quad c] = -1$

D. a, b, c are mutually perpendicular

Answer: B

Watch Video Solution

32. Area of rhombus is ...., where diagonals are $a = 2\hat{i} - 3\hat{j} + 5\hat{k}$ and $b = -\hat{i} + \hat{j} + \hat{k}$

A. $\sqrt{21.5}$

B. $\sqrt{31.5}$

C. $\sqrt{28.5}$

D. $\sqrt{38.5}$

Answer: C

Watch Video Solution

33. Let $ABCD$ be a p[arallelogram whose diagonals intersect at P and let O be the origin. Then prove that $\overrightarrow{O}A + \overrightarrow{O}B + \overrightarrow{O}C + \overrightarrow{O}D = 4\overrightarrow{O}P$.

A. OP

B. $2OP$

C. $3OP$

D. $4OP$

Answer: D

Watch Video Solution

34. If $a = \hat{i} + \hat{j} - 2\hat{k}, b = 2\hat{i} - \hat{j} + \hat{k}$ and $c = 3\hat{i} - \hat{k}$ and $c = ma + nb$, then $m + n$ is equal to

A. 0

B. 1

C. 2

D. -1

Answer: C

View Text Solution

35. M and N are the mid-points of the diagonals AC and BD respectively of quadrilateral ABCD, then $AB + AD + CB + CD$ is equal to

A. 2 MN

B. 2NM

C. 4 MN

D. 4 NM

Answer: C

View Text Solution

36. If $G(g)$, $H(h)$ and $P(p)$ are centroid' orthocentre and circumcentre of a triangle and $xp + yh + zg = 0$, then (x, y, z) is equal to

A. 1, 1, -2

B. 2, 1, -3

C. 1, 3, -4

D. 2, 3, -5

Answer: B

View Text Solution

37. If $a = \hat{i} + \hat{j} + \hat{k}, b = 2\hat{i} + \lambda\hat{j} + \hat{k}, c = \hat{i} - \hat{j} + 4\hat{k}$ and $a.\,(b \times c) = 10$, then λ is equal to

A. 6

B. 7

C. 9

D. 10

Answer: A

View Text Solution

38. If the position vectors of the vertices A, B and C are $6\hat{i}, 6\hat{j}$ and $\hat{k}$ repsectively w.r.t. origin O, the volume of the tetrahedron OABC is

A. 6 cu units

B. 3 cu units

C. $\frac{1}{6}$ cu units

D. $\frac{1}{3}$ cu units

Answer: A

View Text Solution

39. If three vectors $2\hat{i} - \hat{j} - \hat{k}, \hat{i} + 2\hat{j} - 3\hat{k}$ and $3\hat{i} + \lambda\hat{j} + 5\hat{k}$ are coplanar, then the value of λ is

A. -4

B. -2

C. -1

D. -8

Answer: D

View Text Solution

40. The vector perpendicular to the vectors $4\hat{i} - \hat{j} + 3\hat{k}$ and $-2\hat{i} + \hat{j} - 2k$ whose magnitude is 9, is

A. $3\hat{i} + 6\hat{j} - 6\hat{k}$

B. $3\hat{i} - 6\hat{j} + 6\hat{k}$

C. $-3\hat{i} + 6\hat{j} + 6\hat{k}$

D. None of these

Answer: C

View Text Solution

41. If in a ΔABC, O and O' are the incentre and orthocentre respectively, then $(O'A + O'B + O'C)$ is equal to

A. $2O'O$

B. $O'O$

C. OO'

D. $2OO'$

Answer: A

View Text Solution

42. If $a + b + c = 0$ and $|a| = 5, |b| = 3$ and $|c| = 7$, then angle between a and b is

A. $\frac{\pi}{2}$

B. $\frac{\pi}{3}$

C. $\frac{\pi}{4}$

D. $\frac{\pi}{6}$

Answer: B

View Text Solution

43. If $u = a - b$ and $v = a + b$ and $|a| = |b| = 2$, then $|u \times v|$ is equal to

A. $2\sqrt{16 - (a.\,b)^2}$

B. $\sqrt{16 - (a.\,b)^2}$

C. $2\sqrt{4 - (a.\,b)^2}$

D. $2\sqrt{4 + (a.\,b)^2}$

Answer: A

View Text Solution

44. If the vectors a, b and c are coplanar, then $\begin{vmatrix} a & b & c \\ a.\,a & a.\,b & a.\,c \\ b.\,a & b.\,b & b.\,c \end{vmatrix}$ is equal to

A. 1

B. 0

C. -1

D. None of these

Answer: B

View Text Solution

45. If a, b, c are three non-coplanar vectors and p, q, r are defined by the relations

$p = \frac{b \times c}{[a \quad b \quad c]}, q = \frac{c \times a}{[a \quad b \quad c]}$ and $r = \frac{b \times a}{a \quad b \quad c}$, then $a.\,p + b.\,q + c.\,r$ is equal to

A. 0

B. 1

C. 2

D. 3

Answer: B

View Text Solution

46. The volume of a parallelopiped whose coterminous edges are 2a, 2b, 2c, is

A. $2[a \quad b \quad c]$

B. $4[a \quad b \quad c]$

C. $8[a \quad b \quad c]$

D. $[a \quad b \quad c]$

Answer: C

View Text Solution

47. The position vectors of vertices of a ΔABC are $4\hat{i} - 2\hat{j}$, $\hat{i} - 3\hat{k}$ and $-\hat{i} + 5\hat{j} + \hat{k}$ respectively, then $\angle ABC$ is equal to

A. $\frac{\pi}{6}$

B. $\frac{\pi}{4}$

C. $\frac{\pi}{3}$

D. $\frac{\pi}{2}$

Answer: D

View Text Solution

48. Given $p = 3\hat{i} + 2\hat{j} + 4\hat{k}, a = \hat{i} + \hat{j}, b = \hat{j} + \hat{k}, c = \hat{i} + \hat{k}$ and $p = xa + yb + zc$, then x, y and z are respectively

A. $\frac{3}{2}, \frac{1}{2}, \frac{5}{2}$

B. $\frac{1}{2}, \frac{3}{2}, \frac{5}{2}$

C. $\frac{5}{2}, \frac{3}{2}, \frac{1}{2}$

D. $\frac{1}{2}, \frac{5}{2}, \frac{3}{2}$

Answer: B

View Text Solution

49. Volume of the parallelopiped having vertices at $O \equiv (0, 0, 0)$, $A \equiv (2, -2, 1)$, $B \equiv (5, -4, 4)$ and $C \equiv (1, -2, 4)$ is

A. 5 cu units

B. 10 cu units

C. 15 cu units

D. 20 cu units

Answer: B

View Text Solution

50. If $2a + 3b - 5c = 0$, then ratio in which c divides AB is

A. $3:2$ internally

B. $3:2$ externally

C. $2:3$ internally

D. $2:3$ externally

Answer: B

View Text Solution

51. If the constant due to which it is displaced from a point on a particle due to which it is displaced from a point $A(4, -3, -2)$ to a point $B(6, 1, -3)$ then the work done by the forces is

A. 10 units

B. -10 units

C. -15 units

D. -9 units

Answer: A

View Text Solution

52. If the vectors $\hat{i}-3\hat{j}+2\hat{k},\ -\hat{i}+2\hat{j}$ represent the diagonals of a parallelogram, then its area will be

A. $\sqrt{21}$

B. $\frac{\sqrt{21}}{2}$

C. $2\sqrt{21}$

D. $\frac{\sqrt{21}}{4}$

Answer: C

View Text Solution

53. If $|a|=2,\ |b|=3$ and a, b are mutually perpendicular, then the area of the triangle whose vertices are $0,\ a+b,\ a-b$ is

A. 5

B. 1

C. 6

D. 8

Answer: B

View Text Solution

54. $a \times [a \times (a \times b)]$ is equal to

A. $(a \times a).\ (b \times a)$

B. $a.\ (b \times a) - b(a \times b)$

C. $[a.\ (a \times b)]a$

D. $(a.\ a)(b \times a)$

Answer: C

View Text Solution

55. If the vectors $a + \lambda b + 3c, \ -2a + 3b - 4c$ and $a - 3b + 5c$ are coplanar, then the value of λ is

A. 2

B. -1

C. 1

D. -2

Answer: D

View Text Solution

56. If the vectors $a = \hat{i} + a\hat{j} + a^2\hat{k}, b = \hat{i} + b\hat{j} + b^2\hat{k}$ and $c = \hat{i} + c\hat{j} + c^2\hat{k}$ are three non-coplanar vectors and $\begin{vmatrix} a & a^2 & 1 + a^3 \\ b & b^2 & 1 + b^3 \\ c & c^2 & 1 + c^3 \end{vmatrix} = 0$, then the value of abc is

A. 0

B. 1

C. 2

D. -1

Answer: D

View Text Solution

57. Let $a = 2\hat{i} - \hat{j} + \hat{k}, b = \hat{i} + 2\hat{j} - \hat{k}$ and $c = \hat{i} + \hat{j} - 2\hat{k}$ be three vectors, A vector in the plane of b and c whose projection on a is of magnitude $\sqrt{\frac{2}{3}}$, is

A. $2\hat{i} + 3\hat{j} - 3\hat{k}$

B. $2\hat{i} + 3\hat{j} + 3\hat{k}$

C. $2\hat{i} - 5\hat{j} + 5\hat{k}$

D. $2\hat{i} + \hat{j} + 5\hat{k}$

Answer: A

View Text Solution

58. $\dfrac{a.\,(b \times c)}{b.\,(c \times a)} + \dfrac{b.\,(axb)}{a.\,(b \times c)}$ is equal to

A. 1

B. 2

C. 0

D. ∞

Answer: B

View Text Solution

59. If $|a| = |b| = 1$ and $|a + b| = \sqrt{3}$, then the value of $(3a - 4b).\,(2a + 5b)$ is

A. -21

B. $-\dfrac{21}{2}$

C. 21

D. $\frac{21}{2}$

Answer: B

View Text Solution

60. If a is perpendicular to b and c, $|a| = 2, |b| = 3, |c| = 4$ and the angle between b and c is $\frac{2\pi}{3}$, then $[\,a \quad b \quad c\,]$ is equal to

A. $4\sqrt{3}$

B. $6\sqrt{3}$

C. $12\sqrt{3}$

D. $18\sqrt{3}$

Answer: C

View Text Solution

61. If a, b and c are perpendicular to $b+c, c+a$ and $a+b$ respectively and if $|a+b|=6, |b+c|=8$ and $|c+a|=10,$ then $|a+b+c|$ is equal to

A. $5\sqrt{2}$

B. 50

C. $10\sqrt{2}$

D. 10

Answer: D

View Text Solution

62. If vector $\hat{i}+\hat{j}+\hat{k}, \hat{i}-\hat{j}+\hat{k}$ and $2\hat{i}+3\hat{j}+\lambda\hat{k}$ are coplanar, then λ is equal to

A. -2

B. 3

C. 2

D. -3

Answer: C

View Text Solution

63. Given $a \perp b, |a| = 1$ and if $(a + 3b).(2a - b) = -10,$ then $|b|$ is equal to

A. 1

B. 2

C. 3

D. 4

Answer: C

View Text Solution

64. $\begin{bmatrix} a+b & b+c & c+a \end{bmatrix} = \begin{bmatrix} a & b & c \end{bmatrix}$, then

A. $\begin{bmatrix} a & b & c \end{bmatrix} = 1$

B. a, b, c are coplanar

C. $\begin{bmatrix} a & b & c \end{bmatrix} = -1$

D. a, b, c are mutually perpendicular

Answer: B

View Text Solution

65. Area of rhombus is ...., where diagonals are $a = 2\hat{i} - 3\hat{j} + 5\hat{k}$ and $b = -\hat{i} + \hat{j} + \hat{k}$

A. $\sqrt{21.5}$

B. $\sqrt{31.5}$

C. $\sqrt{28.5}$

D. $\sqrt{38.5}$

Answer: C

View Text Solution

66. Let ABCD be a parallelogram whose diagonals intersect at P and O be the origin, then $OA + OB + OC + OD$ equals

A. OP

B. $2OP$

C. $3OP$

D. $4OP$

Answer: D

View Text Solution