MATHS

BOOKS - A N EXCEL PUBLICATION

VECTOR ALGEBRA

Question Bank

1. Write the direction ratios of the vector $\vec{a} = \hat{i} + 2\hat{j} - \hat{k}$ and calculate its direction cosines ?

Watch Video Solution

2. Classify 5 seconds measures as scalar and vector.

Watch Video Solution

3. Classify $1000cm^3$measures as scalar and vector.

Watch Video Solution

4. Classify 10 Newton measures as scalar and vector.

Watch Video Solution

5. Classify 30km/hr measures as scalar and vector.

Watch Video Solution

6. Classify $10g/m^3$measures as scalar and vector.

Watch Video Solution

7. Classify 20 m/s towards north measures as scalar and vector.

Watch Video Solution

8. In Figure, which of the vectors are : Collinear

Watch Video Solution

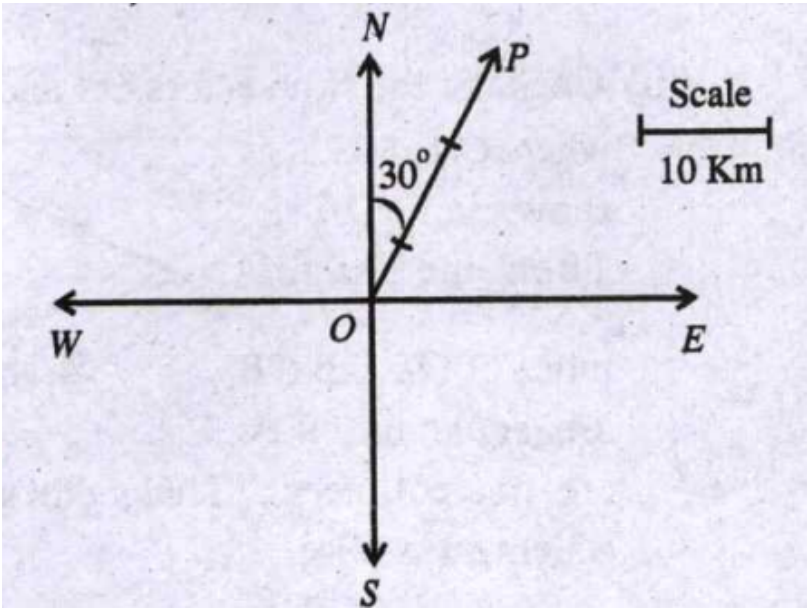
9. In Figure, which of the vectors are :Equal

Watch Video Solution

10. In Figure, which of the vectors are :Coinitial

Watch Video Solution

11. Represent graphically a displacement of $40km, 30^\circ$ east of north.



Watch Video Solution

12. Classify 10 kg measures as scalar and vector.

Watch Video Solution

13. Classify 2 metres north-west measures as scalar and vector.

Watch Video Solution

14. Classify 40° measures as scalar and vector.

Watch Video Solution

15. Classify 10^{-19}coulomb measures as scalar and vector.

Watch Video Solution

16. Classify $20m/\sec^2$ measures as scalar and vector.

Watch Video Solution

17. Classify "Time period" as scalar and vector quantity

Watch Video Solution

18. Classify "distance" as scalar and vector quantity

Watch Video Solution

19. Classify "Force" as scalar and vector quantity

Watch Video Solution

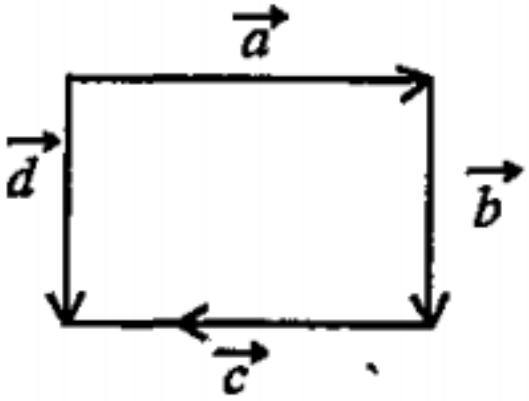
20. Classify "velocity"as scalar and vector quantity

Watch Video Solution

21. Classify "Work done"as scalar and vector quantity

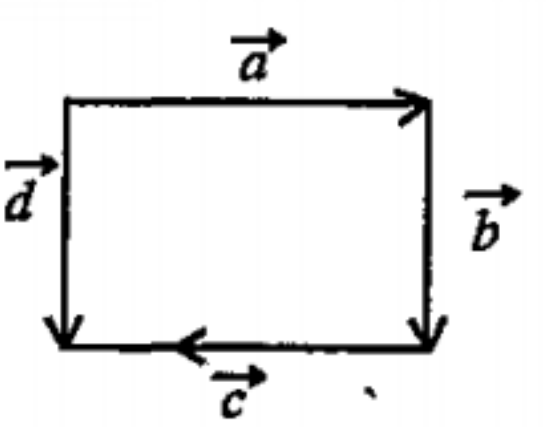
Watch Video Solution

22. In the following figure, identify co-initial vector



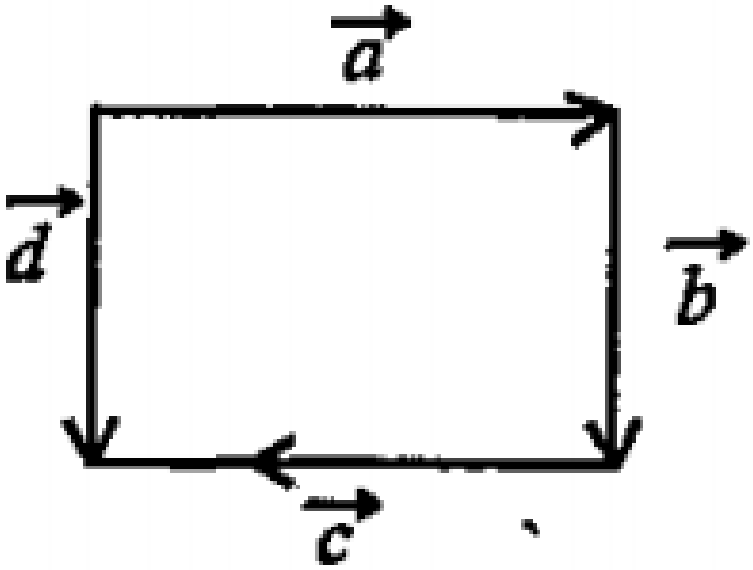
Watch Video Solution

23. In the following figure, identify equal vector



Watch Video Solution

24. In the following figure, identify collinear but not equal vector



Watch Video Solution

25. $\vec{a}$ and $-\vec{a}$ are collinear (true or false)

Watch Video Solution

26. Two collinear vectors are always equal in magnitude. (true or false)

Watch Video Solution

27. Two vectors having same magnitude are collinear.

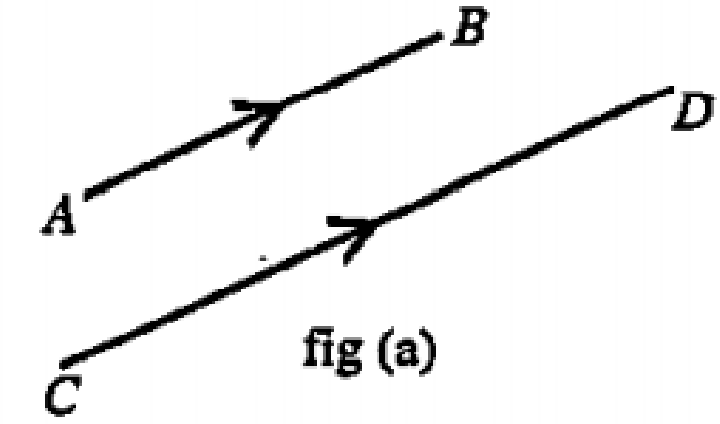


fig (a)

(true or false)

Watch Video Solution

28. Two collinear vectors having the same magnitude are equal (true or false)

Watch Video Solution

29. If $\vec{a} + 5\vec{b} = \vec{c}$ and $\vec{a} - 7\vec{b} = 2\vec{c}$, then show that $\vec{a}$ has same direction as $\vec{c}$ and opposite direction to $\vec{b}$.

Watch Video Solution

30. Suppose ABC is a triangle and D and E are the mid points of AB and AC respectively.

Choose the correct answer from the bracket and fill in the blank

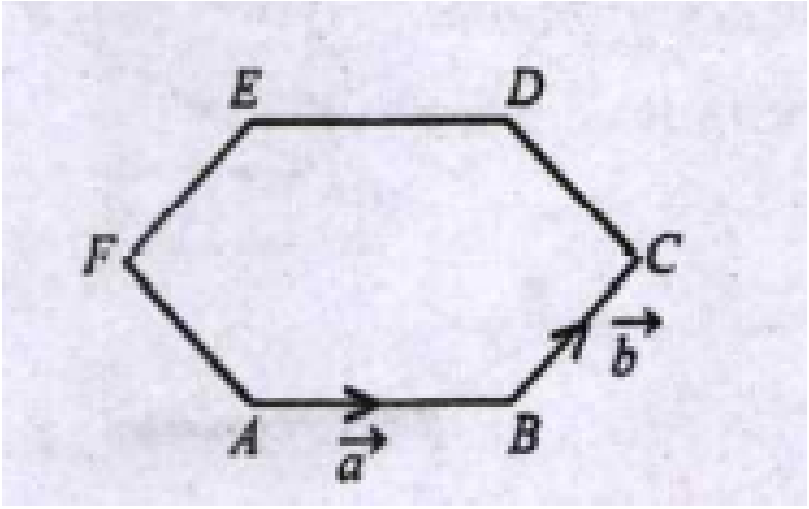
$\overrightarrow{BA} + \overrightarrow{AC} = \ldots\ldots$

`(oversetrarr(CB),oversetrarr(BC),1/2

oversetrarr(BC),2oversetrarr(BC))

View Text Solution

31. Suppose a and b represent in magnitude and direction the two sides AB and BC of the regular hexagon ABCDEF as shown in the figure.



View Text Solution

32. Suppose a and b represent in magnitude and direction the two sides AB and BC of the regular hexagon ABCDEF as shown in the figure.Find $\overrightarrow{CD}, \overrightarrow{DE}, \overrightarrow{EF}$ and $\overrightarrow{FA}$ in terms of $\overrightarrow{a}$ "and"oversetrarrb`

View Text Solution

33. Find the values of x,y and z so that $\overrightarrow{a} = x\hat{I} + y\hat{j} + z\hat{k}$ and $\overrightarrow{b} = \hat{I} - 2\hat{j} + 3\hat{k}$ are equal?

Watch Video Solution

34. Are the vectors $\overrightarrow{a} = 2\hat{i} - \hat{j}$ and $\overrightarrow{b} = \hat{i} + 2\hat{j}$ equal?

Watch Video Solution

35. Find a unit vector along the vector $\vec{b} = 3\hat{i} - \hat{j} + \hat{k}$

Watch Video Solution

36. Find a vector along $\vec{a} = 2\hat{i} - \hat{j} + 3\hat{k}$ that has magnitude 5 ?

Watch Video Solution

37. Find aunit vector along the sum of the vectors $\vec{a} = \hat{i} - 3\hat{k} \text{and } \vec{b} = 2\hat{i} + 5\hat{j} - 3\hat{k}$?

Watch Video Solution

38. Write the direction ratios and direction cosines of the vector $\vec{a} = 2\hat{i} + 3\hat{j} - 4\hat{k}.$

Watch Video Solution

39. The position vectors of the points A,B,C are given to be $\hat{i}+2\hat{j}+3\hat{k}, 4\hat{i}+4\hat{k}$ and $-2\hat{k}$ respectively.

Find $\overrightarrow{AB}$ and $\overrightarrow{AC}$

Watch Video Solution

40. The position vectors of the points A,B,C are given to be $2\hat{i}+\hat{j}-\hat{k}, 3\hat{i}-2\hat{j}+\hat{k}$ and $1\hat{i}+4\hat{j}-3\hat{k}$ respectively.Prove that A,B,C are collinear

Watch Video Solution

41. Consider the points A,B,C,D with position vectors $\hat{i}+2\hat{j}+8\hat{k}, 3\hat{j}+4\hat{k}, \hat{i}+\hat{j}+3\hat{k}$ and $2\hat{i}+7\hat{k}$ respectively.

Find the position vector of the mid point of AC

Watch Video Solution

42. Consider the points A,B,C,D with position vectors $\hat{i}+2\hat{j}+8\hat{k}, 3\hat{j}+4\hat{k}, \hat{i}+\hat{j}+3\hat{k}$ and $2\hat{i}+7\hat{k}$ respectively.

Find the position vector of the mid point of BD

Watch Video Solution

43. Consider the points A,B,C,D with position vectors $\hat{i}+2\hat{j}+8\hat{k}, 3\hat{j}+4\hat{k}, \hat{i}+\hat{j}+3\hat{k}$ and $2\hat{i}+7\hat{k}$ respectively.

Prove that ABCD is parallelogram

Watch Video Solution

44. Compute the magnitude of $\vec{a} = \hat{i} + \hat{j} + \hat{k}$,vector

Watch Video Solution

45. Compute the magnitude of $\vec{b} = 2\hat{i} - 7\hat{j} - 3\hat{k}$,vector

Watch Video Solution

46. Compute the magnitude of $\vec{c} = \frac{1}{\sqrt{3}}\hat{i} + \frac{1}{\sqrt{3}}\hat{j} - \frac{1}{\sqrt{3}}\hat{k}$ vector

Watch Video Solution

47. Write two different vectors having same magnitude.

Watch Video Solution

48. Write two different vectors having same direction.

Watch Video Solution

49. Find the values of x and y so that the vectors $2\hat{i}+3\hat{j}$ and $x\hat{i}+y\hat{j}$ are equal.

Watch Video Solution

50. Find the sum of the vectors $\vec{a}=\hat{i}-2\hat{j}+\hat{k}$, $\vec{b}=-2\hat{i}+4\hat{j}+5\hat{k}$ and $\vec{c}=\hat{i}-6\hat{j}-7\hat{k}$

Watch Video Solution

51. Find the unit vector in the direction of the vector $\vec{a} = \hat{i} + \hat{j} + 2\hat{k}$.

Watch Video Solution

52. For given vectors $\vec{a} = 2\hat{i} - \hat{j} + 2\hat{k}$ and $\vec{b} = -\hat{i} + \hat{j} - \hat{k}$, find the unit vector in the direction of the vector $\vec{a} + \vec{b}$.

Watch Video Solution

53. Find a vector in the direction of vector '5 hati-hatj+2 hatk' which has magnitude 8 units.

Watch Video Solution

54. Show that the vectors $2\hat{i} - 3\hat{j} + 4\hat{k}$ and $-4\hat{i} + 6\hat{j} - 8\hat{k}$ are collinear.

Watch Video Solution

55. Find the direction cosines of the vector 'hati+2 hatj+3 hatk'

Watch Video Solution

56. Find the scalar and vector components of the vector with initial point (2,1)

and terminal point(-5,7).

Watch Video Solution

57. Find the unit vector in the direction of $\overrightarrow{PQ}$, where P and Q are the points (1,2,3) and (4,5,6)

respectively.

Watch Video Solution

58. Find the, direction cosines of the vector joining 'A(1,2,-3)' and 'B(-1,-2,1)', directed from 'A' fò 'B'.

Watch Video Solution

59. Show that the vector $\hat{i} + \hat{j} + \hat{k}$ is equally inclined to the axes OX,OY and OZ.

Watch Video Solution

60. Find the position vector of a point R which divides the line joining the points P and Q whose vectors are $i + 2j - k$ and $-i + j + k$ in the ratio $2:1$

Internally.

Watch Video Solution

61. Find the position vector of a point R which divides the line joining the points P and Q whose vectors $i + 2j - k$ and

$-i+j+k$ in the ratio $2:1$

externally.

Watch Video Solution

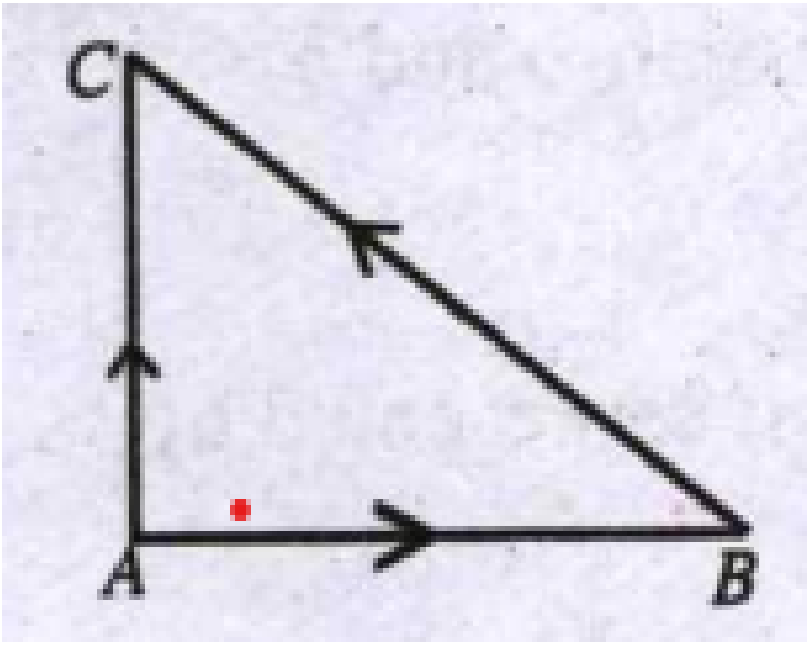
62. Find the position vector of the mid point of the vector joining the points

P(2,3,4)and Q(4,1,-2).

Watch Video Solution

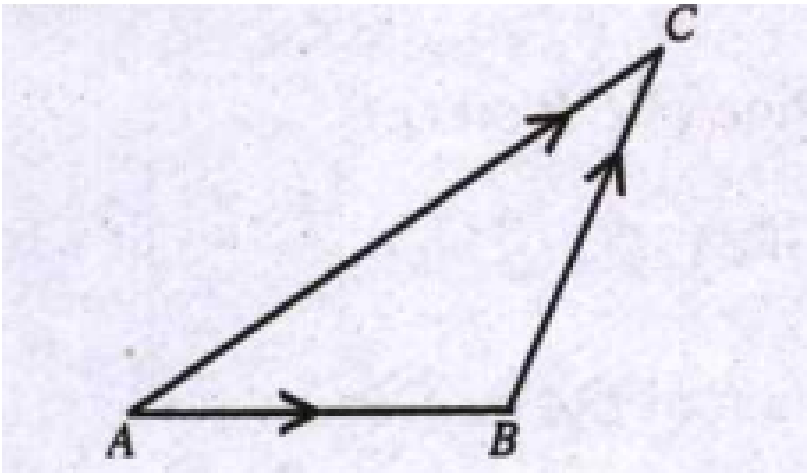
63. Show that the points A,B and C with position vectors $\vec{a}=3\hat{i}-4\hat{j}-4\hat{k}$, $\vec{b}=2\hat{i}-\hat{j}+\hat{k}$ and $\vec{c}=\hat{i}-3\hat{j}-5\hat{k}$

respectively form the vertices of a right angled triangle.



Watch Video Solution

64. In triangle ABC, which of the following is not true.



a) $\overrightarrow{AB} + \overrightarrow{BC} + \overrightarrow{CA} = \overrightarrow{0}$ b) $\overrightarrow{AB} + \overrightarrow{BC} - \overrightarrow{AC} = \overrightarrow{0}$ c) $\overrightarrow{AB} + \overrightarrow{BC} - \overrightarrow{CA} = \overrightarrow{0}$ d) $\overrightarrow{AB} - \overrightarrow{CB} + \overrightarrow{CA} = \overrightarrow{0}$

A. $\overrightarrow{AB} + \overrightarrow{BC} + \overrightarrow{CA} = \overrightarrow{0}$

B. $\overrightarrow{AB} + \overrightarrow{BC} - \overrightarrow{AC} = \overrightarrow{0}$

C. $\overrightarrow{AB} + \overrightarrow{BC} - \overrightarrow{CA} = \overrightarrow{0}$

D. $\overrightarrow{AB} - \overrightarrow{CB} + \overrightarrow{CA} = \overrightarrow{0}$

Answer: C

Watch Video Solution

65. If $\vec{a}$ and $\vec{b}$ are two collinear vectors, then which of the following are incorrect: a) $\vec{b} = \vec{a}\lambda scalar\lambda$ b) $\vec{a} = \pm \vec{b}$ c)The respective components of $\vec{a}$ and $\vec{b}$ are proportional d)Both $\vec{a}$ and $\vec{b}$ have same direction, but different magnitude.

A. $\vec{b} = \lambda\vec{a}$ "for some scalar"lambda`

B. $\vec{a} = \pm \vec{b}$

C. The respective components of $\vec{a}$ and $\vec{b}$ are proportional

D. Both $\vec{a}$ and $\vec{b}$ have same direction, but different magnitude.

Answer: D

Watch Video Solution

66. Show that the points

$A\left(-2\hat{i}+3\hat{j}+5\hat{k}\right), B\left(\hat{i}+2\hat{j}+3\hat{k}\right) \text{and} C\left(7\hat{i}-\hat{k}\right)$ are collinear.

Watch Video Solution

67. Find the projection of the vector $\vec{a}=2\hat{i}+\hat{j}-3\hat{k}$ on the vector.

$\vec{b}=-\hat{i}+3\hat{j}-\hat{k}$

Watch Video Solution

68. Find the angle between the vectors $\vec{a}=\hat{i}+\hat{j}-\hat{k}$ and $\vec{b}=\hat{i}-\hat{j}+\hat{k}$

Watch Video Solution

69. Find $\left|\vec{a}-\vec{b}\right|$ if two vectors $\vec{a}$ and $\vec{b}$ are such that $\left|\vec{a}\right|=2, \quad \left|\vec{b}\right|=3$ and $\vec{a}.\vec{b}=4$

Watch Video Solution

70. If $\vec{a}$ is a unit vector and $\left(\vec{x}-\vec{a}\right).\left(\vec{x}+\vec{a}\right)=15$, then find $\left|\vec{x}\right|$.

Watch Video Solution

71. Express $2\hat{i}-\hat{j}+3\hat{k}$ as the sum of a vector parallel and a vector perpendicular to $2\hat{i}+4\hat{j}-2\hat{k}$

Watch Video Solution

72. Consider the vectors $\vec{a} = 2\hat{i} + 3\hat{j} + \hat{k}$ and $\vec{b} = 3\hat{i} + 2\hat{j} - 3\hat{k}$

find $\vec{a} . \vec{b}$

Watch Video Solution

73. Consider the vectors $\vec{a} = 2\hat{i} + 3\hat{j} + m\hat{k}$ and $\vec{b} = 3\hat{i} + 2\hat{j} - 3\hat{k}$

Find the value of m for which $\vec{a}$ and $\vec{b}$ are perpendicular. In such a case verify that $\left(\vec{a} + \vec{b}\right)^2 = \left|\vec{a}^2\right| + \left|\vec{b}^2\right|$

Watch Video Solution

74. Consider $\vec{a} = \hat{i} + 2\hat{j} - 3\hat{k}$, $\vec{b} = 3\hat{i} - \hat{j} + 2\hat{k}$ and $\vec{c} = 11\hat{i} + \hat{j}$:

Find $\vec{a} + \vec{b}$ and $\vec{a} . \vec{b}$

Watch Video Solution

75. Consider $\vec{a} = \hat{i} + 2\hat{j} - 3\hat{k}, \quad \vec{b} = 3\hat{i} - \hat{j} + 2\hat{k}$ and $\vec{c} = 11\hat{i} + \hat{j}$:

Find the unit vector in the direction of $\vec{a} + \vec{b}$

Watch Video Solution

76. Consider $\vec{a} = i + 2j - 3k$, $\vec{b} = 3i - j + 2k$, $\vec{c} = 11i + 2j$. Show that $\vec{a} + \vec{b}$ and $\vec{a} - \vec{b}$ are orthogonal.

Watch Video Solution

77. Consider $\vec{a} = \hat{i} + 2\hat{j} - 3\hat{k}, \vec{b} = 3\hat{i} - \hat{j} + 2\hat{k} \text{and} \vec{c} = 11\hat{i} + \hat{j}$:

Find the value of $\lambda \text{and} \mu$such that $\vec{c} = \lambda \vec{a} + \mu \vec{b}$

Watch Video Solution

78. Consider the vectors $\vec{a} = 2\hat{i} - 3\hat{j} + \hat{k}$ and $\vec{b} = \hat{i} + \hat{j} - 2\hat{k}$. Find $\left|3\vec{a} + \vec{b}\right|$

Watch Video Solution

79.

Consider the vectors

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

Watch Video Solution

80. Consider the vectors $\vec{a} = 2\hat{i} - 3\hat{j} + \hat{k}$ and $\vec{b} = \hat{i} + \hat{j} - 2\hat{k}$. Find the projection of $\vec{a}$ on $\vec{b}$

Watch Video Solution

81. Suppose $\vec{a} = a_1\hat{i} + a_2\hat{j} + a_3\hat{k}$ .Find $\vec{a} \cdot \hat{i}$, $\vec{a} \cdot \hat{j}$ and $\vec{a} \cdot \hat{k}$. Hence,prove that $\vec{a} = \left(\vec{a} \cdot \hat{i}\right)\hat{i} + \left(\vec{a} \cdot \hat{j}\right)\hat{j} + \left(\vec{a} \cdot \hat{k}\right)\hat{k}$

Watch Video Solution

82. Given that A,B,C are the points $(2, 1, -1), (3, 2, -1)$ and $(3, 1, 0)$. Find $\overrightarrow{AB}$ and $\overrightarrow{AC}$ .Hence, find the angle between $\overrightarrow{AB}$ and $\overrightarrow{AC}$.

Watch Video Solution

83. Find the angle between two vectors $\vec{a}$ and $\vec{b}$ with magnitudes $\sqrt{3}$ and 2 respectively having $\vec{a} \cdot \vec{b} = \sqrt{6}$.

Watch Video Solution

84. Find the angle between the vectors $\hat{i} - 2\hat{j} + 3\hat{k}$ and $3\hat{i} - 2\hat{j} + \hat{k}$.

Watch Video Solution

85. Find the projection of the vector 'hati-hatj' on the vector 'hati+hatj'.

Watch Video Solution

86. Find the projection of a vector $i + 3j + 7k$ on the vector $7i - j + 8k$.

Watch Video Solution

87. Show that each of the given three vectors is a unit vector :

$$\frac{1}{7}\left(2\hat{i} + 3\hat{j} + 6\hat{k}\right), \frac{1}{7}\left(3\hat{i} - 6\hat{j} + 2\hat{k}\right), \frac{1}{7}\left(6\hat{i} + 2\hat{j} - 3\hat{k}\right).$$

Also, show that the are mutually perpendicular to each other.

Watch Video Solution

88. Find $|\vec{a}|$ and $|\vec{b}|$ if $(\vec{a}+\vec{b}).(\vec{a}-\vec{b})=8$ and $|\vec{a}|=8|\vec{b}|$

Watch Video Solution

89. Evaluate the product '(3 veca-5 vecb) .(2 veca+7 vecb)'

Watch Video Solution

90. Find the magnitude of two vectors $\vec{a}$ and $\vec{b}$, having the same magitude and such that the angle between them is 60° and their scalar product is $\frac{1}{2}$.

Watch Video Solution

91. Find '|vecx|', if for a unit vector 'veca,(vecx-veca) . (vecx+veca)=12'

Watch Video Solution

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

Watch Video Solution

93. Show that $|\vec{a}|\vec{b} + |\vec{b}|\vec{a}$ is perpendicular to $|\vec{a}|\vec{b} - |\vec{b}|\vec{a}$, for any two non-zero vectors.

Watch Video Solution

94. If 'veca.veca=0' and 'veca. vecb=0', then what can be concluded about the vector 'vecb' ?

Watch Video Solution

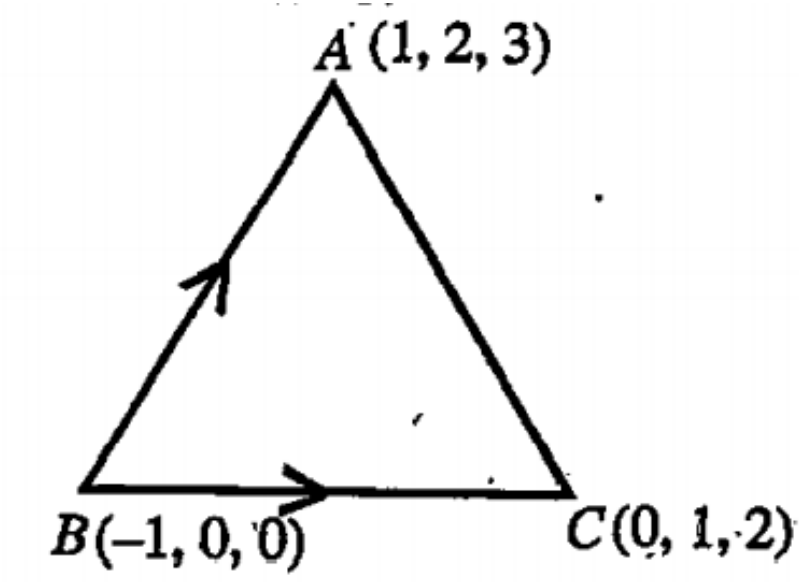
95. If $\vec{a}, \vec{b}, \vec{c}$ are unit vectors such that $\vec{a} + \vec{b} + \vec{c} = 0$, find the value of $\vec{a}.\vec{b} + \vec{b}.\vec{c} + \vec{c}.\vec{a}.$

Watch Video Solution

96. If either vecotor $\vec{a} = \vec{0}$ or $\vec{b} = \vec{0}$, then $\vec{a}.\vec{b} = 0.$ But the converse need not be true. Justify your answer with an example.

Watch Video Solution

97. If the vertices A,B,C of a triangle ABC are (1,2,3),(-1,0,0), (0,1,2)respectively,then find $\angle ABC$.



Watch Video Solution

98. Show that the points $A(1, 2, 7), B(2, 6, 3)$ and $C(3, 10, -1)$ are collinear.

Watch Video Solution

99. Show that the vectors $2\hat{i}-\hat{j}+\hat{k}, \hat{i}-3\hat{j}-5\hat{k}$ and $3\hat{i}-4\hat{j}-4\hat{k}$ form the vertices of a right angled trainagle.

Watch Video Solution

100. If a is a non-zero vector of magnitude'a' and λ a non-zero scalar, then $\lambda\vec{a}$ is a unit vector if: a)$\lambda=1$ b)$\lambda=-1$ c) $a=|\lambda|$ d)$a=\frac{1}{|\lambda|}$

A. $\lambda=1$

B. $\lambda=-1$

C. $a=|\lambda|$

D. $a=\frac{1}{|\lambda|}$

Answer: D

Watch Video Solution

101. Find the magnitude of $\vec{a}$ given by

$$\vec{a} = \left(\hat{i} + 3\hat{j} - 2\hat{k}\right) \times \left(-\hat{i} + 3\hat{k}\right)$$

Watch Video Solution

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

Watch Video Solution

103. Find a unit vector perpendicular to the plane ABC where A,B,C are the

points (3,-1,2)(1,-1,-3)(4,-3,1) respectively.

Watch Video Solution

104. Given $\left|\vec{a}\right| = 10, \left|\vec{b}\right| = 2$ and $\vec{a}.\vec{b} = 12$ find $\left|\vec{a} \times \vec{b}\right|$.

Watch Video Solution

105. Consider the vectors

$\vec{a} = \hat{i} - \hat{j} + \hat{k}$ and $\vec{b} = 2\hat{i} - 3\hat{j} - 5\hat{k}$:

Find $\vec{a} \times \vec{b}$

Watch Video Solution

106. Consider the vectors

$\vec{a} = \hat{i} - \hat{j} + \hat{k}$ and $\vec{b} = 2\hat{i} - 3\hat{j} - 5\hat{k}$:

Find $\vec{a} \times \vec{b}$

Watch Video Solution

107. Consider the vectors

$\vec{a} = \hat{i} - \hat{j} + \hat{k}$ and $\vec{b} = 2\hat{i} - 3\hat{j} - 5\hat{k}$:

If $\vec{a}$ and $\vec{b}$ ' are two adjactent sides of a parallelogram, find the area of the parallelogram`.

Watch Video Solution

108. Consider the vectors

$\vec{a} = \hat{i} - \hat{j} + \hat{k}$ and $\vec{b} = 2\hat{i} - 3\hat{j} - 5\hat{k}$:

Prove that $\vec{a} \times \vec{b} = -\vec{b} \times \vec{a}$

Watch Video Solution

109. Consider the points A(1,2,-1), B(2,5,1), and C(0,-1,-3):

Find $\overrightarrow{AB}$ and $\overrightarrow{AC}$

Watch Video Solution

110. Consider the points A(1,2,-1),B(2,5,1)andC(0,-1,-3):

Find $\overrightarrow{AB} \times \overrightarrow{AC}$. Hence, prove that A,B,C are collinear

Watch Video Solution

111. Consider two vectors

$\vec{a}$ and $\vec{b}$ so that $\left|\vec{a}\right| = 2, \left|\vec{b}\right| = 5$ and

|oversetrarraxxoversetrarrb| $= 8$ .Suppose the angle between a

and b is acute.

find $\sin\theta$, where θ is the angle between $\vec{a}$ and $\vec{b}$

View Text Solution

112. Consider two vectors

$\vec{a}$ "and" $\vec{b}$ so that $\left|\vec{a}\right| = 2, \left|\vec{b}\right| = 5$and $\left|\vec{a} \times \vec{b}\right| = 8.$

Suppose the angle between a and b is acute.

Prove that $\vec{a}.\ \vec{b} = 6$

Watch Video Solution

113. Find $\left|\vec{a} \times \vec{b}\right|$ if $\vec{a} = \hat{i} - 7\hat{j} + 7\hat{k}$ and $\vec{b} = 3\hat{i} - 2\hat{j} + 2\hat{k}$.

Watch Video Solution

114. Find a unit vector perpendicular to each of the vectors $\vec{a} + \vec{b}$ and $\vec{a} - \vec{b}$ where $\vec{a} = 3\hat{i} + 2\hat{j} + 2\hat{k}$ and $\vec{b} = \hat{i} + 2\hat{j} - 2\hat{k}$.

Watch Video Solution

115. Choose the correct answer from the backet. If a unit vector $\hat{a}$ makes angles $\frac{\pi}{4}$ with i and $\frac{\pi}{3}$ with j and acute angle θ with k. then θ is

Watch Video Solution

116. Show that

$$\left(\vec{a}-\vec{b}\right)\times\left(\vec{a}+\vec{b}\right)=2\left(\vec{a}\times\vec{b}\right)$$

Watch Video Solution

117. Find $\lambda$and μ if

$$\left(2\hat{i}+6\hat{j}+27\hat{k}\right)\times\left(\hat{i}+\lambda\hat{j}+\mu\hat{k}\right)=\vec{0}.$$

Watch Video Solution

118. Given that $\vec{a}.\vec{b}=0\text{and}\vec{a}\times\vec{b}=\vec{0}$.What can you conclude about the vectors $\vec{a}$ and $\vec{b}$.

Watch Video Solution

119. If either $\vec{a} = \vec{0}$ or $\vec{b} = \vec{0}$, then $\vec{a} \times \vec{b} = \vec{0}$. Is the converse true? Justify your answer with an example.

Watch Video Solution

120. Find the area of the triangle with vertices A(1,1,2),B(2,3,5) and C(1,5,5).

Watch Video Solution

121. Find the area of the parallelogram whose adjacent are determined by the vectors $\vec{a} = \hat{i} - \hat{j} + 3\hat{k}$ and $\vec{b} = 2\hat{i} - 7\hat{j} + \hat{k}$.

Watch Video Solution

122. Let the vectors $\vec{a}$ and $\vec{b}$ be such that $\left|\vec{a}\right| = 3$ and $\left|\vec{b}\right| = \frac{\sqrt{2}}{3}$, then $\vec{a} \times \vec{b}$ is a unit vector, if the angle between $\vec{a}$ and $\vec{b}$ is : a) $\frac{\pi}{6}$ b) $\frac{\pi}{4}$ c) $\frac{\pi}{3}$ d) $\frac{\pi}{2}$

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

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

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

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

Answer: B

Watch Video Solution

123. Area of a rectangle having vertices A,B,C and D with position vectors

$-\hat{i}+\frac{1}{2}\hat{j}+4\hat{k}, \hat{i}+\frac{1}{2}\hat{j}+4\hat{k}, \hat{i}-\frac{1}{2}\hat{j}+4\hat{k}$ and $-\hat{i}-\frac{1}{2}\hat{j}+4\hat{k}$ respectively is : a)$\frac{1}{2}$ b)1 c)2 d)4

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

B. 1

C. 2

D. 4

Answer: C

Watch Video Solution

124. Find $\vec{a}.\left(\vec{b}\times\vec{c}\right)$,if $\vec{a}=2\hat{i}+\hat{j}+3\hat{k}.\ \vec{b}=-\hat{i}+2\hat{j}+\hat{k}$ and $\vec{c}=3\hat{i}+\hat{j}+2\hat{k}.$

Watch Video Solution

125. Show that the vectors

$\vec{a} = \hat{i} - 2\hat{j} + 3\hat{k}, \vec{b} = -2\hat{i} + 3\hat{j} - 4\hat{k}$ and

$\vec{c} = \hat{i} - 3\hat{j} + 5\hat{k}$ are coplanar.

Watch Video Solution

126. Show that the four points A,B,C and D with position cectors

$4\hat{i} + 5\hat{j} + \hat{k}, -\hat{j} - k, 3\hat{i} + 9\hat{j} + 4\hat{k}$ and $4\left(-\hat{i} + \hat{j} + \hat{k}\right)$,

respectively are coplanar.

Watch Video Solution

127. Prove that $\left[\vec{a} + \vec{b}\ \vec{b} + \vec{c}\ \vec{c} + \vec{a}\right] = 2\left[\vec{a}\ \vec{b}\ \vec{c}\right]$

Watch Video Solution

128. Find the volume of a parallelepiped with coterminal edges represented by vectors $\vec{a} = 2\hat{i} + 3\hat{j} + 4\hat{k}$, $\vec{b} = 3\hat{i} - \hat{j} + 2\hat{k}$ and $\vec{c} = \hat{i} + 2\hat{j} - \hat{k}$.

Watch Video Solution

129. Find $\left[\vec{a} \quad \vec{b} \quad \vec{c}\right]$ if $\vec{a} = \hat{i} - 2\hat{j} + \hat{k}$, $\vec{b} = 2\hat{i} - 3\hat{j} + \hat{k}$ and $\vec{c} = 3\hat{i} + \hat{j} - 2\hat{k}$

Watch Video Solution

130. Show that the vectors $\vec{a} = \hat{i} - 2\hat{j} + 3\hat{k}$, $\vec{b} = -2\hat{i} + 3\hat{j} - 4\hat{k}$ and $\vec{c} = \hat{i} - 3\hat{j} + 5\hat{k}$ are coplanar.

Watch Video Solution

131. Find λ if the vectors $\hat{i}-\hat{j}+\hat{k}, 3\hat{i}+\hat{j}+2\hat{k}$ and $\hat{i}+\lambda\hat{j}-3\hat{k}$ are coplanar.

Watch Video Solution

132. Let $\vec{a}=\hat{i}+\hat{j}+\hat{k}, \vec{b}=\hat{i}$ and $\vec{c}=c_1\hat{i}+c_2\hat{j}+c_3\hat{k}$

.Then:

If $c_1=1$ and $c_2=2$, find c_3 which makes $\vec{a}, \vec{b}$ and $\vec{c}$ coplanar

Watch Video Solution

133. Let $\vec{a}=\hat{i}+\hat{j}+\hat{k}, \vec{b}=\hat{i}$ and $\vec{c}=c_1\hat{i}+c_2\hat{j}+c_3\hat{k}$

.Then:

If $c_2 = -1$ and $c_3 = 1$,show that no value of c_1 can makes $\vec{a}, \vec{b}$ and $\vec{c}$ coplanar

Watch Video Solution

134. Show that the four points with position vectors $4\hat{i} + 8\hat{j} + 12\hat{k}, 2\hat{i} + 4\hat{j} + 6\hat{k}, 3\hat{i} + 5\hat{j} + 4\hat{k}$ and $5\hat{i} + 8\hat{j} + 5\hat{k}$ are coplanar.

Watch Video Solution

135. Find x such that the four points A(3,2,1)B(4,x,5),C(4,2,-2)and D(6,5-1)are coplanar.

Watch Video Solution

136. If $\vec{a}, \vec{b}, \vec{c}$ are coplanar,prove that $\vec{a}+\vec{b}, \vec{b}+\vec{c}, \vec{c}+\vec{a}$ are coplanar.

Watch Video Solution

137. Find the volume of the following parallelo-piped whose the coterminal edges are:

$\vec{a}=\hat{i}-2\hat{j}+3\hat{k}, \vec{b}=2\hat{i}+\hat{j}+\hat{k}$ and $\vec{c}=2\hat{i}+\hat{j}-\hat{k}$

Watch Video Solution

138. Find the volume of the following parallelo-piped whose the coterminous edges are: $\vec{a}=3\hat{i}+4\hat{j}, \vec{b}=2\hat{i}+3\hat{j}+4\hat{k}$, $\vec{c}=5\hat{k}$

Watch Video Solution

139. Find the value of λ if the points. $A(-1, 4, -3), B(3, \lambda, -5), C(-3, 8, -5)$ and $D(-3, 2, 1)$ are coplanar.

Watch Video Solution

140. Write down a unit vector in XY plane making an angle of 30° with the positive direction of x-axis.

Watch Video Solution

141. Find the scalar components and magnitude of the vector joining the points

$P(x_1, y_1, z_1)$and $Q(x_2, y_2, z_2)$.

Watch Video Solution

142. A girl walks 4km towards west, then she walks 3 km in a direction 30° east of north and stops. Determine the girls displacement from her initial point of departure.

Watch Video Solution

143. If $\vec{a} = \vec{b} + \vec{c}$, then is it true that $\left|\vec{a}\right| = \left|\vec{b}\right| + \left|\vec{c}\right|$? Justify your answer.

Watch Video Solution

144. Find the value of x for which $x\left(\hat{i} + \hat{j} + \hat{k}\right)$ is a unit vector.

Watch Video Solution

145. Find a vector of magnitude 5 units and parallel to the resultant of the vectors $\vec{a} = 2\hat{i} + 3\hat{j} - \hat{k} \text{and } \vec{b} = \hat{i} - 2\hat{j} + \hat{k}.$

Watch Video Solution

146. Show that the points A(1,-2,-8),B(5,0,-2)andC(11,3,7)are collinear and find the ratio in which B divides AC.

Watch Video Solution

147. Find the position vector of a point R which divides the line joining two points P and Q whose position vectors are $\left(2\vec{a}+\vec{b}\right)$ and $\left(\vec{a}-3\vec{b}\right)$ externally in the ratio $1:2$ Also show that P is the mid point of the line segment RQ.

Watch Video Solution

148. The two adjacent sides of a parallelogram are $2\hat{i}-4\hat{j}+5\hat{k}\text{and}\hat{i}-2\hat{j}-3\hat{k}$. find the unit vector parallel to its diagonal. Also, find its area.

Watch Video Solution

149. Show that the direction cosines of a vector equally inclined to the axes OX, OY and OZ are $\frac{1}{\sqrt{3}},\frac{1}{\sqrt{3}},\frac{1}{\sqrt{3}}$

Watch Video Solution

150. Let $\vec{a} = \hat{i} + 4\hat{j} + 2\hat{k}$,

$\vec{b} = 3\hat{i} - 2\hat{j} + 7\hat{k}$ and $\vec{c} = 2\hat{i} - \hat{j} + 4\hat{k}$.

Find a vector $\vec{d}$ perpendicular to both $\vec{a}$ and $\vec{b}$ and $\vec{c}$. $\vec{d} = 15$.

Watch Video Solution

151. The scalar product of the vector $\hat{i} + \hat{j} + \hat{k}$ with a unit vector along the sum of the vectors $2\hat{i} + 4\hat{j} - 5\hat{k}$ and $\lambda\hat{i} + 2\hat{j} + 3\hat{k}$ is equal to I.Find the value of λ.

Watch Video Solution

152. If $\vec{a}, \vec{b}, \vec{c}$ are mutually perpendicular vectors of equal magnitudes, show that the vector $\vec{a}+\vec{b}+\vec{c}$ is equally inclined to $\vec{a}, \vec{b}$ and $\vec{c}$

Watch Video Solution

153. Prove that

$\left(\vec{a}+\vec{b}\right).\left(\vec{a}+\vec{b}\right)=\left|\vec{a}\right|^2+|b|^2$ if and only if $\vec{a}, \vec{b}$ are perpendicular, given

$\vec{a} \neq \vec{0}$ and $\vec{b} \neq 0$.

Watch Video Solution

154. Choose the correct answer. If θ is the angle between two vectors $\vec{a}$ and $\vec{b}$, then $\vec{a}.\vec{b} \geq 0$ only when a)$0<\theta<\frac{\pi}{2}$ b)

$0 \leq \theta \leq \frac{\pi}{2}$ c)$0 < \theta < \pi$ d)$0 \leq \theta \leq \pi$

A. $0 < \theta < \frac{\pi}{2}$

B. $0 \leq \theta \leq \frac{\pi}{2}$

C. $0 < \theta < \pi$

D. $0 \leq \theta \leq \pi$

Answer: B

Watch Video Solution

155. Choose the correct answer. Let $\vec{a}$ and $\vec{b}$ be two unit vectors and θ be the angle between them.Then $\vec{a} + \vec{b}$ is a unit vector, if: a)$\theta = \frac{\pi}{4}$ b)$\theta = \frac{\pi}{3}$ c)$\theta = \frac{\pi}{2}$ d)$\theta = \frac{2\pi}{3}$

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

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

C. $\theta = \frac{\pi}{2}$

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

Answer: D

Watch Video Solution

156. Choose the correct answer.The value of $\hat{i}.\left(\hat{j} \times \hat{k}\right) + \hat{j}.\left(\hat{i} \times \hat{k}\right) + \hat{k}.\left(\hat{i} \times \hat{j}\right) is$: a)0 b)-1 c)1 d)3

A. 0

B. -1

C. 1

D. 3

Answer: C

Watch Video Solution

157. If θ is the acute angle between any two vectors $\vec{a}$ and $\vec{b}$, then $\left|\vec{a}.\vec{b}\right| = \left|\vec{a} \times \vec{b}\right|$ when θ is equal to :

A. 0

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

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

D. π

Answer: B

Watch Video Solution

158. Write all the unit vectors in XY-plane.

Watch Video Solution

159. If $i+j+k, 2i+5j, 3i+2j-3k, i-6j-k$ respectively are the position vector of points A,B,C and D. Then find the angle between the vectors $\overrightarrow{AB}$ and $\overrightarrow{CD}$.

Watch Video Solution

160. Let $\vec{a}, \vec{b}$, and $\vec{c}$ be three vectors such that $\left|\vec{a}\right| = 3, \left|\vec{b}\right| = 4, \left|\vec{c}\right| = 5$ and each one of the being perpendicular to the sum of the other two, find $\left|\vec{a}+\vec{b}+\vec{c}\right|$.

Watch Video Solution

161. Three vectors $\vec{a}, \vec{b}, \text{and} \vec{c}$ satisfy the condition $\vec{a} + \vec{b} + \vec{c} = \vec{0}$. Evaluate the quantity $\mu = \vec{a} . \vec{b} + \vec{b} . \vec{c} + \vec{c} . \vec{a}$. If $\left|\vec{a}\right| = 1, \left|\vec{b}\right| = 4$ and $\left|\vec{c}\right| = 2$.

Watch Video Solution