





MATHS

BOOKS - MAHAVEER PUBLICATION

VECTOR

Question Bank

1. State which of the following are scalars and which are vectors?

Give reasons.

Mass

2. State which of the following are scalars and which are vectors?

Give reasons.

Weight

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3. State which of the following are scalars and which are vectors?

Give reasons.

Momentum

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4. State which of the following are scalars and which are vectors?

Give reasons.

Temperature

5. State which of the following are scalars and which are vectors?

Give reasons.

Force

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6. State which of the following are scalars and which are vectors?

Give reasons.

Density

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7. Represent graphically a force 40 N in a direction 60° north of

east.

8. Represent graphically a force of 30 N in a direction 49° east of north.

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9. When is the sum of two non zero vectors is zero ?
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10. The position vectors of two points A and B are $3\overrightarrow{a}+2\overrightarrow{b}$ and
$2\overrightarrow{a}-\overrightarrow{b}$ respectively. Find the vector \overrightarrow{AB}
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11. Given $\overrightarrow{a} = \hat{i} - \hat{j} + \hat{k}$ and $\overrightarrow{b} = 2\hat{i} - 4\hat{j} - 3\hat{k}$, find the magnitude of \overrightarrow{a}

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12. Given
$$\overrightarrow{a} = \hat{i} - \hat{j} + \hat{k}$$
 and $\overrightarrow{b} = 2\hat{i} - 4\hat{j} - 3\hat{k}$, find the magnitude of \overrightarrow{b}

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13. Given $\overrightarrow{a} = \hat{i} - \hat{j} + \hat{k}$ and $\overrightarrow{b} = 2\hat{i} - 4\hat{j} - 3\hat{k}$, find the magnitude of $\overrightarrow{a} + \overrightarrow{b}$

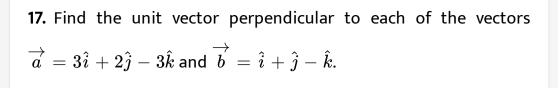
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14. Given $\overrightarrow{a} = \hat{i} - \hat{j} + \hat{k}$ and $\overrightarrow{b} = 2\hat{i} - 4\hat{j} - 3\hat{k}$, find the magnitude of $\overrightarrow{a} - \overrightarrow{b}$



15. Find the position vector of a point which divides the join of two points whose position vectors are given by \overrightarrow{a} and \overrightarrow{b} in the ratio 1:3 internally.

16. Find the position vector of mid point of the line segment AB, if the position vectors of A and B are respectively, $\overrightarrow{x} + 3\overrightarrow{y}$ and $3\overrightarrow{x} - \overrightarrow{y}$.





18. Find the area of the triangle having point A(1,1,1)B(1,2,3) and C(2,3,1) as its vertices.

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19. Find the area of the parallelogram having point A(5,-1,1),

B(-1,-3,4) C(1,-6,10) and D(7,-4,7) as its vertices.



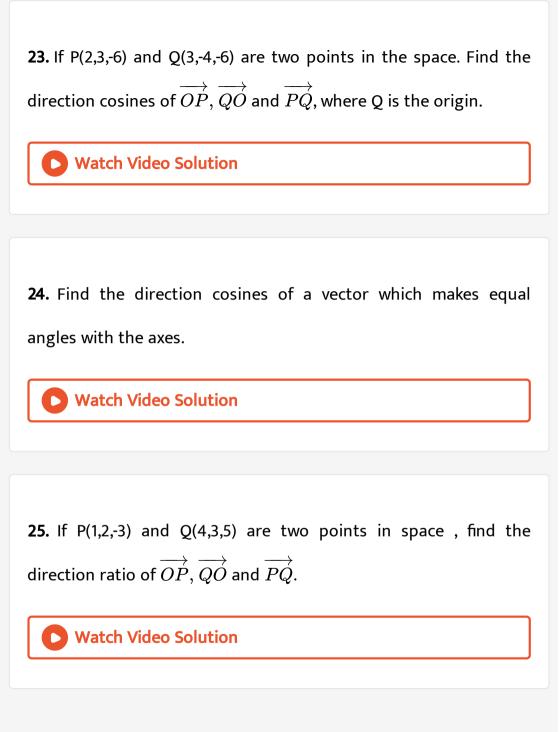
20. Let, P be a point in space such that $\left|\overrightarrow{OP}\right| = \sqrt{3}$ and \overrightarrow{OP} makes angles $\frac{\pi}{3}, \frac{\pi}{4}, \frac{\pi}{3}$ with positive direction of x, y and z axes respectively. Find co-ordinates of point. -

21. If P(2,-1,4) is a point in the space, find the direction cosines of vector \overrightarrow{OP}

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22. Can
$$\left(\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$$
 be direction cosines of a vector.



26. Find the scalar triple product of vectors $\hat{i} + 2\hat{j} + 3\hat{k}, -\hat{i} - \hat{j} + \hat{k}$ and $\hat{i} + \hat{j} + \hat{k}$.

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27. Show that the vectors $4\hat{i}-\hat{j}+\hat{k}, 3\hat{i}-2\hat{j}-\hat{k}$ and $\hat{i}+\hat{j}+2\hat{k}$

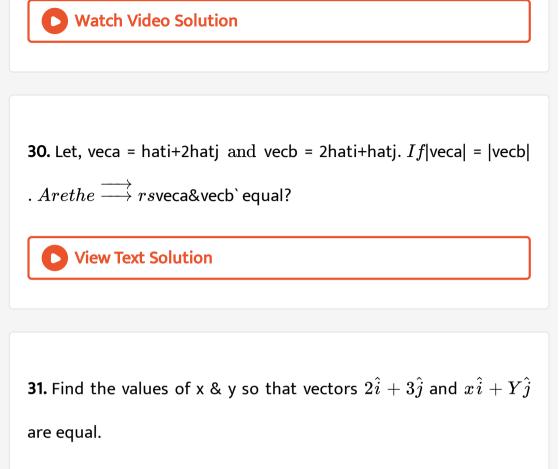
are co-planar.

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28. Find lambda if the vectors $\hat{i}+\hat{j}+2\hat{k},\lambda\hat{i}-\hat{j}+\hat{k}$ and $3\hat{i}-2\hat{j}-\hat{k}$ are co-planar.

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29. Find the unit vector in the direction of $2\hat{i}+3\hat{j}+\hat{k}$.\



32. Find the scalar and dot product of vectors $\hat{i} + 2\hat{j} - 3\hat{k}$ and

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

33. Show that
$$rac{\hat{i}-\hat{j}}{\sqrt{2}}$$
 is a unit vector.

34. Find the direction ratios and direction cosines of the vector $\vec{a} = \hat{i} + \hat{j} - 2\hat{k}.$

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

collinear.



36. Find
$$\left|\overrightarrow{x}\right|$$
, if for a unit vector \overrightarrow{a} , $\left(\overrightarrow{x} - \overrightarrow{a}\right)$. $\left(\overrightarrow{x} + \overrightarrow{a}\right) = 12$.



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

38. If =
$$\overrightarrow{a} = \hat{i} - 7\hat{j} + 7\hat{k}$$
 and $\overrightarrow{b} = 3\hat{i} - 2\hat{j} + 2\hat{k}$ find $\overrightarrow{a} \times \overrightarrow{b}$ and $\left|\overrightarrow{a} \times \overrightarrow{b}\right|$.

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39. Evaluate
$$\left(3\overrightarrow{a} - 5\overrightarrow{b}\right)$$
. $\left(2\overrightarrow{a} + 7\overrightarrow{b}\right)$

40. Find
$$\lambda$$
 and μ if $\left(2\hat{i}+6\hat{j}+27\hat{k}
ight) imes\left(\hat{i}+\lambda\hat{j}+\mu\hat{k}
ight)=\overrightarrow{0}$.

41. Show that,
$$\left(\overrightarrow{a} - \overrightarrow{b}\right) \times \left(\overrightarrow{a} + \overrightarrow{b}\right) = 2\left(\overrightarrow{a} \times \overrightarrow{b}\right).$$

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42. Find the scalar triple product vectors $\hat{i} + 2\hat{j} + 3\hat{k}, \, \hat{i} - \hat{j} + \hat{k}$ and $\hat{i} + \hat{j} + \hat{k}$.



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

are coplanar.

44. Show that the points A(-2, 3, 5), B(1, 2, 3) and C(7, 0, -1) are

collinear

45. Show that the points with position vectors $\hat{i} + 2\hat{j} + 7\hat{k}$, $2\hat{i} + 6\hat{j} + 3\hat{k}$ and $3\hat{i} + 10\hat{j} - \hat{k}$ are collinear **Watch Video Solution**

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

47. Show that the vectors $\frac{1}{7} (2\hat{i} + 3\hat{j} + 6\hat{k}), \frac{1}{7} (3\hat{i} - 6\hat{j} + 2\hat{k})$ and $\frac{1}{7} (6\hat{i} + 2\hat{j} - 3\hat{k})$ are mutually perpendicular.

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48. If
$$\overrightarrow{a} = 5\hat{i} - \hat{j} - 3\hat{k}$$
, $\overrightarrow{b} = \hat{i} + 3\hat{j} - 5\hat{k}$ then show that the vectors $\overrightarrow{a} + \overrightarrow{b} \& \overrightarrow{a} - \overrightarrow{b}$ are perpendicular

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

50. Find x,y,z if $\hat{i} + \hat{j} + 2\hat{k}$, $-\hat{i} + z\hat{k}$ and $2\hat{i} + x\hat{j} + y\hat{k}$ are mutually orthogonal.

51. Find a vector and unit vector perpendicular to each of the vector $\overrightarrow{a} + \overrightarrow{b}$ and $\overrightarrow{a} - \overrightarrow{b}$ Where $\overrightarrow{a} = 3\hat{i} + 2\hat{j} + 2\hat{k} \& \overrightarrow{b} = \hat{i} + 2\hat{j} - 2\hat{k}.$

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52. Find a vector of magnitude 11 in the direction opposite to that of \overrightarrow{PQ} , where P and Q are the points (1,3,2) and (-1,0,8), respectively.

53. If the points (-1,-1,2) ,(2,m,5) and (3,11,6) are co-linear then find

the value of m.



54. Calculate the work done if a sled is pulled forward 50m along a frictionless surface by a force of 250N at an angle of 60° to the horizontal.



55. It takes 12000J of work to pull a sled 200m with a 120N force.

Determine the angle of the rope with the horizontal.

56. Calculate the work done by a force F = $-5\hat{i} + \hat{j} + 7\hat{k}N$ when its point of application moves from point $(-2\hat{i} - 6\hat{j} + \hat{k})m$ to the point $(\hat{i} - \hat{j} + 10\hat{k})m$.

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57. A bolt is tightened using a 20N force, applied at an angle of 30° to the end of a wrench that is 30 cm long. Calculate the magnitude of the moment or torque about its point of rotation.



58. A bicycle pedal, 20 cm in length, has a 50N force applied to it at an angle of 45° . Determine the magnitude of the moment or torque.

59. Which of the following is a vector quantity?

A. Mass

B. Force

C. Time

D. Temperature

Answer:

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60. You are given a displacement vector of 5 cm due east. Show by

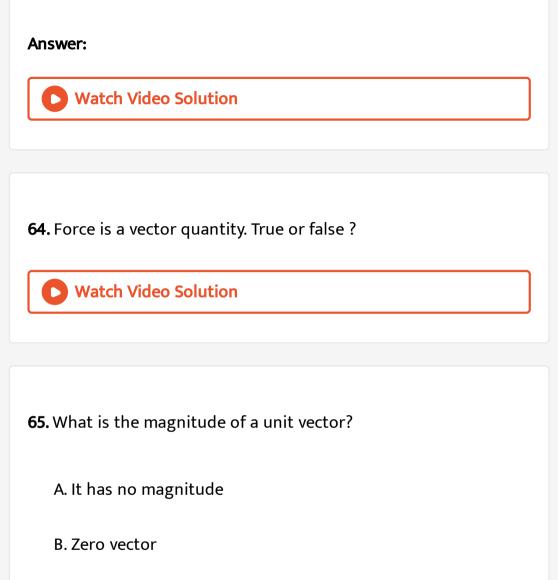
a diagram the corresponding negative vector.

61. Represent graphically a force 60N is a direction $60^{\,\circ}$ west of

north.

Watch Video Solution **62.** Represent graphically a force 100N is a direction 45° west of north. Watch Video Solution 63. The quantity which has only magnitude is called A. A scalar quantity B. A vector quantity C. A chemical quantity

D. A magnitude quantity



- C. Constant but not zero
- D. Unity

Answer:





66. Which have the following has zero magnitude?

A. Fixed vector

B. Zero vector

C. Modulus of a vector

D. Unit vector

Answer:

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67. Adding of two vectors to get a single vector is termed as

A. Final vector

B. Resultant vector

C. Dominant vector

D. Recessive vector

Answer:

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68. A vector which can be displaced parallel to itself and applied at

any point, is known as?

A. Free vector

B. Null vector

C. Position vector

D. Unit vector

Answer:



69. Which of the following lists of physical quantities consists only

of Vector?

A. Time, temperature, velocity

B. Force, volume, momentum

C. Velocity, acceleration, mass

D. Force, accelration, velocity

Answer:



70. If two vectors 2A and 3B which are in same direction are added

together then their resultant is given by ?

A. 2A+3B

B. 3A+2B

C. 2A-3B

D. None of above

Answer:

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71. If two non-zero vectors are perpendicular to each other then

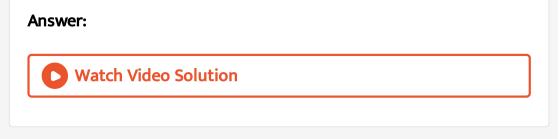
their Scalar product is equal to ?

A. 0

B. 1

C. 2

D. 3



72. Two forces are acting together on an object. The magnitude of their resultant is minimum when the angle between the forces is

A. 0° B. 60° C. 120°

D. 180°

Answer:



73. If the resultant of two forces each of magnitude F is 2F, then

the angle between them will be?

A. 0°

B. 60°

C. 120°

D. 180°

Answer:

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74. The Scalar product of two vectors is $2\sqrt{3}$ and the magnitude of

their vector product is 2. The angle between them is

A. $30^{\,\circ}$

B. 60°

C. 45°

D. 0°

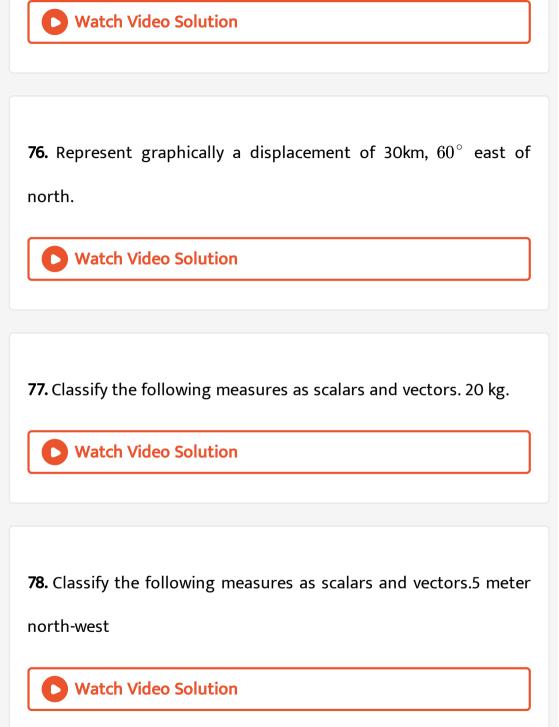
Answer:

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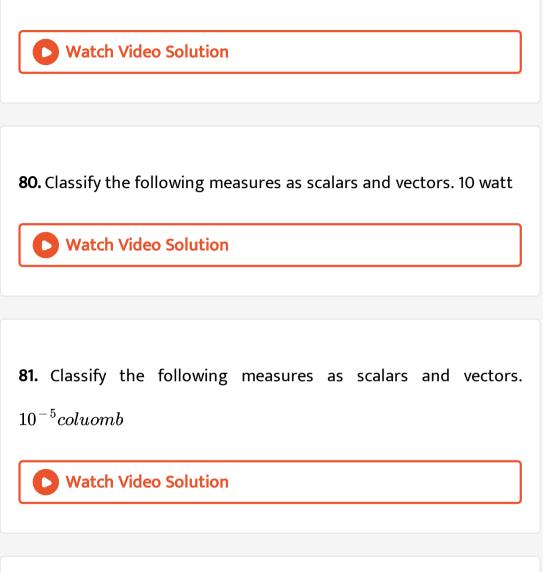
75. Which of the following vectors is/are perpendicular to the vector $4\hat{i} + 3\hat{j}$?

A. $4\hat{i} + 3\hat{j}$ B. $8\hat{i}$ C. $7\hat{j}$ D. $3\hat{i} - 4\hat{j}$

Answer:





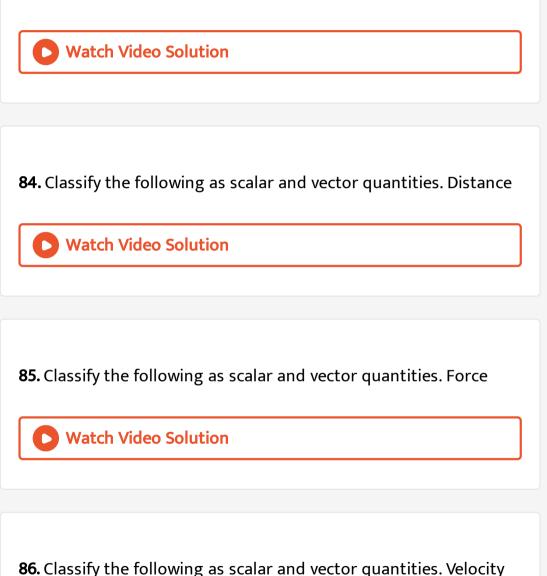


82. Classify the following measures as scalars and vectors. $30 \frac{m}{s^2}$



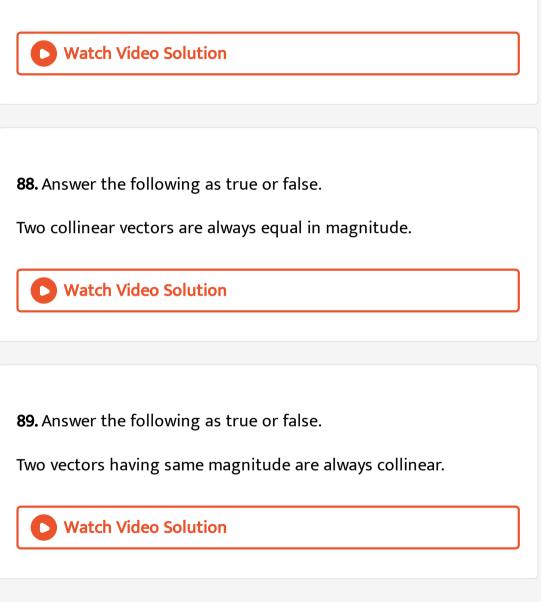
83. Classify the following as scalar and vector quantities. Time

period



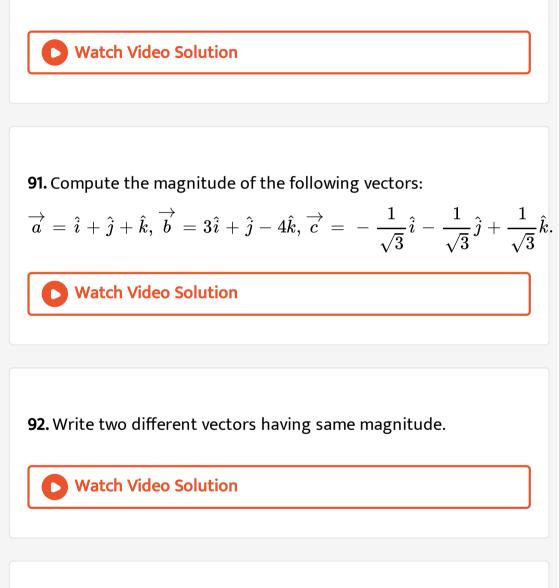
87. Classify the following as scalar and vector quantities. Work

done



90. Answer the following as true or false.

Two collinear vectors having the same magnitude are equal.



93. Write two different vectors having same direction.



94. Find the values of x,y and z so that the vectors $3\hat{i}+\hat{j}+4\hat{k}$ and $x\hat{i}+y\hat{j}+z\hat{k}$ are equal,

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95. Find the scalar and vector components of the vector with initial point (3, 5) and terminal point (-2,3).

96. Find the sum of the vectors
$$\vec{a} = -2\hat{i} + \hat{j} - 4\hat{k}$$
 and $\vec{b} = 3\hat{i} - \hat{j} + 5\hat{k}.$

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97. Find the unit vector in the direction of the vector $\vec{a} = 2\hat{i} + 2\sqrt{2}\hat{j} - 3\hat{k}.$

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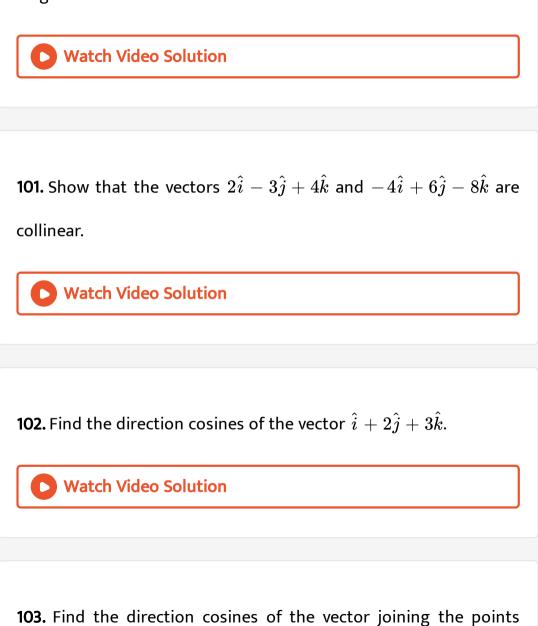
98. Find the unit vector in the direction of vector PQ, where P and Q are the points (1, 2, 3)and (4, 5, 6) respectively.

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99. For given vectors, $\vec{a} = \hat{i} + 2\hat{j} + 3\hat{k}$ and $\vec{b} = 2\hat{i} + 3\hat{j} + 5\hat{k}$, find the unit vector in the direction of the vector $\vec{a} + \vec{b}$.

100. Find a vector in the direction of vector $5\hat{i}-\hat{j}+2\hat{k}$ which has

magnitude 8 units.



A(1,2,-3) and B(-1, -2, I)directed from A to B.



104. Find the position vector of a point R which-divides the line joining two points P and Q whose position vectors are $\hat{i} + 2\hat{j} - \hat{k}$ and $-\hat{i} + \hat{j} + \hat{k}$ respectively, in the ratio 2:1 Internally



105. Find the position vector of a point R which-divides the line joining two points P and Q whose position vectors are $\hat{i} + 2\hat{j} - \hat{k}$ and $-\hat{i} + \hat{j} + \hat{k}$ respectively, in the ratio 2:1 externally



106. Find the position vector of the mid point of the vector joining

the points P(2,4, -1) and Q(4, 2, 5).

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

respectively form the vertices of a right angled triangle.

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108. If
$$\overrightarrow{a} \times \overrightarrow{b} = \overrightarrow{c} \times \overrightarrow{d}$$
 and $\overrightarrow{a} \times \overrightarrow{c} = \overrightarrow{b} \times \overrightarrow{d}$, show that $\left(\overrightarrow{a} - \overrightarrow{d}\right)$ is parallel to $\left(\overrightarrow{b} - \overrightarrow{c}\right)$.

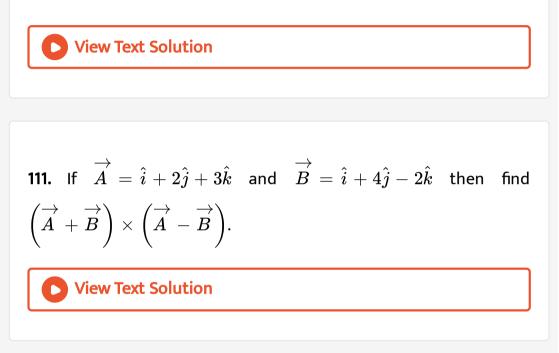
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109. Find the area of the parallelogram whose adjacent sides are

represented by the vectors $\hat{i}+2\hat{j}+3\hat{k}$ and $3\hat{i}-2\hat{j}+\hat{k}.$

110. Find the area of the $\ riangle ABC$ where co ordinates of A,B,C are

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



112. Find a unit vector perpendicular to each of the vectors $2\hat{i}-3\hat{j}+\hat{k}$ and $3\hat{i}-4\hat{j}-\hat{k}.$

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