



MATHS

BOOKS - NAGEEN MATHS (HINGLISH)

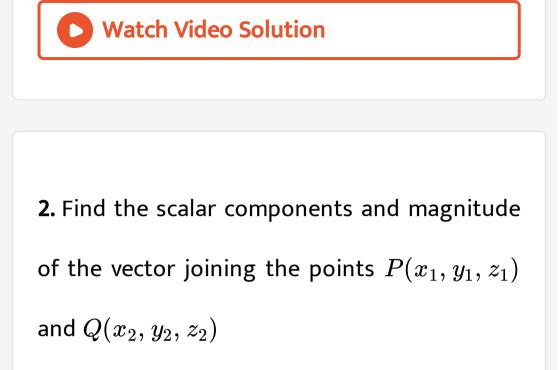
VECTORS

Miscellaneous Exercise

1. Write down a unit vector in XY-plane, making

an angle of 30 with the positive direction of x-

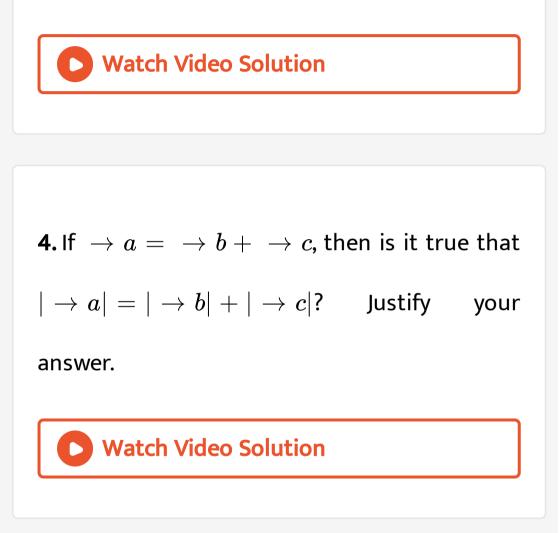
axis.



3. A girl walks 4 km towards west, and then she walks 3 km in a direction 30^0 east of north and

stops. Determine the girls displacement from

her initial point of departure.



5. Find the value of x for which $x\left(\hat{i}+\hat{j}+\hat{k}
ight)$

is a unit vector.

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

7. If $\overrightarrow{a} = \hat{i} + \hat{j} + \hat{k}$, $\overrightarrow{b} = 2\hat{i} - \hat{j} + 3\hat{k}$ and $\overrightarrow{c} = \hat{i} - 2\hat{j} + \hat{k}$ find a unit vector parallel to the vector $2\overrightarrow{a} - \overrightarrow{b} + 3\overrightarrow{c}$.

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

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

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10. The two adjacent sides of a parallelogram are $2\hat{i}-4\hat{j}+5\hat{k}$ and $\hat{i}-2\hat{j}-3\hat{k}$. Find the

unit vector parallel to its diagonal. Also, find

its area.

A.
$$13\sqrt{5}$$
 sq. units

B. $6\sqrt{5}$ sq. units

C. $11\sqrt{2}$ sq. units

D. $11\sqrt{5}$ sq. units

Answer: D



11. Show that the direction cosines of a vector

equally inclined to the axes OX, OY and OZ are

$$\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}$$

12. Let

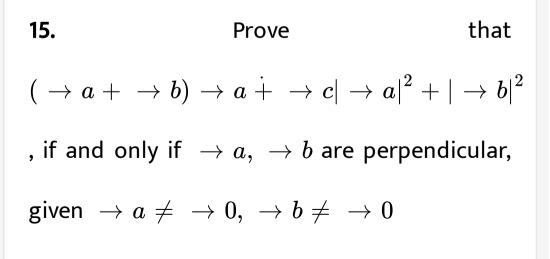
$$ightarrow a = \hat{i} + 4\hat{j} + 2\hat{k},
ightarrow b = 3\hat{i} - 2\hat{j} + 7\hat{k}$$

and $ightarrow c = 2\hat{i} - \hat{j} + 4\hat{k}$. Find a vector $ightarrow d$
which is perpendicular to both $ightarrow a$ and $ightarrow b$
and $ightarrow c .
ightarrow d = 15$.



13. The scalar product of the vector $\vec{a} = \hat{i} + \hat{j} + \hat{k}$ with a unit vector along the sum of the vectors $\vec{b} = 2\hat{i} + 4\hat{j} - 5\hat{k}$ and $\vec{c} = \lambda\hat{i} + 2\hat{j} + 3\hat{k}$ is equal to 1. Find the value of λ and hence find the unit vector along $\vec{b} + \vec{c}$.

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





16. If θ is the angle between two vectors $\overrightarrow{a} and \overrightarrow{b}, then \overrightarrow{a} \overrightarrow{b} \geq 0$ only when `0 A. $0 < \theta < \frac{\pi}{2}$ $\mathsf{B.0} \le \theta \le \frac{\pi}{2}$ $C.0 < \theta < \pi$ D. $0 \leq heta \leq \pi$

Answer: B

17. Let \overrightarrow{a} and \overrightarrow{b} be two unit vectors and α be the angle between them, then $\overrightarrow{a} + \overrightarrow{b}$ is a unit vectors, if

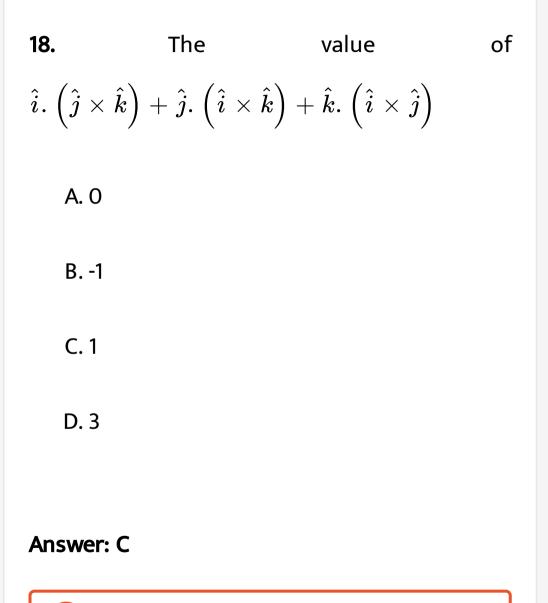
A.
$$lpha=rac{\pi}{4}$$

B. $lpha=rac{\pi}{3}$
C. $lpha=rac{\pi}{2}$
D. $lpha=rac{2\pi}{3}$

Answer: D









19. If is the angle between any two vectors \overrightarrow{a} and \overrightarrow{b} , then $\left|\overrightarrow{a}, \overrightarrow{b}\right| = \left|\overrightarrow{a} \times \overrightarrow{b}\right|$ when θ is equal to (a) 0 (B) $\frac{\pi}{4}$ (C) $\frac{\pi}{2}$ (d) π

A. 0

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

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

D. π

Answer: b



