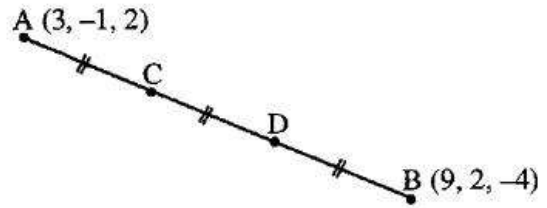


Vectors Homework

- [SQA] 1. Vectors p , q and r are defined by

$$p = i + j - k, \quad q = i + 4k \quad \text{and} \quad r = 4i - 3j.$$
 (a) Express $p - q + 2r$ in component form. 2
 (b) Calculate $p \cdot r$ 1
 (c) Find $|r|$. 1

- [SQA] 2. The line AB is divided into 3 equal parts by the points C and D, as shown. A and B have coordinates (3, -1, 2) and (9, 2, -4).



- (a) Find the components of \vec{AB} and \vec{AC} . 2
 (b) Find the coordinates of C and D. 2
3. If $u = k \begin{pmatrix} 3 \\ -1 \\ 0 \end{pmatrix}$, where $k > 0$ and u is a unit vector, determine the value of k .
- A. $\frac{1}{2}$
 B. $\frac{1}{8}$
 C. $\frac{1}{\sqrt{2}}$
 D. $\frac{1}{\sqrt{10}}$ 2

4. The vector u has components $\begin{pmatrix} -3 \\ 0 \\ 4 \end{pmatrix}$.

Which of the following is a unit vector parallel to u ?

- A. $-\frac{3}{5}i + \frac{4}{5}k$
 B. $-3i + 4k$
 C. $-\frac{3}{\sqrt{7}}i + \frac{4}{\sqrt{7}}k$
 D. $-\frac{1}{3}i + \frac{1}{4}k$ 2

[SQA] 5. The vectors p , q and r are defined as follows:

$$p = 3i - 3j + 2k, \quad q = 4i - j + k, \quad r = 4i - 2j + 3k.$$

(a) Find $2p - q + r$ in terms of i , j and k . 1

(b) Find the value of $|2p - q + r|$. 2

[SQA] 6. Calculate the length of the vector $2i - 3j + \sqrt{3}k$. 2

7. Given that $u = \begin{pmatrix} 2 \\ 0 \\ 1 \end{pmatrix}$ and $v = \begin{pmatrix} -1 \\ 2 \\ 4 \end{pmatrix}$, find $3u - 2v$ in component form.

A. $\begin{pmatrix} 4 \\ -1 \\ -5 \end{pmatrix}$

B. $\begin{pmatrix} 4 \\ -4 \\ 11 \end{pmatrix}$

C. $\begin{pmatrix} 8 \\ -1 \\ 5 \end{pmatrix}$

D. $\begin{pmatrix} 8 \\ -4 \\ -5 \end{pmatrix}$ 2

[SQA] 8. A is the point $(2, -5, 6)$, B is $(6, -3, 4)$ and C is $(12, 0, 1)$. Show that A, B and C are collinear and determine the ratio in which B divides AC. 4

[END OF QUESTIONS]