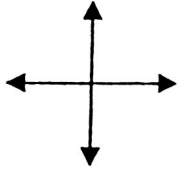


1a) Draw $\vec{u} = [5, -3]$ and express in $\vec{i}$ and $\vec{j}$.

/K1

b) Change $\vec{u}$ into a unit vector.



2. Given $\vec{a} = [2, 0, -5]$ and $\vec{b} = [-3, 6, 2]$, determine

a) $\vec{a} \cdot \vec{b}$

/K1

b) the angle between $\vec{a}$ and $\vec{b}$

c) $|4\vec{a} - \vec{b}|$

/K2

d) $(3\vec{a} - 2\vec{b}) \cdot (\vec{a} + 5\vec{b})$

e) $\vec{a} \times \vec{b}$

/K1

f) a vector perpendicular to $\vec{a}$ and $\vec{b}$

/K1

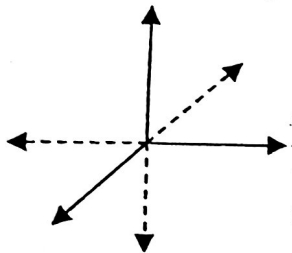
3. Find k if $[2, k]$ and $[4, -3]$ are
a) parallel.

/A1 b) perpendicular.

4. Given the vertices $A(3, 0, -2)$, $B(0, 2, 1)$, and $D(1, -5, 4)$,

- a) plot A , B , D and state the coordinates of C
so that $ABCD$ is a parallelogram.

/A2 b) determine $|\overrightarrow{BA}|$, $|\overrightarrow{BC}|$.



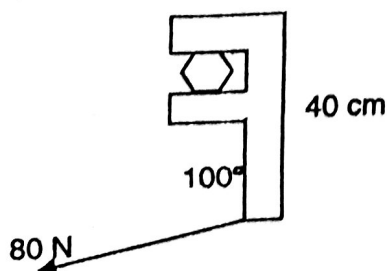
- c) determine the perimeter of $ABCD$

/A1 d) determine the area of parallelogram $ABCD$.

/K1

- 5a) Find the torque and its direction.

/A2C1



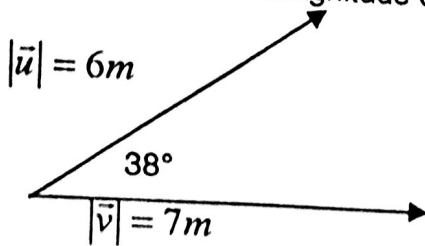
- b) Is the bolt tightening or loosening? Why?

/C2

6. Find the work done by a force of
a) $[3,5]$ moving an object in the direction $[6,7]$.

/A1 b) 75 N pulling a wagon handle 40° to the ground for 20 m.

7. Draw and find the magnitude of the projection of $\vec{u}$ on $\vec{v}$.



8. Find the projection of $\vec{u} = [-1,2,5]$ on $\vec{v} = [6,3,4]$. What does the projection represent?

/A1

9. If $\vec{u} = [u_1, u_2]$ and $\vec{v} = [v_1, v_2]$, prove $k(\vec{u} - \vec{v}) = k\vec{u} - k\vec{v}$

/T3

10. Express a bird's displacement of 5 km, N 15° E, 500 m up as a cartesian vector.

/T3

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