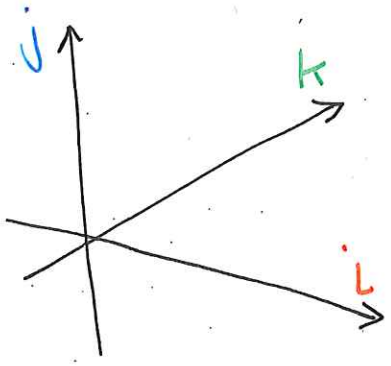
YEAR 2 PURE — VECTORS — Chapter 12

- 3D VECTORS



$8i + 2j + 3k$

or

$$\begin{pmatrix} 8 \\ 2 \\ 3 \end{pmatrix}$$

- MAGNTIUDE / LENGTH

Length of a vector A

$A = 8i + 2j + 3k$

$|A| = \sqrt{8^2 + 2^2 + 3^2}$

$|A| = \sqrt{89}$

Length between 2 points

$A = 8i + 2j + 3k$

$B = 2i + 3j + 2k$

diff between A and B: $AB = -6i + 1j - k$

$|AB| = \sqrt{(-6)^2 + (+1)^2 + (-1)^2} = \sqrt{38}$

- UNIT VECTOR $\frac{a}{|a|}$ (unit vector has a length of 1)

$a = 8i + 2j + 3k$

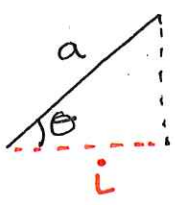
unit vector $= \frac{1}{\sqrt{89}}(8i + 2j + 3k)$

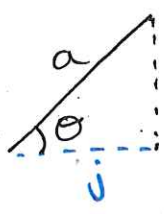
- ANGLE WITH AXIS

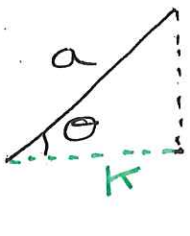
x axis: $\cos\theta_i = \frac{i}{|a|}$

y axis: $\cos\theta_j = \frac{j}{|a|}$

z axis: $\cos\theta_k = \frac{k}{|a|}$







- PARALLEL

Vectors are parallel if one is a multiple of the other.

$$a = \begin{pmatrix} 5 \\ 10 \\ 15 \end{pmatrix} \qquad b = \begin{pmatrix} 50 \\ 100 \\ 150 \end{pmatrix}$$

$10a = b$ therefore parallel

- GEOMETRIC PROBLEMS

Show $\triangle$ is isosceles – compare magnitude/length of each side

Show/describe the quadrilateral – are sides parallel? equal length?

- MECHANICS

Resultant of Forces = add all forces

$F = ma$

F = vector
a = vector
m = scalar