

Useful Vector Formulae for Further Maths

Angle between two vectors	$\cos\theta = \frac{a \cdot b}{ a b }$
Cross product of two vectors = area of parallelogram formed by the vectors	$a \times b = a b \sin\theta\hat{n}$
Volume of parallelopiped	$a \cdot b \times c$
Volume of tetrahedron	$\frac{1}{6}(a \cdot b \times c)$
Some properties of the cross product	$a \times b = -(b \times a)$ $ma \times nb = mn(a \times b)$ $a \times (b + c) = a \times b + a \times c$
Vector equation of line takes the form	$r = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix} + \lambda \begin{pmatrix} 4 \\ 5 \\ 6 \end{pmatrix}$ $r = a + \lambda d$ $\Leftrightarrow r - a = \lambda d$ $\Leftrightarrow (r - a) \times d = 0$ $\frac{x - 1}{4} = \frac{y - 2}{5} = \frac{z - 3}{6}$

Vectors parallel $\Leftrightarrow a \times b = 0$

Vectors perpendicular $\Leftrightarrow a \cdot b = 0$