

LINE (Q 3, PAPER 2)

1998

3 (a) The parametric equations $x = 3 - 4t$ and $y = 1 + 2t$ represent a line, where $t \in \mathbf{R}$.
Find the Cartesian equation of the line.

(b) Find the equation of the line pq where p has coordinates $(7, -6)$ and q has coordinates $(-3, 2)$.

Find the point of intersection of pq and the line $2x - 3y + 1 = 0$.

Determine the ratio in which the line $2x - 3y + 1 = 0$ divides $[pq]$.

(c) (i) The line M is $ax + by + c = 0$.

Prove that the perpendicular distance from the point (x_1, y_1) to the line M is given by

$$\frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}.$$

(ii) If p is the length of the perpendicular from the origin to the line $\frac{x}{a} + \frac{y}{b} = 1$,

prove that $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$.

ANSWERS

3 (a) $x + 2y - 5 = 0$

(b) $4x + 5y + 2 = 0$; $(-\frac{1}{2}, 0)$; 3:1