LINE (Q 3, PAPER 2)

2001

3 (a) The line B contains the points $(6, -2)$ and $(-4, 10)$. The line A with equation $ax + 6y + 21 = 0$ is perpendicular to B. Find the value of the real number a.

3 (b) f is the transformation $(x, y) \to (x', y')$

$$x' = -5x - 6y$$
$$y' = 4x + 3y.$$

L is the line $x - 9y = 2$.

(i) Find the equation of $f(L)$, the image of L under f.

M is a line containing the point $(1, k)$ where $k \in \mathbf{Z}$.

(ii) Given that $f(M)$ is $5x' - 2y' + 3k = 0$, find the value of k.

3 (c) N is the line $tx + (t-2)y + 4 = 0$ where $t \in \mathbf{R}$.

(i) Write down the slope of N in terms of t.

(ii) Given that the angle between N and the line $x - 3y + 1 = 0$ is 45°, find the two possible values of t.

ANSWERS

3 (a) $a = -5$

3 (b) (i) $f(L) = 13x' + 17y' - 6 = 0$ (ii) $k = -1$

3 (c) (i) $\frac{t}{2-t}$ (ii) $t = -2, \frac{4}{3}$