

LINE (Q 3, PAPER 2)

1999

3 (a) Show that the line $6x - 8y - 71 = 0$ contains the midpoint $[ab]$ where a has coordinates $(8, -6)$ and b has coordinates $(5, -2)$.

(b) The line L has equation $5x - 3y + 10 = 0$.

The point k has coordinates $(6, 2)$.

Show that the perpendicular distance from k to L is $\sqrt{34}$.

f is the transformation $(x, y) \rightarrow (x', y')$ where

$$x' = 7x - 2y$$

$$y' = -4x + y.$$

The image of L under f is the line $f(L)$. Find the equation of $f(L)$.

Show that the perpendicular distance from $f(k)$ to $f(L)$ is $\frac{\sqrt{34}}{\sqrt{5}}$.

(c) A line containing the point $(-4, -2)$ has slope m , where $m \neq 0$.

This line intercepts the x axis at $(x_1, 0)$ and the y axis at $(0, y_1)$.

Given that $x_1 + y_1 = 3$, find the slopes of the two lines that satisfy this condition.

Find the measure of the acute angle between these two lines and give your answer to the nearest degree.

ANSWERS

3 (b) $7x' + 11y' + 10 = 0$

3 (c) $m = \frac{1}{4}, 2; \theta = 49^\circ$