LINE (Q 3, PAPER 2)

2009

3 (a) Find the equation of the line through the point (1, 0) that also passes through the point of intersection of the lines $2x - y + 6 = 0$ and $10x + 3y - 2 = 0$.

(b) (i) Prove that the measure of one of the angles between two lines with slopes m_1 and m_2 is given by

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2}.$$

(ii) Find the equations of the two lines that pass through the point (6, 1) and make an angle of 45° with the line $x + 2y = 0$.

(c) f is the transformation (x, y) where $(x, y) \to (x', y')$, where $x' = -x + 2y$ and $y' = 2x - y$.

(i) L is the line $ax + by + c = 0$. Prove that $f(L)$ is a line.

(ii) The line $y = mx$ is its own image under f.
Find the two possible values of m.

ANSWERS

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

(b) (ii) $x - 3y - 3 = 0$, $3x + y - 19 = 0$

(c) (ii) $m = \pm 1$