## <u>Matrices – A2 Further Mathematics P2</u>

1. June/2022/Paper\_7367/02/No.11

(a)	Find the	eigenvalues	and	corresponding	eigenvectors	of the	matriv
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$$\mathbf{M} = \begin{bmatrix} \frac{5}{2} & -\frac{3}{2} \\ -\frac{3}{2} & \frac{13}{2} \end{bmatrix}$$

	[5 marks

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(b) (i)	Describe how the directions of the invariant lines of the transformation represented by ${\bf M}$ are related to each other.				
	Fully justify your answer.	[2 marks]			
(b) (ii)	Describe fully the transformation represented by <b>M</b>	[2 marks]			

2.	June/2022/	/Paper	7367	/02/	No.13
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(a) The matrix **A** represents a reflection in the line y = mx, where m is a constant.

Show that  $\mathbf{A} = \left(\frac{1}{m^2 + 1}\right) \begin{bmatrix} 1 - m^2 & 2m \\ 2m & m^2 - 1 \end{bmatrix}$ 

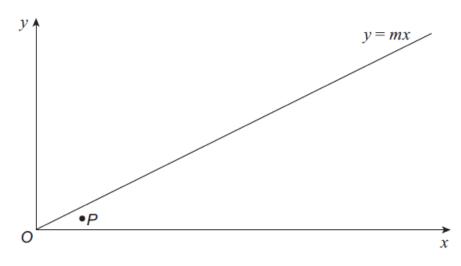
You may use the result in the formulae booklet. [5 marks]

The matrix  ${f B}$  is defined as  ${f B}=$ (b) Show that  $(\mathbf{BA})^2 = k\mathbf{I}$ where I is the 2  $\times$  2 identity matrix and k is an integer. [3 marks] (c) (i) The diagram below shows a point P and the line y = mx

Draw four lines on the diagram to demonstrate the result proved in part (b).

Label as P' the image of P under the transformation represented by  $(BA)^2$ 

[2 marks]



(c) (ii) Explain how your completed diagram shows the result proved in part (b).

			[2 marks]

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(d)	The matrix <b>C</b> is defined as $\mathbf{C} = \begin{bmatrix} \frac{12}{5} & \frac{9}{5} \\ \frac{9}{5} & -\frac{12}{5} \end{bmatrix}$	
	Find the value of $m$ such that $C = BA$	
	Fully justify your answer.	[4 marks