

## Lesson 11

### Further A-Level Pure Mathematics : Core 1 Matrix Transformations

#### 11.1 Test

*Any solution based entirely on graphical  
or numerical methods is not acceptable*

Marks Available : 40

#### Question 1

*Further A-Level Examination Question from June 2013, IAL, FP1, Q1 (Edexcel)*

$$\mathbf{M} = \begin{pmatrix} x & x - 2 \\ 3x - 6 & 4x - 11 \end{pmatrix}$$

Given that the matrix  $\mathbf{M}$  is singular, find the possible values of  $x$

[ 4 marks ]

**Question 2**

*Further A-Level Examination Question from June 2009, IAL, FP1, Q5 (Edexcel)*

$$\mathbf{R} = \begin{pmatrix} a & 2 \\ a & b \end{pmatrix} \text{ where } a \text{ and } b \text{ are constants and } a > 0$$

**( a )** Find  $\mathbf{R}^2$  in terms of  $a$  and  $b$

**[ 3 marks ]**

Given that  $\mathbf{R}^2$  represents an enlargement with centre ( 0, 0 ) and scale factor 15

**( b )** find the value of  $a$  and the value of  $b$

**[ 5 marks ]**

**Question 3**

*Further A-Level Examination Question from June 2014(R), IAL, FP1, Q6 (Edexcel)*

$$\mathbf{A} = \begin{pmatrix} 2 & 1 \\ -1 & 0 \end{pmatrix} \text{ and } \mathbf{B} = \begin{pmatrix} -1 & 1 \\ 0 & 1 \end{pmatrix}$$

Given that  $\mathbf{M} = (\mathbf{A} + \mathbf{B})(2\mathbf{A} - \mathbf{B})$ ,

**(a)** calculate the matrix  $\mathbf{M}$

**[ 6 marks ]**

**(b)** find the matrix  $\mathbf{C}$  such that  $\mathbf{MC} = \mathbf{A}$

**[ 4 marks ]**

**Question 4**

Further A-Level Examination Question from May 2017, IAL, FP1, Q5 (Edexcel)

(i)  $\mathbf{A} = \begin{pmatrix} p & 2 \\ 3 & p \end{pmatrix}$ ,  $\mathbf{B} = \begin{pmatrix} -5 & 4 \\ 6 & -5 \end{pmatrix}$  where  $p$  is a constant

(a) Find, in terms of  $p$ , the matrix  $\mathbf{AB}$

[ 2 marks ]

Given that  $\mathbf{AB} + 2\mathbf{A} = k\mathbf{I}$  where  $k$  is a constant and  $\mathbf{I}$  is the  $2 \times 2$  identity matrix

(b) find the value of  $p$  and the value of  $k$

[ 4 marks ]

(ii)  $\mathbf{M} = \begin{pmatrix} a & -9 \\ 1 & 2 \end{pmatrix}$  where  $a$  is a real constant

Triangle  $T$  has an area of 15 square units

Triangle  $T$  is transformed to the triangle  $T'$  by the transformation represented by the matrix  $\mathbf{M}$ .

Given that the area of triangle  $T'$  is 270 square units, find the possible values of  $a$

[ 5 marks ]

### Question 5

Further A-Level Examination Question from June 2014, IAL, FP1, Q4 (Edexcel)

(i) Given that  $\mathbf{A} = \begin{pmatrix} 1 & 2 \\ 3 & -1 \\ 4 & 5 \end{pmatrix}$  and  $\mathbf{B} = \begin{pmatrix} 2 & -1 & 4 \\ 1 & 3 & 1 \end{pmatrix}$ ,

(a) find  $\mathbf{AB}$

[ 3 marks ]

(b) Explain why  $\mathbf{AB} \neq \mathbf{BA}$

[ 1 mark ]

(ii) Given that  $\mathbf{C} = \begin{pmatrix} 2k & -2 \\ 3 & k \end{pmatrix}$  find  $\mathbf{C}^{-1}$ , giving your answer in terms of  $k$

[ 3 marks ]

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Teachers may obtain detailed worked solutions to the exercises by email from [mhh@shrewsbury.org.uk](mailto:mhh@shrewsbury.org.uk)