

Matrices

Question Paper 1

Level	IGCSE
Subject	Maths (0580)
Exam Board	Cambridge International Examinations (CIE)
Paper Type	Extended
Topic	Matrices and Transformations
Sub-Topic	Matrices
Booklet	Question Paper 1

Time Allowed: 62 minutes

Score: /51

Percentage: /100

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	75%	60%	45%	35%	25%	<25%

1 $\mathbf{M} = \begin{pmatrix} 5 & 1 \\ -3 & -2 \end{pmatrix}$

(a) Work out $4\mathbf{M}$.

$$\begin{pmatrix} & \\ & \end{pmatrix} \quad [1]$$

(b) Work out \mathbf{M}^2 .

$$\begin{pmatrix} & \\ & \end{pmatrix} \quad [2]$$

(c) Find \mathbf{M}^{-1} , the inverse of \mathbf{M} .

$$\begin{pmatrix} & \\ & \end{pmatrix} \quad [2]$$

2

$$\mathbf{A} = \begin{pmatrix} 2 & 0 \\ -1 & 5 \\ 3 & -4 \end{pmatrix}$$

$$\mathbf{B} = \begin{pmatrix} 1 & 3 \\ -1 & 5 \end{pmatrix}$$

$$\mathbf{C} = \begin{pmatrix} 7 \\ -4 \end{pmatrix}$$

$$\mathbf{D} = (2 \ 5)$$

(a) Work out each of the following if the answer is possible.
If a calculation is not possible, write “not possible” in the answer space.

(i) \mathbf{BA}

[1]

(ii) $2\mathbf{A}$

[1]

(iii) \mathbf{CD}

[2]

(iv) \mathbf{DC}

[2]

(v) \mathbf{B}^2

[2]

(b) Find \mathbf{B}^{-1} , the inverse of \mathbf{B} .

$\left(\begin{array}{cc} & \\ & \end{array} \right)$ [2]

3 Find the inverse of the matrix $\begin{pmatrix} 3 & -2 \\ -8 & 7 \end{pmatrix}$.

$$\begin{pmatrix} & \\ & \end{pmatrix} [2]$$

4 $\mathbf{M} = \begin{pmatrix} 3 & 1 \\ -11 & -2 \end{pmatrix}$

Find \mathbf{M}^{-1} , the inverse of \mathbf{M} .

Answer $\begin{pmatrix} & \\ & \end{pmatrix} [2]$

5 (a) Calculate $\begin{pmatrix} 3 & 7 \\ -1 & 4 \end{pmatrix} \begin{pmatrix} -2 & 1 \\ 4 & 2 \end{pmatrix}$.

Answer(a) $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

(b) Calculate the inverse of $\begin{pmatrix} 5 & 3 \\ 6 & 4 \end{pmatrix}$.

Answer(b) $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

6 $\mathbf{P} = \begin{pmatrix} 2 & 3 \\ 1 & 4 \end{pmatrix}$ $\mathbf{Q} = \begin{pmatrix} 1 & 2 \\ 0 & 3 \end{pmatrix}$ $\mathbf{R} = \begin{pmatrix} 0 & u \\ 1 & v \end{pmatrix}$ $\mathbf{S} = \begin{pmatrix} w & 3 \\ 8 & 2 \end{pmatrix}$

(a) Work out \mathbf{PQ} .

Answer(a) $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

(b) Find \mathbf{Q}^{-1} .

Answer(b) $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

(c) $\mathbf{PR} = \mathbf{RP}$

Find the value of u and the value of v .

Answer(c) $u = \dots\dots\dots$

$v = \dots\dots\dots$ [3]

(d) The determinant of \mathbf{S} is 0.

Find the value of w .

Answer(d) $w = \dots\dots\dots$ [2]

7 (a) Work out $\begin{pmatrix} 1 & -2 \\ 3 & 4 \end{pmatrix} \begin{pmatrix} -5 & -3 \\ 2 & 1 \end{pmatrix}$.

Answer(a) $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

(b) Find the inverse of $\begin{pmatrix} 1 & -2 \\ 3 & 4 \end{pmatrix}$.

Answer(b) $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

(c) Explain why it is not possible to work out $\begin{pmatrix} 1 & -2 \\ 3 & 4 \end{pmatrix} + \begin{pmatrix} 3 \\ 2 \end{pmatrix}$.

Answer(c) [1]

8

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

$$\mathbf{N} = \begin{pmatrix} 5 & 0 \\ 1 & 2 \end{pmatrix}$$

Calculate \mathbf{MN} .

Answer $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

9

$$\mathbf{M} = \begin{pmatrix} 7 & u \\ 2 & 3 \end{pmatrix} \text{ and } |\mathbf{M}| = 1.$$

Find the value of u .

Answer $u = \dots\dots\dots$ [2]

10 $\mathbf{A} = \begin{pmatrix} 8 & 3 \\ 4 & 2 \end{pmatrix}$

Find

(a) \mathbf{A}^2 ,

Answer(a) $\mathbf{A}^2 = \begin{pmatrix} & \\ & \end{pmatrix}$ [2]

(b) \mathbf{A}^{-1} .

Answer(b) $\mathbf{A}^{-1} = \begin{pmatrix} & \\ & \end{pmatrix}$ [2]

11

$$\mathbf{A} = \begin{pmatrix} 2 & 8 \\ 1 & 4 \end{pmatrix}$$

Work out $\mathbf{A}^2 - 4\mathbf{A}$.

Answer $\begin{pmatrix} & \\ & \end{pmatrix}$ [3]

12

$$\mathbf{A} = \begin{pmatrix} 3 & -2 \\ 1 & 4 \end{pmatrix} \quad \mathbf{B} = \begin{pmatrix} 2 & 0 \\ -5 & 7 \end{pmatrix}$$

(a) Calculate \mathbf{BA} .

Answer(a) $\mathbf{BA} =$ [2]

(b) Find the determinant of \mathbf{A} .

Answer(b) [1]