

## Matrices 1 IGCSE

1)

- (a) **A** is a  $(2 \times 4)$  matrix, **B** is a  $(3 \times 2)$  matrix and **C** is a  $(1 \times 3)$  matrix.

Which two of the following matrix products is it possible to work out?

**A**<sup>2</sup>    **B**<sup>2</sup>    **C**<sup>2</sup>    **AB**    **AC**    **BA**    **BC**    **CA**    **CB**

*Answer(a)*

and

[2]

- (b) Find the inverse of  $\begin{pmatrix} \frac{1}{2} & \frac{3}{4} \\ \frac{1}{8} & \frac{1}{4} \end{pmatrix}$ .

Simplify your answer as far as possible.

*Answer(b)*  $\begin{pmatrix} & \\ & \end{pmatrix}$  [3]

- (c) Explain why the matrix  $\begin{pmatrix} 4 & 2 \\ 6 & 3 \end{pmatrix}$  does not have an inverse.

*Answer(c)*

[1]

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2)

$$\mathbf{M} = \begin{pmatrix} 6 & -3 \\ 4 & 5 \end{pmatrix} \begin{pmatrix} x \\ 1 \end{pmatrix}.$$

(a) Find the matrix  $\mathbf{M}$ .

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

(b) Simplify  $(x \quad 1) \mathbf{M}$ .

*Answer(b)* [2]

3)

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

Find

(a)  $\mathbf{AB}$ ,

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

(b) the inverse matrix  $\mathbf{B}^{-1}$ ,

*Answer(b)*  $\mathbf{B}^{-1} =$  [2]

(c)  $\mathbf{BB}^{-1}$ .

*Answer(c)*  $\mathbf{BB}^{-1} =$  [1]

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4)

(a)

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

$$\mathbf{B} = \begin{pmatrix} 6 \\ -4 \end{pmatrix}$$

(i) Work out  $\mathbf{AB}$ .

*Answer(a)(i)*

[2]

(ii) Work out  $\mathbf{BA}$ .

*Answer(a)(ii)*

[2]

(b)  $\mathbf{C} = \begin{pmatrix} 3 & 1 \\ 1 & 1 \end{pmatrix}$

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

*Answer(b)*

[2]

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5)

$$\mathbf{M} = \begin{pmatrix} 5 & 2 \\ -3 & 4 \end{pmatrix} \qquad \mathbf{N} = \begin{pmatrix} -1 & -2 \\ 2 & 6 \end{pmatrix}$$

Calculate

**(a)**  $\mathbf{MN}$ ,

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

**(b)**  $\mathbf{M}^{-1}$ , the inverse of  $\mathbf{M}$ .

*Answer(b)*  $\mathbf{M}^{-1} =$  [2]

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6)

Find the values of  $x$  for which

(a)  $\begin{pmatrix} 1 & 0 \\ 0 & 2x-7 \end{pmatrix}$  has no inverse,

*Answer(a)*  $x =$  [2]

(b)  $\begin{pmatrix} 1 & 0 \\ 0 & x^2-8 \end{pmatrix}$  is the identity matrix,

*Answer (b)*  $x =$  or  $x =$  [3]

(c)  $\begin{pmatrix} 1 & 0 \\ 0 & x-2 \end{pmatrix}$  represents a stretch with factor 3 and the  $x$  axis invariant.

*Answer (c)*  $x =$  [2]

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7)

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

(a) Calculate  $\mathbf{BA}$ .

*Answer(a)*

[2]

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

*Answer(b)*

[2]

8)

$$\mathbf{A} = \begin{pmatrix} 2 & 2 \\ 2 & -2 \end{pmatrix}$$

Work out

(a)  $\mathbf{A}^2$ ,

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

(b)  $\mathbf{A}^{-1}$ , the inverse of  $\mathbf{A}$ .

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