AQA Qualifications

AQA Level 2 Certificate FURTHER MATHEMATICS

Level 2 (8360)

Worksheet 6

Matrices 2

Version 2.0

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6 Matrices 2

Question 1

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

Work out

(a) $\mathbf{AB}$ (b) $\mathbf{BC}$ (c) $3\mathbf{A}$

(d) $\mathbf{BA}$ (e) $-\mathbf{C}$ (f) $\mathbf{B}\begin{pmatrix} 1 & -4 \\ -5 & 7 \end{pmatrix}$

(12 marks)

Question 2

$$\mathbf{P} = \begin{pmatrix} -2 & 0 \\ 5 & 1 \end{pmatrix} \qquad \mathbf{Q} = \begin{pmatrix} -4 & 1 \\ 3 & -2 \end{pmatrix} \qquad \mathbf{C} = \begin{pmatrix} 3 \\ -2 \end{pmatrix}$$

Work out

(a) $\mathbf{P}^2$ (b) $\mathbf{QP}$ (c) $5\mathbf{Q}$

(d) $\mathbf{PC}$ (e) $\mathbf{IQ}$ (f) $3\mathbf{I}$

(12 marks)

Question 3

$$\begin{pmatrix} -2 & a \\ -4 & 3 \end{pmatrix}\begin{pmatrix} 3 \\ 7 \end{pmatrix} = \begin{pmatrix} 22 \\ 9 \end{pmatrix}$$

Work out the value of a.

(2 marks)

Question 4

Work out the values of a, b and c.

$$\begin{pmatrix} 2 & a \\ 3 & 1 \end{pmatrix}\begin{pmatrix} 1 & 3 \\ 2 & b \end{pmatrix} = \begin{pmatrix} 12 & 26 \\ c & 13 \end{pmatrix}$$

(3 marks)

Question 5

Work out the image of the point D (–1, 2) after transformation by the matrix $\begin{pmatrix} 2 & 3 \\ -1 & 1 \end{pmatrix}$

(2 marks)

Question 6

The point $A(m, n)$ is transformed to the point A' (–2, 0) by the matrix $\begin{pmatrix} 2 & 3 \\ 1 & 1 \end{pmatrix}$

Work out the values of m and n.

(4 marks)

Question 7

The matrix A represents a reflection in the line $y = x$.

Write down the matrix A.

The unit square is transformed by the matrix A and then by rotation through –90° about O.

Work out the matrix representing the combined transformation.

(4 marks)

Question 8

Describe fully the transformation given by the matrix $\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}$

(2 marks)

Question 9 (non-calculator)

The unit square $OABC$ is transformed by the matrix $\begin{pmatrix} h & 0 \\ 0 & h \end{pmatrix}$ to the square $OA'B'C'$.

The area of $OA'B'C'$ is 27.

Work out the exact value of h.

(3 marks)

Question 10

$\mathbf{A} = \begin{pmatrix} 3 & 0 \\ 0 & 3 \end{pmatrix}$ and $\mathbf{B} = \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}$

The point P (2, 7) is transformed by matrix **BA** to **P′**.

Show that P lies on the line $7x + 2y = 0$

(3 marks)