

# EdExcel Core Pure 1

## Matrices and transformations

### Introduction to matrices

#### Multiple Choice Quiz Addition/ subtraction/multiplication

1) The order of the matrix  $\begin{pmatrix} 3 & 8 & 6 & 2 & 0 \\ -2 & 4 & -1 & 0 & 2 \\ 3 & 0 & 0 & 2 & -4 \end{pmatrix}$  is

- (a)  $3 \times 5$  (b) 15  
(c)  $5 \times 3$  (d) 8  
(e) I don't know

In Questions 2-4, **A** is the matrix  $\begin{pmatrix} -1 & 2 \\ 1 & 3 \end{pmatrix}$  and **B** is the matrix  $\begin{pmatrix} 2 & 4 \\ 0 & -1 \end{pmatrix}$

2) **A + B =**

- (a)  $\begin{pmatrix} -3 & -2 \\ 1 & 4 \end{pmatrix}$  (b)  $\begin{pmatrix} 1 & 6 \\ 1 & 2 \end{pmatrix}$   
(c)  $\begin{pmatrix} 6 & 1 \\ 2 & 1 \end{pmatrix}$  (d)  $\begin{pmatrix} -2 & -3 \\ 4 & 1 \end{pmatrix}$   
(e) I don't know

3) **A - B =**

- (a)  $\begin{pmatrix} 1 & 2 \\ 1 & 2 \end{pmatrix}$  (b)  $\begin{pmatrix} -1 & -2 \\ 1 & 2 \end{pmatrix}$   
(c)  $\begin{pmatrix} 1 & 6 \\ 1 & 2 \end{pmatrix}$  (d)  $\begin{pmatrix} -3 & -2 \\ 1 & 4 \end{pmatrix}$   
(e) I don't know

4) **3A - 2B =**

- (a)  $\begin{pmatrix} -2 & -1 \\ 2 & 6 \end{pmatrix}$  (b)  $\begin{pmatrix} 1 & 14 \\ 3 & 7 \end{pmatrix}$   
(c)  $\begin{pmatrix} -7 & -2 \\ 3 & 11 \end{pmatrix}$  (d)  $\begin{pmatrix} 6 & 11 \\ 6 & 6 \end{pmatrix}$   
(e) I don't know

In Questions 5-9, **A** is the matrix  $\begin{pmatrix} 2 & 3 \\ 1 & 4 \end{pmatrix}$ .

**B** is the matrix  $\begin{pmatrix} 3 & -1 \\ 0 & 2 \end{pmatrix}$

**C** is the matrix  $\begin{pmatrix} -1 \\ 2 \end{pmatrix}$

5) **AB** is the matrix

(a)  $\begin{pmatrix} 6 & 3 \\ 4 & 7 \end{pmatrix}$

(b)  $\begin{pmatrix} 5 & 2 \\ 5 & 8 \end{pmatrix}$

(c)  $\begin{pmatrix} 6 & 4 \\ 3 & 7 \end{pmatrix}$

(d)  $\begin{pmatrix} 5 & 5 \\ 2 & 8 \end{pmatrix}$

(f) I don't know

6) **BA** is the matrix

(a)  $\begin{pmatrix} 6 & 4 \\ 3 & 7 \end{pmatrix}$

(b)  $\begin{pmatrix} 5 & 5 \\ 2 & 8 \end{pmatrix}$

(c)  $\begin{pmatrix} 6 & 3 \\ 4 & 7 \end{pmatrix}$

(d)  $\begin{pmatrix} 5 & 2 \\ 5 & 8 \end{pmatrix}$

(f) I don't know

7) **AC** is the matrix

(a)  $\begin{pmatrix} 4 \\ 7 \end{pmatrix}$

(b)  $\begin{pmatrix} 0 \\ 5 \end{pmatrix}$

(c)  $\begin{pmatrix} -2 & -3 \\ 2 & 8 \end{pmatrix}$

(d) Not defined

(f) I don't know

8) **CB** is the matrix

(a)  $\begin{pmatrix} -3 & 1 \\ 0 & 4 \end{pmatrix}$

(b)  $\begin{pmatrix} -5 \\ 4 \end{pmatrix}$

(c)  $\begin{pmatrix} -3 \\ 5 \end{pmatrix}$

(d) Not defined

(f) I don't know

9)  $\mathbf{A}^2$  is the matrix

(a)  $\begin{pmatrix} 4 & 9 \\ 1 & 16 \end{pmatrix}$

(c)  $\begin{pmatrix} 5 & 10 \\ 10 & 25 \end{pmatrix}$

(e) I don't know

(b)  $\begin{pmatrix} 7 & 18 \\ 6 & 19 \end{pmatrix}$

(d)  $\begin{pmatrix} 13 & 14 \\ 14 & 17 \end{pmatrix}$

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## Solutions to Multiple Choice Quiz

1) The correct answer is a)

The matrix has 3 rows and 5 columns, so its order is  $3 \times 5$ .

2) The correct answer is b)

$$\begin{aligned} A + B &= \begin{pmatrix} -1 & 2 \\ 1 & 3 \end{pmatrix} + \begin{pmatrix} 2 & 4 \\ 0 & -1 \end{pmatrix} \\ &= \begin{pmatrix} -1+2 & 2+4 \\ 1+0 & 3-1 \end{pmatrix} \\ &= \begin{pmatrix} 1 & 6 \\ 1 & 2 \end{pmatrix} \end{aligned}$$

3) The correct answer is d)

$$\begin{aligned} A - B &= \begin{pmatrix} -1 & 2 \\ 1 & 3 \end{pmatrix} - \begin{pmatrix} 2 & 4 \\ 0 & -1 \end{pmatrix} \\ &= \begin{pmatrix} -1-2 & 2-4 \\ 1-0 & 3+1 \end{pmatrix} \\ &= \begin{pmatrix} -3 & -2 \\ 1 & 4 \end{pmatrix} \end{aligned}$$

4) The correct answer is c)

$$\begin{aligned} 3A - 2B &= 3 \begin{pmatrix} -1 & 2 \\ 1 & 3 \end{pmatrix} - 2 \begin{pmatrix} 2 & 4 \\ 0 & -1 \end{pmatrix} \\ &= \begin{pmatrix} -3 & 6 \\ 3 & 9 \end{pmatrix} - \begin{pmatrix} 4 & 8 \\ 0 & -2 \end{pmatrix} \\ &= \begin{pmatrix} -7 & -2 \\ 3 & 11 \end{pmatrix} \end{aligned}$$

5) The correct answer is c)

$$\begin{aligned} AB &= \begin{pmatrix} 2 & 3 \\ 1 & 4 \end{pmatrix} \begin{pmatrix} 3 & -1 \\ 0 & 2 \end{pmatrix} \\ &= \begin{pmatrix} (2 \times 3) + (3 \times 0) & (2 \times -1) + (3 \times 2) \\ (1 \times 3) + (4 \times 0) & (1 \times -1) + (4 \times 2) \end{pmatrix} \\ &= \begin{pmatrix} 6 & 4 \\ 3 & 7 \end{pmatrix} \end{aligned}$$

6) The correct answer is b)

$$\begin{aligned} BA &= \begin{pmatrix} 3 & -1 \\ 0 & 2 \end{pmatrix} \begin{pmatrix} 2 & 3 \\ 1 & 4 \end{pmatrix} \\ &= \begin{pmatrix} (3 \times 2) + (-1 \times 1) & (3 \times 3) + (-1 \times 4) \\ (0 \times 2) + (2 \times 1) & (0 \times 3) + (2 \times 4) \end{pmatrix} \\ &= \begin{pmatrix} 5 & 5 \\ 2 & 8 \end{pmatrix} \end{aligned}$$

7) The correct answer is a)

$$\begin{aligned} AC &= \begin{pmatrix} 2 & 3 \\ 1 & 4 \end{pmatrix} \begin{pmatrix} -1 \\ 2 \end{pmatrix} \\ &= \begin{pmatrix} (2 \times -1) + (3 \times 2) \\ (1 \times -1) + (4 \times 2) \end{pmatrix} \\ &= \begin{pmatrix} 4 \\ 7 \end{pmatrix} \end{aligned}$$

8) The correct answer is d)

$$CB = \begin{pmatrix} -1 \\ 2 \end{pmatrix} \begin{pmatrix} 3 & -1 \\ 0 & 2 \end{pmatrix}$$

The matrices are not conformable so cannot be multiplied.

9) The correct answer is b)

$$\begin{aligned} A^2 &= \begin{pmatrix} 2 & 3 \\ 1 & 4 \end{pmatrix} \begin{pmatrix} 2 & 3 \\ 1 & 4 \end{pmatrix} \\ &= \begin{pmatrix} (2 \times 2) + (3 \times 1) & (2 \times 3) + (3 \times 4) \\ (1 \times 2) + (4 \times 1) & (1 \times 3) + (4 \times 4) \end{pmatrix} \\ &= \begin{pmatrix} 7 & 18 \\ 6 & 19 \end{pmatrix} \end{aligned}$$