Algebra of matrices

Student name: _____ Score: _____

1. (a) Let $\begin{pmatrix} b & 3 \\ 7 & 8 \end{pmatrix} + \begin{pmatrix} 9 & 5 \\ -2 & 7 \end{pmatrix} = \begin{pmatrix} 4 & 8 \\ a & 15 \end{pmatrix}$.

(i) Write down the value of a.

(ii) Find the value of b.

(b) Let $3\begin{pmatrix} -4 & 8 \\ 2 & 1 \end{pmatrix} - 5\begin{pmatrix} 2 & 0 \\ q & -4 \end{pmatrix} = \begin{pmatrix} -22 & 24 \\ -9 & 23 \end{pmatrix}$.

Find the value of q.

2. Let $\boldsymbol{A} = \begin{pmatrix} 1 & 2 \\ 3 & -1 \end{pmatrix}$ and $\boldsymbol{B} = \begin{pmatrix} 3 & 0 \\ -2 & 1 \end{pmatrix}$.

Find

(a) $\boldsymbol{A} + \boldsymbol{B}$;

(b) $-3\boldsymbol{A}$;

3. Let $\boldsymbol{A} = \begin{pmatrix} 3 & 2 \\ k & 4 \end{pmatrix}$ and $\boldsymbol{B} = \begin{pmatrix} 2 & 2 \\ 1 & 3 \end{pmatrix}$. Find, in terms of k, $2\boldsymbol{A} - \boldsymbol{B}$

4. Let $\boldsymbol{C} = \begin{pmatrix} -2 & 4 \\ 1 & 7 \end{pmatrix}$ and $\boldsymbol{D} = \begin{pmatrix} 5 & 2 \\ -1 & a \end{pmatrix}$.

The 2×2 matrix $\boldsymbol{Q}$ is such that $3\boldsymbol{Q} = 2\boldsymbol{C} - \boldsymbol{D}$.

Find $\boldsymbol{Q}$.

5. Let $A = \begin{pmatrix} 2 & a \\ -4 & 2 \end{pmatrix}$, $B = \begin{pmatrix} -1 & -5 \\ b & -2 \end{pmatrix}$, $C = \begin{pmatrix} 1 & -8 \\ -1 & c \end{pmatrix}$

If $A + B = C$, find the values of a, b, and c.

6. Let $A = \begin{pmatrix} 2 & -3 \\ -4 & 2 \end{pmatrix}$, $B = \begin{pmatrix} -1 & -5 \\ 3 & -2 \end{pmatrix}$

Find $A - B$.

7. Let $A = \begin{pmatrix} 3 & -5 & 4 \\ -1 & 4 & 6 \end{pmatrix}$, $B = \begin{pmatrix} -1 & 4 & 2 \\ -5 & -2 & 3 \end{pmatrix}$.

Find $2A + 3B$

8. Let $A = \begin{pmatrix} -3 & 1 \\ -2 & 4 \\ 5 & -1 \end{pmatrix}$, $B = \begin{pmatrix} 4 & -3 \\ 0 & -2 \\ -2 & 4 \end{pmatrix}$.

Find $3A - 2B$

Algebra of matrices

Student name: _____ ANSWERS _____ Score: _____

1. (a) Let $\begin{pmatrix} b & 3 \\ 7 & 8 \end{pmatrix} + \begin{pmatrix} 9 & 5 \\ -2 & 7 \end{pmatrix} = \begin{pmatrix} 4 & 8 \\ a & 15 \end{pmatrix}$.

(i) Write down the value of a. $a = 5$

(ii) Find the value of b. $b = -5$

(b) Let $3\begin{pmatrix} -4 & 8 \\ 2 & 1 \end{pmatrix} - 5\begin{pmatrix} 2 & 0 \\ q & -4 \end{pmatrix} = \begin{pmatrix} -22 & 24 \\ -9 & 23 \end{pmatrix}$.

Find the value of q. $q = 3$

2. Let $\boldsymbol{A} = \begin{pmatrix} 1 & 2 \\ 3 & -1 \end{pmatrix}$ and $\boldsymbol{B} = \begin{pmatrix} 3 & 0 \\ -2 & 1 \end{pmatrix}$.

Find

(a) $\boldsymbol{A} + \boldsymbol{B}$; $\begin{pmatrix} 4 & 2 \\ 1 & 0 \end{pmatrix}$

(b) $-3\boldsymbol{A}$; $\begin{pmatrix} -3 & -6 \\ -9 & 3 \end{pmatrix}$

3. Let $\boldsymbol{A} = \begin{pmatrix} 3 & 2 \\ k & 4 \end{pmatrix}$ and $\boldsymbol{B} = \begin{pmatrix} 2 & 2 \\ 1 & 3 \end{pmatrix}$. Find, in terms of k, $2\boldsymbol{A} - \boldsymbol{B}$ $\begin{pmatrix} 4 & 2 \\ 2k-1 & 5 \end{pmatrix}$

4. Let $\boldsymbol{C} = \begin{pmatrix} -2 & 4 \\ 1 & 7 \end{pmatrix}$ and $\boldsymbol{D} = \begin{pmatrix} 5 & 2 \\ -1 & a \end{pmatrix}$.

The 2×2 matrix $\boldsymbol{Q}$ is such that $3\boldsymbol{Q} = 2\boldsymbol{C} - \boldsymbol{D}$.

Find $\boldsymbol{Q}$. $\begin{pmatrix} -3 & 2 \\ 1 & \frac{14-a}{3} \end{pmatrix}$

5. Let $A = \begin{pmatrix} 2 & a \\ -4 & 2 \end{pmatrix}$, $B = \begin{pmatrix} -1 & -5 \\ b & -2 \end{pmatrix}$, $C = \begin{pmatrix} 1 & -8 \\ -1 & c \end{pmatrix}$

If $A + B = C$, find the values of a, b, and c. $a = -3$; $b = 3$; $c = 3$

6. Let $A = \begin{pmatrix} 2 & -3 \\ -4 & 2 \end{pmatrix}$, $B = \begin{pmatrix} -1 & -5 \\ 3 & -2 \end{pmatrix}$

Find $A - B$. $\begin{pmatrix} 3 & 2 \\ -7 & 4 \end{pmatrix}$

7. Let $A = \begin{pmatrix} 3 & -5 & 4 \\ -1 & 4 & 6 \end{pmatrix}$, $B = \begin{pmatrix} -1 & 4 & 2 \\ -5 & -2 & 3 \end{pmatrix}$.

Find $2A + 3B$ $\begin{pmatrix} 3 & 2 & 14 \\ -17 & 2 & 21 \end{pmatrix}$

8. Let $A = \begin{pmatrix} -3 & 1 \\ -2 & 4 \\ 5 & -1 \end{pmatrix}$, $B = \begin{pmatrix} 4 & -3 \\ 0 & -2 \\ -2 & 4 \end{pmatrix}$.

Find $3A - 2B$ $\begin{pmatrix} -17 & 9 \\ -6 & 16 \\ 19 & -11 \end{pmatrix}$