

Enrichment
Objective 3.02
Operations with Matrices

Matrices on the graphing calculator
Use the graphing calculator to solve the following:

$$A = \begin{bmatrix} 4 & -1 \\ 3 & 7 \end{bmatrix} \quad B = \begin{bmatrix} 1 & 2 \\ -3 & 8 \end{bmatrix}$$

1. $A + B$ 2. $A - B$ 3. $12(A)$ 4. $8(A) + 9(B)$

Step 1: Go to MATRIX on your calculator

Step 2: Arrow over to EDIT (as shown)

```
NAMES MATH [EDIT]
1: [A]
2: [B]
3: [C]
4: [D]
5: [E]
6: [F]
7↓ [G]
```

Step 3: Enter in the dimension of the first matrix, then each element.

```
MATRIX[A] 2 ×2
[ 4   -1 ]
[ 3   7 ]
```

2, 2=7

Step 4: Repeat Steps 2 and 3, only this time EDIT B and enter in that matrix

```
MATRIX[B] 2 ×2
[ 1   2 ]
[ -3  8 ]
```

2, 2=8

Continue until all given matrices are entered.

Step 5: Go back to the MATRIX screen press ENTER. [A] will appear on the screen. Put in the given operation and repeat, highlighting B

```

MATH MATH EDIT
1: [A] 2x2
2: [B] 2x2
3: [C]
4: [D]
5: [E]
6: [F]
7↓ [G]

```

Here are the solutions for 1 and 2.

```

[A]+[B]      [[5  1 ]
              [0 15]]
[A]-[B]      [[3 -3]
              [6 -1]]

```



If there is a scalar, simply type that in first:

Solutions for 3 and 4:

```

12[A]        [[48 -12]
              [36 84 ]]
8[A]+9[B]    [[41 10 ]
              [-3 128]]

```



You try: $A = \begin{bmatrix} 1 & -15 \\ 9 & -8 \\ 0 & 7 \end{bmatrix}$ $B = \begin{bmatrix} 17 & -12 \\ -3 & 20 \\ -1 & 0 \end{bmatrix}$

1. A + B 2. A - B 3. 3A 4. 5B 5. #3 - #4 6. AB

Answers: 1. $\begin{bmatrix} 18 & -27 \\ 6 & 12 \\ -1 & 7 \end{bmatrix}$ 2. $\begin{bmatrix} -16 & -3 \\ 12 & -28 \\ 1 & 7 \end{bmatrix}$ 3. $\begin{bmatrix} 3 & -45 \\ 27 & -24 \\ 0 & 21 \end{bmatrix}$ 4. $\begin{bmatrix} 85 & -60 \\ -15 & 100 \\ -5 & 0 \end{bmatrix}$

5. $\begin{bmatrix} -82 & 15 \\ 42 & -124 \\ 5 & 21 \end{bmatrix}$ 6. product undefined

Equal Matrices

Equal Matrices are matrices with the same dimensions and equal corresponding elements.

Find the value of each variable

$$\begin{bmatrix} 2x+1 & b-1 \\ t-4 & 9c \end{bmatrix} = \begin{bmatrix} -5x-6 & 5b \\ 3t+4 & -3c \end{bmatrix}$$

To solve for each variable set each element equal to its corresponding one.

$2x + 1 = -5x - 6$	$b - 1 = 5b$	$t - 4 = 3t + 4$	$9c = -3c$
$\begin{array}{r} + 1 \\ -1 \\ \hline 2x = -5x - 7 \end{array}$	$\begin{array}{r} -b \\ -b \\ \hline -1 = 4b \end{array}$	$\begin{array}{r} - 4 \\ +4 \\ \hline t = 3t + 8 \end{array}$	$\begin{array}{r} +3c \\ +3c \\ \hline 12c = 0 \end{array}$
$\begin{array}{r} +5x \\ +5x \\ \hline 7x = -7 \end{array}$	$\begin{array}{r} -1 \\ 4 \\ \hline -1 = 4b \end{array}$	$\begin{array}{r} -3t \\ -3t \\ \hline -2t = 8 \end{array}$	$\begin{array}{r} 12c \\ 12 \\ \hline 12c = 0 \end{array}$
$\begin{array}{r} 7x \\ 7 \\ \hline x = -1 \end{array}$	$b = -1/4$	$\begin{array}{r} -2t \\ -2 \\ \hline t = -4 \end{array}$	$c = 0$

You try:

1.

$$\begin{bmatrix} x+1 & 4z \\ 2y+3 & 5w-3 \end{bmatrix} = \begin{bmatrix} 7-x & 3z+5 \\ 3y-4 & 63-w \end{bmatrix}$$

2.

$$\begin{bmatrix} \frac{1}{2}+a & \frac{1}{2}+b \\ c-\frac{1}{3} & \frac{1}{3}d+\frac{2}{3} \end{bmatrix} = \begin{bmatrix} \frac{13}{2}-a & b-1 \\ \frac{14}{3} & d+\frac{4}{9} \end{bmatrix}$$

Answers:

1. $x = 3$ $z = 5$ $y = 7$ $w = 11$

2. $a = 3$ $b = 6$ $c = 5$ $d = 1/3$