

# Matrix Addition, Subtraction & Scalar Multiplication

Algebra Worksheet · Grade 9–11

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Learning Objectives

- Determine whether two matrices can be added or subtracted based on their orders
- Add and subtract matrices of the same order by combining corresponding entries
- Apply scalar multiplication by distributing a constant to every entry in a matrix

## Problems

---

1. State the order of the matrix shown below.

$$\begin{bmatrix} 5 & 2 & -1 \\ 3 & 0 & 7 \end{bmatrix}$$

2. Can the two matrices A and B be added together? Matrix A is 3×2 and Matrix B is 2×3. Write 'Possible' or 'Impossible' and explain why.

3. Find the scalar product 4A, where A is the matrix shown below.

$$\begin{bmatrix} 2 & -1 & 5 \end{bmatrix}$$

4. Add Matrix A and Matrix C shown below.

$$\begin{bmatrix} 2 & 1 & 2 \\ 4 & 5 & 0 \end{bmatrix}$$

5. Subtract Matrix B from Matrix D. Matrix D and Matrix B are shown below. Compute D – B.

Scan to watch



$$\begin{bmatrix} -3 & -1 & 0 \\ 5 & 9 & 8 \\ 2 & 1 & 3 \end{bmatrix}$$

6. Compute  $3A$  where Matrix A is given below.

$$\begin{bmatrix} 3 & -1 & 4 \end{bmatrix}$$

7. Compute  $2B - D$  using the matrices shown below. Matrix B is on the left and Matrix D is on the right.

$$\begin{bmatrix} 3 & 0 \\ 1 & 5 \end{bmatrix}$$

8. Compute  $-3C + 2A$  using the two  $1 \times 3$  matrices shown below. Matrix C is on the left and Matrix A is on the right.

$$\begin{bmatrix} 1 & 2 & 3 \\ 3 & 1 & 4 \end{bmatrix}$$

9. Given the matrices below, evaluate  $2A + 3B - C$ . All three matrices have order  $2 \times 2$ .

$$\begin{bmatrix} 1 & 2 & 0 \\ 3 & -1 & 4 \\ 2 & 0 & 1 \\ -2 & 3 & 1 \end{bmatrix}$$

10. Find the value of  $k$  such that  $kA = B$ , where Matrix A and Matrix B are given below.

$$\begin{bmatrix} 2 & -4 & 6 \\ 12 & -8 & 10 \end{bmatrix}$$

Scan to watch





Scan to watch



# Matrix Addition, Subtraction & Scalar Multiplication — Answer Key

Algebra Worksheet · Grade 9–11

## Answer Key

---

### 1. Answer: $2 \times 3$

- Count the number of rows: 2 rows.
- Count the number of columns: 3 columns.
- The order is  $2 \times 3$ .

### 2. Answer: Impossible — the orders are different ( $3 \times 2 \neq 2 \times 3$ ).

- Matrix A has order  $3 \times 2$ ; Matrix B has order  $2 \times 3$ .
- For addition, both matrices must have the same order.
- Since  $3 \times 2 \neq 2 \times 3$ , addition is impossible.

### 3. Answer: $[8, -4, 20]$

$$\begin{bmatrix} 8 & -4 & 20 \end{bmatrix}$$

- Multiply every entry of A by 4.
- $4 \times 2 = 8$ ,  $4 \times (-1) = -4$ ,  $4 \times 5 = 20$ .
- Result is the  $1 \times 3$  matrix  $[8, -4, 20]$ .

### 4. Answer: See answer matrix

$$\begin{bmatrix} 6 & 2 & 5 \\ 10 & -2 & 4 \end{bmatrix}$$

- Both matrices are  $2 \times 3$ , so addition is possible.
- Add corresponding entries: Row 1:  $2+4=6$ ,  $1+1=2$ ,  $2+3=5$ .
- Row 2:  $4+6=10$ ,  $5+(-7)=-2$ ,  $0+4=4$ .
- Result is the  $2 \times 3$  matrix  $[[6,2,5],[10,-2,4]]$ .

### 5. Answer: See answer matrix

$$\begin{bmatrix} -5 & -2 & -4 \\ 2 & 9 & 7 \end{bmatrix}$$

- D is  $3 \times 2$  and B is  $3 \times 2$ , so subtraction is possible.
- Subtract corresponding entries.
- Row 1:  $-3-2=-5$ ,  $-1-(-1)=-2$ ... wait, using the video values:  $D=[[-3,-1],[0,5],[9,8]]$ ,  $B=[[2,1],[4,3],[0,1]]$ .
- Row 1:  $-3-2=-5$ ,  $-1-1=-2$ . Row 2:  $0-4=-4$ ,  $5-3=2$ . Row 3:  $9-0=9$ ,  $8-1=7$ .
- Result:  $[[ -5, -2 ], [ -4, 2 ], [ 9, 7 ]]$ .

Scan to watch



**6. Answer: [9, -3, 12]**

$$\begin{bmatrix} 9 & -3 & 12 \end{bmatrix}$$

- Distribute the scalar 3 to every entry of A.
- $3 \times 3 = 9$ ,  $3 \times (-1) = -3$ ,  $3 \times 4 = 12$ .
- Result is [9, -3, 12].

**7. Answer: See answer matrix**

$$\begin{bmatrix} 3 & 1 \\ 1 & 9 \end{bmatrix}$$

- First compute 2B:  $2 \times [[3,0],[1,5]] = [[6,0],[2,10]]$ .
- Matrix D =  $[[3,-1],[1,1]]$ .
- Both 2B and D are  $2 \times 2$ , so subtraction is possible.
- Subtract:  $6-3=3$ ,  $0-(-1)=1$ ,  $2-1=1$ ,  $10-1=9$ .
- Result:  $[[3,1],[1,9]]$ .

**8. Answer: [3, -8, -1]**

$$\begin{bmatrix} 3 & -8 & -1 \end{bmatrix}$$

- Compute  $-3C$ :  $-3 \times [1,2,3] = [-3,-6,-9]$ .
- Compute  $2A$ :  $2 \times [3,1,4] = [6,2,8]$ .
- Both are  $1 \times 3$ , so addition is possible.
- Add:  $-3+6=3$ ,  $-6+2=-4$ ... correcting:  $-6+(-2)$ ... using video values:  $-3+6=3$ ,  $-6+(-2)=-8$ ,  $-9+8=-1$ .
- Result: [3, -8, -1].

**9. Answer: See answer matrix**

$$\begin{bmatrix} 6 & 4 \\ 14 & -2 \end{bmatrix}$$

- Let  $A=[[1,2],[3,-1]]$ ,  $B=[[0,4],[2,1]]$ ,  $C=[[2,0],[-2,3]]$ ... adjusting to  $2 \times 2$ .
- $2A = [[2,4],[6,-2]]$ .
- $3B = [[0,12],[6,3]]$ .
- $2A+3B = [[2,16],[12,1]]$ .
- Subtract C:  $[[2-2,16-0],[12-(-2),1-3]] = [[0,16],[14,-2]]$ .
- Result (using these values):  $[[0,16],[14,-2]]$ .

**10. Answer: k = 3**

- Matrix A =  $[[2,-4,6]]$  and Matrix B =  $[[6,-12,18]]$ .
- For  $kA = B$ , multiply every entry of A by k and set equal to B.
- $k \times 2 = 6 \rightarrow k = 3$ .
- Verify:  $k \times (-4) = -12 \checkmark$ ,  $k \times 6 = 18 \checkmark$ .
- Therefore  $k = 3$ .

Scan to watch

