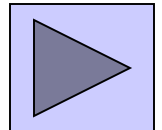


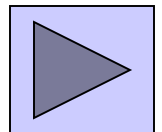
The Matrix

... behind the scenes



Directions for Viewing

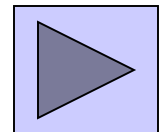
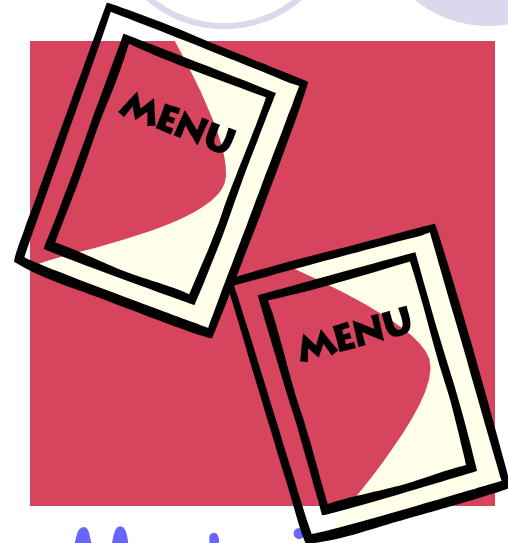
- You should be able to view the information on each slide automatically. When you are asked to "proceed to next slide" or "return to menu", click on the arrow button that appears.



Menu

Click on the topic you want to study:

- [Matrix Vocabulary](#)
- [Matrix Operations](#)
- [Adding and Subtracting Matrices](#)
- [Multiplying Matrices](#)

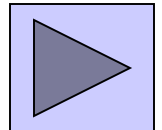


What is a matrix?

- A matrix is an array of numbers in rows and columns.

$$\begin{pmatrix} 3 & -2 \\ 4 & 0 \\ -1 & 5 \end{pmatrix}$$

This is a 3 x 2 matrix containing 6 elements.



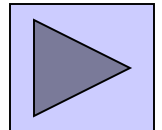
Matrix Vocabulary

- Dimensions of a Matrix

- given by: # rows x # columns

- Elements/Entries

- the numbers in a matrix

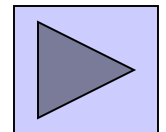


Matrix Vocabulary

● Equal Matrices

○ two matrices are equal if their dimensions are the same and their corresponding entries are equal

$$\begin{pmatrix} -1 & \frac{1}{2} \\ |-2| & 0 \end{pmatrix} = \begin{pmatrix} -1 & 0.5 \\ 2 & 0 \end{pmatrix}$$



Matrix Vocabulary


- Row Matrix

- a matrix with only one row


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


- Column Matrix

- a matrix with only one column

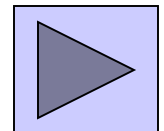

$$\begin{bmatrix} 3 \\ -2 \\ 1 \\ 5 \end{bmatrix}$$

- Square Matrix

- a matrix with the same number of rows as columns


$$\begin{bmatrix} 5 & 0 \\ -3 & -4 \end{bmatrix}$$

return to menu

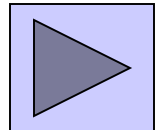


Matrix Operations

● Scalar Multiplication

○ To multiply a matrix by a scalar, multiply each entry in the matrix by the scalar.

$$2 \begin{pmatrix} 5 & 0 \\ -3 & -4 \end{pmatrix} = \begin{pmatrix} 10 & 0 \\ -6 & -8 \end{pmatrix}$$

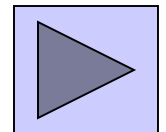


Matrix Operations

● Solving Matrix Equations

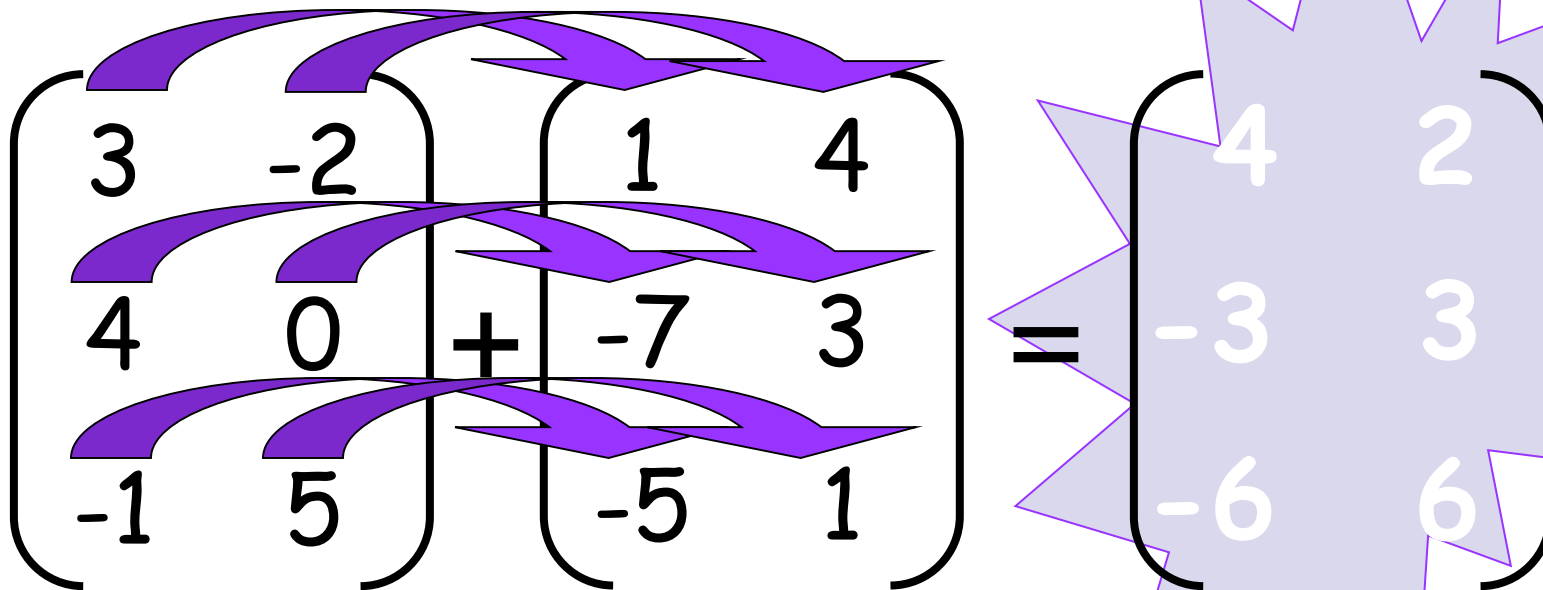
○ If two matrices are equal, their corresponding entries are equal.

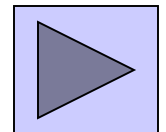
$$\begin{pmatrix} x & 1 \\ -3 & y \end{pmatrix} = \begin{pmatrix} 5 & 1 \\ -3 & -6 \end{pmatrix} \quad \begin{array}{l} x = 5 \\ y = -6 \end{array}$$



Adding Matrices

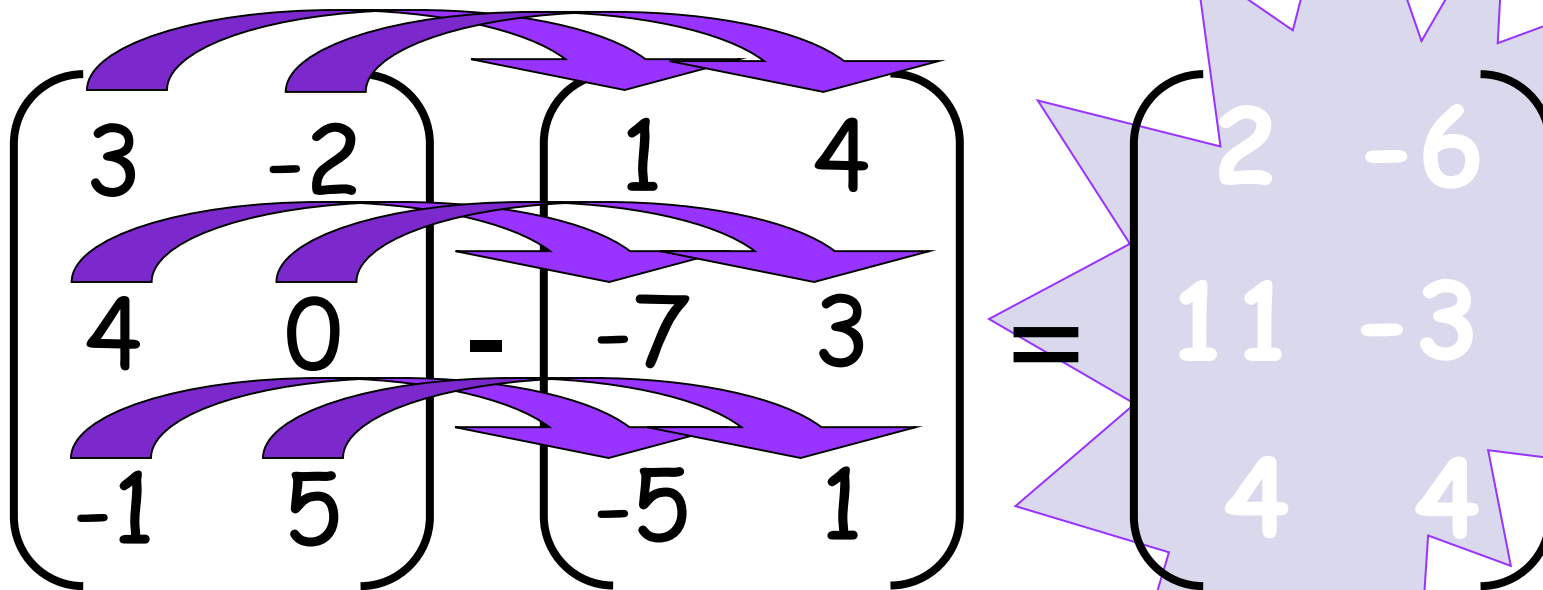
To add matrices, add corresponding entries.

$$\begin{pmatrix} 3 & -2 \\ 4 & 0 \\ -1 & 5 \end{pmatrix} + \begin{pmatrix} 1 & 4 \\ -7 & 3 \\ -5 & 1 \end{pmatrix} = \begin{pmatrix} 4 & 2 \\ -3 & 3 \\ -6 & 6 \end{pmatrix}$$




Subtracting Matrices

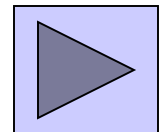
To subtract matrices, subtract corresponding entries.

$$\begin{pmatrix} 3 & -2 \\ 4 & 0 \\ -1 & 5 \end{pmatrix} - \begin{pmatrix} 1 & 4 \\ -7 & 3 \\ -5 & 1 \end{pmatrix} = \begin{pmatrix} 2 & -6 \\ 11 & -3 \\ 4 & 4 \end{pmatrix}$$
The diagram illustrates the subtraction of two 2x3 matrices. The first matrix has entries 3, -2, 4, 0, -1, 5. The second matrix has entries 1, 4, -7, 3, -5, 1. Purple arrows connect corresponding entries between the two matrices, showing the subtraction process. The result matrix has entries 2, -6, 11, -3, 4, 4. The result matrix is highlighted with a purple starburst background.

Hint

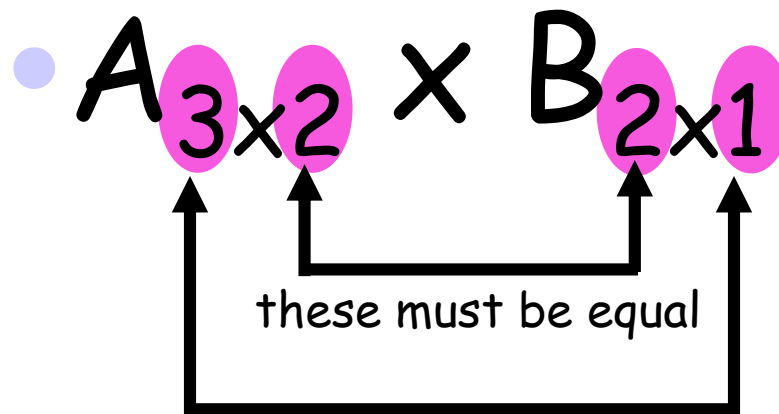


return to menu



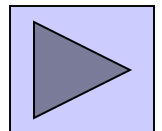
Multiplying Matrices

To multiply matrices, the dimensions have to "match" as shown:



the answer matrix will
have dimensions 3×1

proceed to next slide



Multiplying Matrices

To multiply matrices, use the formula demonstrated:

$$\begin{pmatrix} -1 & 4 \\ 2 & 3 \end{pmatrix} \begin{pmatrix} 5 \\ 0 \end{pmatrix} = \begin{pmatrix} (-1)(5) + (4)(0) \\ (2)(5) + (3)(0) \end{pmatrix} = \begin{pmatrix} -5 \\ 10 \end{pmatrix}$$

2×2 2×1 2×1

Hint



return to menu

