

**ORGANIZING DATA  
INTO MATRICES  
UNIT 04 LESSON 03**



# **OBJECTIVES**

## **STUDENTS WILL BE ABLE TO:**

Multiply matrices, Identify the type of matrices and the procedure to multiply them.

## **KEY VOCABULARY:**

- Matrix Multiplication
- Order of the Matrix
- Types of Matrices

# MATRIX MULTIPLICATION

- Two matrices A and B are confirmable for multiplication AB if  
**No of columns of A = No of Rows of B**

# MATRIX MULTIPLICATION

Let we have matrices A & B

$$A = \begin{bmatrix} a & b \\ c & d \end{bmatrix} \text{ and } B = \begin{bmatrix} e & f \\ g & h \end{bmatrix}$$

$$AB = \begin{bmatrix} a & b \\ c & d \end{bmatrix} \begin{bmatrix} e & f \\ g & h \end{bmatrix}$$

$$AB = \begin{bmatrix} ae + bg & af + bh \\ ce + dg & cf + dh \end{bmatrix}$$

## GENERAL PROPERTIES

In general,

- a.  $A.B \neq B.A$  (not commutative)
- b.  $A(BC) = AB(C)$  (Associative)
- c.  $A.0 = 0$  (0 being zero matrix)
- d.  $A.I = I.A = A$  (I being identity matrix)
- e.  $(A+B)C = AC+BC$
- f.  $A(B+C) = AB+AC$

# MATRIX MULTIPLICATION

## PROBLEM 01

If order of a matrix A is  $3 \times 2$  and order of matrix B is  $2 \times 4$  then order of AB will be:

- a.  $2 \times 2$
- b.  $3 \times 2$
- c.  $3 \times 4$
- d.  $4 \times 3$

# MATRIX MULTIPLICATION

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## PROBLEM 02

Given  $A = \begin{bmatrix} -1 \\ 2 \end{bmatrix}$   $B = \begin{bmatrix} 1 & 0 \\ 2 & 4 \end{bmatrix}$  and  $C = [1 \quad 3]$  find the following if exists:

- a.  $AB$
- b.  $BA$
- c.  $CA$
- d.  $BC$

# MATRIX MULTIPLICATION

For (a) Order is

$$\begin{array}{cc} A & B \\ 2 \times 1 & 2 \times 2 \end{array}$$


Not equal

So AB doesn't exist

# MATRIX MULTIPLICATION

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For (b) Order is

$$\begin{array}{cc} B & A \\ 2 \times 2 & 2 \times 1 \end{array}$$

Equal, BA exists and has order  $2 \times 1$

$$\begin{aligned} & \begin{bmatrix} 1 & 0 \\ 2 & 4 \end{bmatrix} \begin{bmatrix} -1 \\ 2 \end{bmatrix} \\ & \begin{bmatrix} 1 \times -1 & 0 \times 2 \\ 2 \times -1 & 4 \times 2 \end{bmatrix} \\ & \begin{bmatrix} -1 & 0 \\ -2 & 8 \end{bmatrix} \end{aligned}$$

# MATRIX MULTIPLICATION

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For (c) Order is

$$\begin{array}{cc} C & A \\ 1 \times 2 & 2 \times 1 \end{array}$$

equal , CA is possible and has the order  $1 \times 2$

$$C = [1 \quad 3] \quad A = \begin{bmatrix} -1 \\ 2 \end{bmatrix}$$


$$[1 \quad 3] \begin{bmatrix} -1 \\ 2 \end{bmatrix}$$

$$[1 \times -1 \quad -3 \times 2]$$

$$[-1 \quad -6]$$

# MATRIX MULTIPLICATION

For (d) Order is

$$\begin{array}{cc} B & C \\ 2 \times 1 & 2 \times 2 \end{array}$$


Not equal BC doesn't exist.

## PROBLEM 03

From the matrices if the geometrical figures have following vertices.

$$A(0,0) \quad B(5,2) \quad C(-4,2)$$

$$A(4,8) \quad B(-7,4)$$

$$A(0,0) \quad B(0,4) \quad C(4,4)$$

# MATRIX MULTIPLICATION

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

$$\begin{bmatrix} 4 & 8 \\ -7 & 4 \end{bmatrix}$$

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