

## Chapter 3 - Matrices

A *matrix* (plural: *matrices*) is a rectangular array of numbers written within brackets. You represent a matrix with a capital letter and classify it by its dimensions. The number of horizontal rows and vertical columns determine the dimensions of a matrix

3 columns  
↓ ↓ ↓  
 $A = \begin{bmatrix} 2 & 3 & 4 \\ 6 & 7 & 0 \end{bmatrix}$  ← ← 2 rows

Matrix A is a 2x3 matrix.

Write the dimensions of each matrix below:



1.  $\begin{bmatrix} 4 & 5 & -1 \\ 0 & 9 & -4 \\ -3 & -1 & 6 \end{bmatrix}$   $3 \times 3$

2.  $\begin{bmatrix} -4 & \frac{1}{3} & 3 \end{bmatrix}$   $1 \times 3$

3.  $\begin{bmatrix} 1 \\ 2 \\ 0 \\ -5 \end{bmatrix}$   $4 \times 1$

Write a 3x2 matrix:

$\begin{bmatrix} 4 & 9 \\ 7 & 2 \\ 1 & 1 \end{bmatrix}$

Notes

Reset

Write the dimensions of the matrix below.

$$\begin{bmatrix} 4 & 5 & 0 \\ -2 & .5 & 17 \end{bmatrix}$$



2x3



3x2



3x3



3x4

Notes


Reset

Each number in a matrix is a matrix element.

You can identify a matrix element by its position within the matrix. Use a lowercase letter with subscripts.

The subscripts represent the element's row number and column number.

$b_{12}$   $b_{21} = 3$   $B = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

Identify element  $a_{13}$  in  matrix  $A$  below:  $3$

$a_{22} = 12$   $a_{23} = 15$

$$A = \begin{bmatrix} 17 & 24 & 3 \\ 10.4 & 12 & 15 \\ 9 & 30 & 15 \end{bmatrix}$$

$a_{13}$  is in the first row and third column.

Notes

Reset

Identify the matrix elements:

$a_{11}$

17

Identify the matrix elements:

$a_{21}$

10.4

$$A = \begin{bmatrix} 17 & 24 & 3 \\ 10.4 & 12 & 15 \\ 9 & 30 & 15 \end{bmatrix}$$

Identify the matrix elements:

$a_{12}$

24

Identify the matrix elements:

$a_{13}$

3

Notes

Reset

Identify the element  $a_{33}$  in  
Matrix A from Example 2.

$$A = \begin{bmatrix} 17 & 24 & 3 \\ 10.4 & 12 & 15 \\ 9 & 30 & 15 \end{bmatrix}$$

- A 17
- B 30
- C 9
- D 15

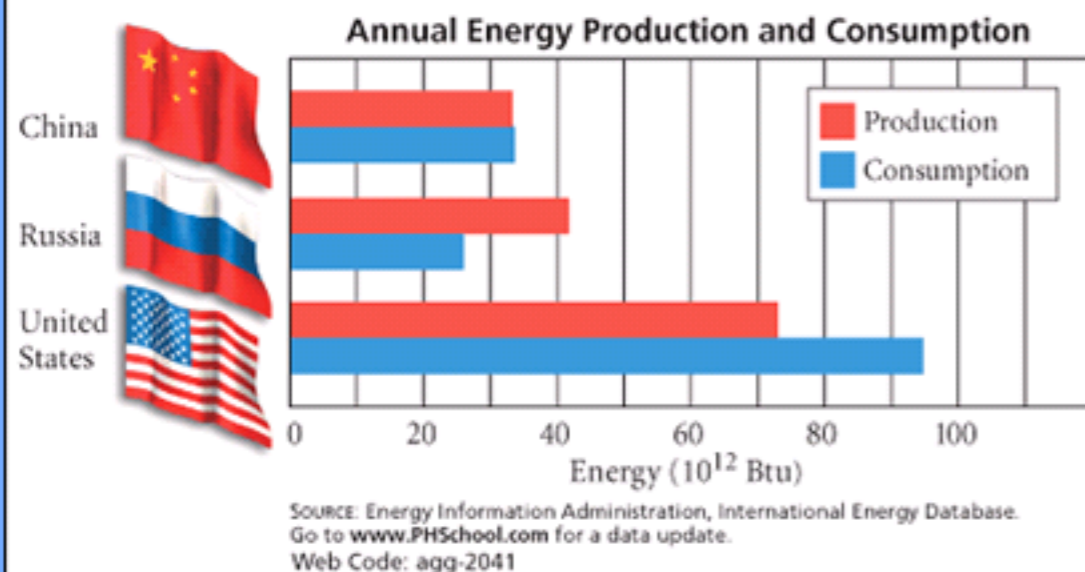
Notes

Reset

# Organizing Statistical Data

Successful businesses must track great amounts of data in order to plan the best use of their resources. They use matrices to organize and compare statistical data.

Energy is often measured in British thermal units (Btus). Write a matrix to represent the data below. Estimate the values from the graph.



Let each row represent a country and each column represent production or consumption levels.

$$\begin{matrix} & & 3 \times 2 \\ \text{China} & & \\ \text{Russia} & = & \\ \text{USA} & & \end{matrix} \begin{bmatrix} 33 & 34 \\ 42 & 27 \\ 73 & 95 \end{bmatrix}$$

$P$                        $C$

The table below shows scores from the 2000 Olympics in Sydney, Australia. Write a matrix  $W$  to represent the information. Use a matrix. Which element represents Kristin Maloney's score on the vault?

$$W = 4 \times 4$$

U.S. Women's Olympic Gymnastics Team Qualification Scores

Gymnast	Floor Exercise	Vault	Balance Beam	Uneven Bars
Amy Chow	9.525	9.468	9.625	9.400
Dominique Dawes	9.087	9.393	8.600	9.675
Kristin Maloney	9.525	9.225	9.312	9.575
Elise Ray	9.225	9.468	9.687	9.687

$$W_{32}$$

SOURCE: NBC News

$$W = \begin{matrix} & \begin{matrix} FE & V & BB & UB \end{matrix} \\ \begin{matrix} 9.525 \\ 9.087 \\ 9.525 \\ 9.225 \end{matrix} & \begin{bmatrix} 9.468 & 9.625 & 9.400 \\ 9.393 & 8.600 & 9.675 \\ 9.225 & 9.312 & 9.575 \\ 9.468 & 9.687 & 9.687 \end{bmatrix} \end{matrix}$$

Notes

Reset

88

89

90

91

L =

	A	C	D	T
	1	1	1	2
	2	1	2	5
	2	2	2	6
	3	1	3	7

①

② 4x3

③ Columbia launch in '91  
1991

⑭