

A matrix is a mathematical term for a group of values which are arranged in horizontal rows and vertical columns, usually enclosed in brackets. Since they are so nicely organized, matrices are an excellent way to present and work with large amounts of data. Spreadsheets are a form of matrix that you may be familiar with.

Each matrix is classified by its order, which is the number of horizontal rows and vertical columns of information that are contained within the matrix, with the number of rows always listed first. For example, a matrix with 2 rows and 3

columns is said to have an order of 2 x 3, read as "2 by 3." A matrix with an equal number of rows and columns is referred to as a square matrix.

Each value, called an element, in a matrix is named using a lowercase letter that matches the uppercase name of the matrix, followed by two small numbers below and to the right of the letter, such as  $a_{13}$ . The first small number indicates the row where the element is found, while the second small number indicates the column. For larger matrices, a comma is used to separate the numbers and avoid confusion.



Determine the order of the following matrices. Then name each element in each matrix, such as  $a_{11} = 7$ . You can check your answers on page 258.

$$A = \begin{bmatrix} 7 & 5 \\ -3 & 8 \\ 2 & -6 \end{bmatrix} \quad B = \begin{bmatrix} 5 & 3 & -2 \\ -9 & 6 & 4 \end{bmatrix}$$

### About a Matrix

$$A = \begin{bmatrix} 27 & 35 & 47 \\ 86 & 65 & 39 \\ 72 & 48 & 51 \\ 79 & 55 & 42 \end{bmatrix}$$

Column (pointing to 35) and Row (pointing to 86) labels are present.



	Jan	Feb	Mar
Car Payment	350	350	350
Insurance	120	120	120
Gas	60	85	75
Maintenance	135	150	45

### The Order of a Matrix

$$A = \begin{bmatrix} 127 & 135 & 179 & 168 \\ 219 & 199 & 227 & 235 \\ 155 & 167 & 197 & 153 \end{bmatrix}$$

Labels: Column 1, Column 2, Column 3, Column 4 (above columns); Row 1, Row 2, Row 3 (to the right of rows).

### Naming Elements in a Matrix

$$A = \begin{bmatrix} 127 & 135 & 179 & 168 \\ 219 & 199 & 227 & 235 \\ 155 & 167 & 197 & 153 \end{bmatrix}$$

$$a_{13} = 179$$

- A matrix is a collection of numbers, called elements, which are arranged in horizontal rows and vertical columns. The collection of numbers is surrounded by brackets.

- A matrix is usually named using an uppercase letter such as A. Note: Matrices is the term used to indicate more than one matrix.

- A matrix is used to present numbers in a format that is easy to read and understand.

- For example, each row in a matrix could include the values for a single expense, such as insurance. Each column in a matrix could include the values for a specific time period, such as one month.

- The size and shape of a matrix is referred to as the order of the matrix.
- The order of a matrix indicates the number of rows and columns in the matrix and is written as two numbers separated by an x, such as 3 x 4. The number of rows is always given before the number of columns.

- In this example, the matrix has 3 rows and 4 columns. The order of the matrix is 3 x 4, which is read as 3 "by" 4. Note: When a matrix has the same number of rows and columns, the matrix is referred to as a square matrix.

- Each element in a matrix is named using a lowercase letter that matches the name of the matrix, followed by two small numbers below and to the right of the letter, such as  $a_{13}$ .

- The first small number following the letter indicates the row where the element is found in the matrix. The second small number indicates the column where the element is found in the matrix.
- For example, the element named  $a_{13}$  is located in the first row and the third column in the matrix.