A **matrix** is a rectangular arrangement of numbers into rows and columns.

For example, matrix A has two **rows** and three **columns**.

3 columns

$$A = \begin{bmatrix} -2 & 5 & 6 \\ 5 & 2 & 7 \end{bmatrix}$$

2 rows

Matrix dimensions

The **dimensions** of a matrix tells its size: the number of rows and columns of the matrix, *in that order*.

Since matrix A has two rows and three columns, we write its dimensions as 2×3, pronounced "two by three".

In contrast, matrix B has three rows and two columns, so it is a 3×2 matrix.

$$B = \begin{bmatrix} -8 & -4 \\ 23 & 12 \\ 18 & 10 \end{bmatrix}$$

When working with matrix dimensions, remember rows $\times$ columns!

Check your understanding

1) What are the dimensions of matrix D?

$$D = \begin{bmatrix} -7 & 24 & 2 \\ 1 & 15 & 11 \\ -9 & 12 & 0 \\ 8 & -3 & -1 \end{bmatrix}$$

[____] × [____]

Check

[I need help!]

2) What are the dimensions of matrix E?

$$E = \begin{bmatrix} -2 & 6 & 1 & 3 \\ 0 & -8 & 3 & 10 \end{bmatrix}$$

[____] × [____]

Check

[I need help!]

3) What are the dimensions of matrix F?

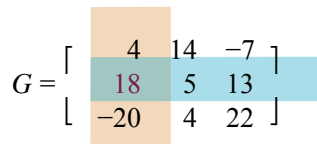$$F = \begin{bmatrix} -2 \\ 0 \\ 10 \end{bmatrix}$$

[____] × [____]

Check

Matrix elements

A **matrix element** is simply a matrix entry. Each element in a matrix is identified by naming the row and column in which it appears.

For example, consider matrix G:

$$G = \begin{bmatrix} 4 & 14 & -7 \\ 18 & 5 & 13 \\ -20 & 4 & 22 \end{bmatrix}$$

The element $g_{2,1}$ is the entry in the second row and the first column.

$$G = \begin{bmatrix} 4 & 14 & -7 \\ 18 & 5 & 13 \\ -20 & 4 & 22 \end{bmatrix}$$

In this case $g_{2,1} = 18$.

In general, the element in row i and column j of matrix A is denoted as $a_{i,j}$.

Check your understanding

4) $A = \begin{bmatrix} 2 & -4 & 8 \\ 1 & 5 & -5 \\ -2 & 6 & 2 \end{bmatrix}$

$a_{1,3} = \boxed{}$

5) $B = \begin{bmatrix} 12 & -2.3 \\ 4.6 & 1.2 \end{bmatrix}$

$b_{2,1} = $ [_____]

6) Matrix C is a 2×3 matrix with $c_{1,2} = 6$.

Which could be matrix C?

Choose 1 answer:

(A)
$\begin{bmatrix} 1 & 2 \\ 6 & 4 \\ 5 & -2 \end{bmatrix}$

(B)
$\begin{bmatrix} -9 & 6 \\ 7 & -3 \\ -3 & 5 \end{bmatrix}$

(C)
$\begin{bmatrix} 2 & 6 & 8 \\ 7 & -3 & 1 \end{bmatrix}$

(D)
$\begin{bmatrix} 2 & 10 & 8 \\ 6 & -3 & 1 \end{bmatrix}$