

# 3.5 Perform Basic Matrix Operations

TEKS a.1, a.2



**Before**

You performed operations with real numbers.

**Now**

You will perform operations with matrices.

**Why?**

So you can organize sports data, as in Ex. 34.

## Key Vocabulary

- matrix
- dimensions
- elements
- equal matrices
- scalar
- scalar multiplication

A **matrix** is a rectangular arrangement of numbers in rows and columns. For example, matrix  $A$  below has two rows and three columns. The **dimensions** of a matrix with  $m$  rows and  $n$  columns are  $m \times n$  (read “ $m$  by  $n$ ”). So, the dimensions of matrix  $A$  are  $2 \times 3$ . The numbers in a matrix are its **elements**.

$$A = \begin{bmatrix} 4 & -1 & 5 \\ 0 & 6 & 3 \end{bmatrix}$$

3 columns

The element in the first row and third column is 5.

Two matrices are **equal** if their dimensions are the same and the elements in corresponding positions are equal.

## KEY CONCEPT

*For Your Notebook*

### Adding and Subtracting Matrices

To add or subtract two matrices, simply add or subtract elements in corresponding positions. You can add or subtract matrices only if they have the same dimensions.

**Adding Matrices**  $\begin{bmatrix} a & b \\ c & d \end{bmatrix} + \begin{bmatrix} e & f \\ g & h \end{bmatrix} = \begin{bmatrix} a + e & b + f \\ c + g & d + h \end{bmatrix}$

**Subtracting Matrices**  $\begin{bmatrix} a & b \\ c & d \end{bmatrix} - \begin{bmatrix} e & f \\ g & h \end{bmatrix} = \begin{bmatrix} a - e & b - f \\ c - g & d - h \end{bmatrix}$

## EXAMPLE 1 Add and subtract matrices

### AVOID ERRORS

Be sure to verify that the dimensions of two matrices are equal before adding or subtracting them.

Perform the indicated operation, if possible.

a.  $\begin{bmatrix} 3 & 0 \\ -5 & -1 \end{bmatrix} + \begin{bmatrix} -1 & 4 \\ 2 & 0 \end{bmatrix} = \begin{bmatrix} 3 + (-1) & 0 + 4 \\ -5 + 2 & -1 + 0 \end{bmatrix} = \begin{bmatrix} 2 & 4 \\ -3 & -1 \end{bmatrix}$

b.  $\begin{bmatrix} 7 & 4 \\ 0 & -2 \\ -1 & 6 \end{bmatrix} - \begin{bmatrix} -2 & 5 \\ 3 & -10 \\ -3 & 1 \end{bmatrix} = \begin{bmatrix} 7 - (-2) & 4 - 5 \\ 0 - 3 & -2 - (-10) \\ -1 - (-3) & 6 - 1 \end{bmatrix} = \begin{bmatrix} 9 & -1 \\ -3 & 8 \\ 2 & 5 \end{bmatrix}$