NAME _____ DATE _____ PERIOD _____

13-2 Introduction to Matrices *(Pages 715–721)*

A rectangular arrangement of numbers, or **elements**, is called a **matrix**. Its **dimensions**, or the number of **rows** by the number of **columns**, describe a matrix. Two or more matrices with the same dimensions can be added or subtracted by performing the operation to corresponding elements. Any matrix can be multiplied by a constant called a *scalar*. The process of multiplying a matrix with a constant is called **scalar multiplication**. In scalar multiplication each element is multiplied by the constant.

Example

If $A = \begin{bmatrix} 1 & 7 \\ 5 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} -4 & 10 \\ 13 & -7 \end{bmatrix}$ find $A + B$ and $5A$.

$A + B = \begin{bmatrix} 1 & 7 \\ 5 & 2 \end{bmatrix} + \begin{bmatrix} -4 & 10 \\ 13 & -7 \end{bmatrix}$	*Substitution*	$5A = 5\begin{bmatrix} 1 & 7 \\ 5 & 2 \end{bmatrix}$	*Substitution*
$A + B = \begin{bmatrix} 1 + (-4) & 7 + 10 \\ 5 + 13 & 2 + (-7) \end{bmatrix}$	*Matrix addition*	$5A = \begin{bmatrix} 5(1) & 5(7) \\ 5(5) & 5(2) \end{bmatrix}$	*Scalar multiplication*
$A + B = \begin{bmatrix} -3 & 17 \\ 18 & -5 \end{bmatrix}$	*Simplify.*	$5A = \begin{bmatrix} 5 & 35 \\ 25 & 10 \end{bmatrix}$	*Simplify.*

Practice

If $A = \begin{bmatrix} 15 & 10 & 9 \\ -2 & -6 & 3 \end{bmatrix}$, $B = [-7 \quad 5]$, and $C = \begin{bmatrix} 17 & 5 & 10 \\ 11 & -3 & -1 \end{bmatrix}$, find each sum, difference, or product.

1. $A + B$ **2.** $A + C$ **3.** $C - A$ **4.** $A - C$

5. $3A$ **6.** $-2B$ **7.** $0.5C$ **8.** $2A + 3C$

9. $B + C$ **10.** $-C - A$ **11.** $-2B + 5C$ **12.** $3A - 4C$

13. **Standardized Test Practice** Find $-3A - B$ if $A = \begin{bmatrix} -5 & 6 & 2 \\ 1 & 0 & -1 \\ -2 & 4 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 6 & 7 \\ 10 & 8 & 6 \\ -6 & 9 & -1 \end{bmatrix}$.

A $\begin{bmatrix} 17 & -12 & 1 \\ 7 & 8 & 9 \\ 0 & -3 & -16 \end{bmatrix}$ **B** $\begin{bmatrix} -7 & 0 & -5 \\ -9 & -8 & -7 \\ 4 & -5 & 6 \end{bmatrix}$

C $\begin{bmatrix} 13 & -24 & -13 \\ -13 & -8 & -3 \\ 12 & -21 & -14 \end{bmatrix}$ **D** $\begin{bmatrix} 13 & -24 & -13 \\ -13 & -8 & -3 \\ 12 & -21 & -4 \end{bmatrix}$

Answers: **1.** Not possible **2.** $\begin{bmatrix} 32 & 15 & 19 \\ 9 & -9 & 2 \end{bmatrix}$ **3.** $\begin{bmatrix} 2 & -5 & 1 \\ 13 & 3 & -4 \end{bmatrix}$ **4.** $\begin{bmatrix} -2 & 5 & -1 \\ -13 & -3 & 4 \end{bmatrix}$ **5.** $\begin{bmatrix} 45 & 30 & 27 \\ -6 & -18 & 9 \end{bmatrix}$ **6.** $[14 \quad -10]$

7. $\begin{bmatrix} 8.5 & 2.5 & 5 \\ 5.5 & -1.5 & -0.5 \end{bmatrix}$ **8.** $\begin{bmatrix} 81 & 35 & 48 \\ 29 & -21 & 3 \end{bmatrix}$ **9.** Not possible **10.** $\begin{bmatrix} -32 & -15 & -19 \\ -9 & 9 & -2 \end{bmatrix}$ **11.** Not possible **12.** $\begin{bmatrix} -23 & 10 & -13 \\ -50 & -6 & 13 \end{bmatrix}$

13. C