

# Practice 4-3

## Matrix Multiplication

Use matrices  $A$ ,  $B$ ,  $C$ ,  $D$ , and  $E$  to find each product, sum, or difference, if possible. If not possible, write *product undefined*, *sum undefined*, or *difference undefined*.

$$A = \begin{bmatrix} 1 & -1 \\ 3 & -2 \end{bmatrix} \quad B = \begin{bmatrix} 0 & 2 \\ -2 & 1 \\ -1 & 0 \end{bmatrix} \quad C = \begin{bmatrix} 3 & -3 & -1 \\ 2 & -2 & 4 \end{bmatrix} \quad D = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \quad E = \begin{bmatrix} 3 \\ -3 \\ 2 \end{bmatrix}$$

- |            |                    |             |             |             |
|------------|--------------------|-------------|-------------|-------------|
| 1. $3AB$   | 2. $2A + 4D$       | 3. $5D - A$ | 4. $2C - E$ | 5. $3D + A$ |
| 6. $DA$    | 7. $AE$            | 8. $BD$     | 9. $DB$     | 10. $CE$    |
| 11. $DC$   | 12. $EB$           | 13. $CB$    | 14. $2D$    | 15. $BE$    |
| 16. $0.2B$ | 17. $\frac{1}{4}C$ | 18. $0.5AC$ | 19. $DE$    | 20. $-3DE$  |

Find the dimensions of the product matrix. Then find each product.

21. $\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} [1 \ 2 \ 3 \ 4]$	22. $\begin{bmatrix} 1 & 2 & 12 \\ 12 & 2 & 1 \end{bmatrix} \begin{bmatrix} 3 & 4 \\ 4 & 3 \\ 5 & 2 \end{bmatrix}$	23. $\begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix} \begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$
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Find each product if possible. If not possible, write *product undefined*.

$-12 \begin{bmatrix} -6 & -2 \\ -5 & -6 \\ 0 & 1 \end{bmatrix}$	25. $\begin{bmatrix} 3 & 2 \\ 4 & 6 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} -3 & 3 & -2 \\ -2 & 5 & -1 \end{bmatrix}$
26. $\begin{bmatrix} 0 & 1 & 0 \\ 2 & 2 & 1 \end{bmatrix} \begin{bmatrix} -2 & 2 & 2 \\ -1 & 1 & 1 \\ 0 & -1 & -1 \end{bmatrix}$	27. $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix} \begin{bmatrix} 2 & 3 \\ 4 & 1 \\ 5 & 6 \end{bmatrix}$
28. $\begin{bmatrix} 1 & 0 & 1 \\ 1 & 1 & 0 \\ 1 & 1 & 1 \end{bmatrix} \begin{bmatrix} 6 & 4 & 2 & 8 \\ 10 & 4 & 6 & 2 \\ 2 & 10 & 12 & 4 \end{bmatrix}$	29. $\begin{bmatrix} 4 & 3 \\ 9 & 7 \end{bmatrix} \begin{bmatrix} 6 & 3 \\ 9 & 4 \end{bmatrix}$

Solve each equation. Check your answers.

30. $2 \begin{bmatrix} 0 & 1 \\ 3 & -4 \end{bmatrix} - 3X = \begin{bmatrix} 9 & -6 \\ 1 & -2 \end{bmatrix}$	31. $\frac{1}{2}X + \begin{bmatrix} 5 & -1 \\ 0 & \frac{2}{3} \end{bmatrix} = 2 \begin{bmatrix} 3 & 0 \\ 1 & 2 \end{bmatrix}$
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Name \_\_\_\_\_

Date \_\_\_\_\_ Period \_\_\_\_\_

Solve each equation.

1) 
$$\begin{bmatrix} -5 \\ 5 \\ -20 \end{bmatrix} = 5B$$

2) 
$$A + \begin{bmatrix} -9 \\ -8 \\ -9 \end{bmatrix} = \begin{bmatrix} -6 \\ -11 \\ -2 \end{bmatrix}$$

3) 
$$\begin{bmatrix} -10 \\ 4 \\ 3 \end{bmatrix} = Y - \begin{bmatrix} 7 \\ -5 \\ -11 \end{bmatrix}$$

4) 
$$5B = \begin{bmatrix} 40 \\ 35 \end{bmatrix}$$

5) 
$$\begin{bmatrix} -4 & -9 & 12 \end{bmatrix} - Z = \begin{bmatrix} -12 & -5 & 7 \end{bmatrix}$$

6) 
$$2X = \begin{bmatrix} 4 \\ 6 \\ -20 \end{bmatrix}$$

7) 
$$\begin{bmatrix} -18 & 8 & -11 \end{bmatrix} = \begin{bmatrix} -9 & 8 & -8 \end{bmatrix} - 3X$$

8) 
$$\begin{bmatrix} -5 & 31 \\ 32 & 30 \end{bmatrix} = \begin{bmatrix} 3 & -5 \\ 0 & -2 \end{bmatrix} + 4X$$

9) 
$$-3X - \begin{bmatrix} 10 \\ 0 \\ -5 \\ 0 \end{bmatrix} = \begin{bmatrix} -25 \\ -30 \\ -22 \\ 9 \end{bmatrix}$$

10) 
$$\begin{bmatrix} -17 \\ -9 \\ -30 \\ -12 \end{bmatrix} = -2B + \begin{bmatrix} -3 \\ 11 \\ -8 \\ -6 \end{bmatrix}$$