

**CHAPTER**  
**4****Chapter Test**  
**Form A**

Select the best answer.

1. The table shows the number of books two students read each month. Which matrix displays the data in the table?

Number of Books Read per Month		
Student	January	February
Sarah	3	0
Nicole	1	8

- A**  $\begin{bmatrix} 3 & 0 \\ 1 & 8 \end{bmatrix}$
- B**  $[3 \ 1 \ 0 \ 8]$
- C**  $\begin{bmatrix} 3 \\ 1 \\ 0 \\ 8 \end{bmatrix}$
- D**  $\begin{bmatrix} 3 & 3 \\ 3 & 3 \end{bmatrix}$
2. If  $A = \begin{bmatrix} 5 & 3 & 2 \\ 6 & 1 & 3 \end{bmatrix}$  and  $B = \begin{bmatrix} 1 & 4 & 3 \\ 9 & 6 & 2 \end{bmatrix}$ , evaluate  $A + B$ .
- A**  $\begin{bmatrix} 6 & 4 & 3 \\ 7 & 2 & 4 \end{bmatrix}$
- B**  $\begin{bmatrix} 6 & 7 & 5 \\ 15 & 7 & 7 \end{bmatrix}$
3. If  $C = \begin{bmatrix} 2 & 5 \\ 5 & 0 \\ 1 & 7 \end{bmatrix}$  and  $D = \begin{bmatrix} 9 & 2 \\ 3 & 4 \\ 6 & 0 \end{bmatrix}$ , evaluate  $C + 2D$ .

- A**  $\begin{bmatrix} 11 & 7 \\ 8 & 4 \\ 7 & 7 \end{bmatrix}$
- B**  $\begin{bmatrix} 18 & 4 \\ 8 & 4 \\ 12 & 0 \end{bmatrix}$
- C**  $\begin{bmatrix} 18 & 10 \\ 15 & 0 \\ 6 & 0 \end{bmatrix}$
- D**  $\begin{bmatrix} 20 & 9 \\ 11 & 8 \\ 13 & 7 \end{bmatrix}$

4. For  $S_{2 \times 4}$  and  $T_{4 \times 3}$ , what are the dimensions of  $ST$ ?
- A**  $2 \times 3$
- B**  $4 \times 4$
5. If  $P = \begin{bmatrix} 3 & 1 \\ 2 & -1 \end{bmatrix}$  and  $Q = \begin{bmatrix} 4 & 0 \\ 2 & 3 \end{bmatrix}$ , evaluate  $PQ$ .
- A**  $\begin{bmatrix} 7 & 1 \\ 4 & 2 \end{bmatrix}$
- B**  $\begin{bmatrix} 12 & 4 \\ 12 & -1 \end{bmatrix}$
- C**  $\begin{bmatrix} 12 & 0 \\ 4 & -3 \end{bmatrix}$
- D**  $\begin{bmatrix} 14 & 3 \\ 6 & -3 \end{bmatrix}$
6. If  $A = \begin{bmatrix} 5 & 0 \\ 0 & 2 \end{bmatrix}$ , evaluate  $A^2$ .
- A**  $\begin{bmatrix} 10 & 0 \\ 0 & 4 \end{bmatrix}$
- B**  $\begin{bmatrix} 25 & 0 \\ 0 & 4 \end{bmatrix}$
7. If  $\triangle ABC$  is defined by the matrix  $P = \begin{bmatrix} -7 & 4 & 2 \\ 3 & -1 & 6 \end{bmatrix}$ , what are the coordinates of  $\triangle ABC$  after it has been rotated 90 degrees counterclockwise?
- A**  $\begin{bmatrix} -3 & 1 & -6 \\ -7 & 4 & 2 \end{bmatrix}$
- B**  $\begin{bmatrix} 3 & -1 & 6 \\ -7 & 4 & 2 \end{bmatrix}$
- C**  $\begin{bmatrix} 3 & -1 & 6 \\ 7 & -4 & -2 \end{bmatrix}$
- D**  $\begin{bmatrix} 7 & -4 & -2 \\ -3 & 1 & -6 \end{bmatrix}$

**CHAPTER** **4** **Chapter Test**  
**Form A** continued

8.  $\triangle ABC$  has vertices  $A(0, 2)$ ,  $B(-3, -2)$ , and  $C(2, -4)$ . What are the coordinates of the image of  $\triangle ABC$  after it has been reflected using the reflection matrix  $\begin{bmatrix} -1 & 0 \\ 0 & 1 \end{bmatrix}$ ?
- A**  $A'(0, 2)$ ,  $B'(-3, -4)$ ,  $C'(-2, -4)$   
**B**  $A'(0, -2)$ ,  $B'(-3, 2)$ ,  $C'(2, 4)$
9. Find the determinant of  $\begin{bmatrix} 5 & 3 \\ 4 & 6 \end{bmatrix}$ .
- A**  $-42$                       **C**  $18$   
**B**  $-18$                       **D**  $42$
10. Find the determinant of  $\begin{bmatrix} 1 & 1 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 1 \end{bmatrix}$ .
- A**  $-2$                       **C**  $0$   
**B**  $-1$                       **D**  $1$
11. What are the solutions of the system  $\begin{cases} 3x + 5y = 29 \\ 5x + 2y = 23 \end{cases}$ , where  $D = \begin{vmatrix} 3 & 5 \\ 5 & 2 \end{vmatrix}$ ?
- A**  $x = \frac{\begin{vmatrix} 3 & 29 \\ 5 & 23 \end{vmatrix}}{D}$ ,  $y = \frac{\begin{vmatrix} 29 & 5 \\ 23 & 2 \end{vmatrix}}{D}$   
**B**  $x = \frac{\begin{vmatrix} 5 & 29 \\ 2 & 23 \end{vmatrix}}{D}$ ,  $y = \frac{\begin{vmatrix} 29 & 3 \\ 23 & 5 \end{vmatrix}}{D}$   
**C**  $x = \frac{\begin{vmatrix} 23 & 2 \\ 29 & 5 \end{vmatrix}}{D}$ ,  $y = \frac{\begin{vmatrix} 5 & 23 \\ 3 & 29 \end{vmatrix}}{D}$   
**D**  $x = \frac{\begin{vmatrix} 29 & 5 \\ 23 & 2 \end{vmatrix}}{D}$ ,  $y = \frac{\begin{vmatrix} 3 & 29 \\ 5 & 23 \end{vmatrix}}{D}$
12. Is  $\begin{bmatrix} -1 & 2 \\ 1 & -1 \end{bmatrix}$  the inverse of  $\begin{bmatrix} 1 & 2 \\ 1 & 1 \end{bmatrix}$ ?
- A** Yes  
**B** No
13. Which matrix is the inverse of  $\begin{bmatrix} 4 & 5 \\ 2 & 3 \end{bmatrix}$ ?
- A**  $\frac{1}{2} \begin{bmatrix} -4 & 2 \\ 5 & -3 \end{bmatrix}$                       **C**  $\begin{bmatrix} -4 & 2 \\ 5 & -3 \end{bmatrix}$   
**B**  $\frac{1}{2} \begin{bmatrix} 3 & -5 \\ -2 & 4 \end{bmatrix}$                       **D**  $\begin{bmatrix} 3 & -5 \\ -2 & 4 \end{bmatrix}$
14. What is the augmented matrix for the system  $\begin{cases} 7x + 2y = -9 \\ 4x - 8 = y \end{cases}$ ?
- A**  $\left[ \begin{array}{cc|c} 7 & 2 & -9 \\ 4 & -8 & 1 \end{array} \right]$   
**B**  $\left[ \begin{array}{cc|c} 7 & 2 & -9 \\ 4 & -1 & 8 \end{array} \right]$
15.  $\left[ \begin{array}{cc|c} 1 & 0 & -4 \\ 0 & 1 & 6 \end{array} \right]$  is the reduced row-echelon form of which of the following?
- A**  $\left[ \begin{array}{cc|c} -4 & 0 & 1 \\ 0 & 6 & 1 \end{array} \right]$   
**B**  $\left[ \begin{array}{cc|c} -4 & -2 & 8 \\ 6 & 3 & 18 \end{array} \right]$   
**C**  $\left[ \begin{array}{cc|c} 2 & 3 & -20 \\ 4 & 5 & 54 \end{array} \right]$   
**D**  $\left[ \begin{array}{cc|c} 2 & 5 & 22 \\ 3 & 1 & -6 \end{array} \right]$
16. The system of equations  $\begin{cases} 2x + 2y - z = 13 \\ 4x - y = 7 \\ 7y - 4z = 11 \end{cases}$  represents the number of red, green, and blue cubes you will need to help your younger sister practice her addition and subtraction. Use  $x$  as the number of red cubes,  $y$  as the number of green cubes, and  $z$  as the number of blue cubes. What is the number of each color of cubes you will need to gather to help your sister?
- A** 3 red, 5 green, and 3 blue  
**B** 4 red, 9 green, and 13 blue

**CHAPTER**

**4**

**Chapter Test**

**Form B**

Select the best answer.

1. The table shows the number of books two students read each month. Which matrix displays the data in the table?

Number of Books Read per Month				
Student	Jan	Feb	March	April
Fred	3	0	4	6
Terrie	1	8	2	7

- A  $\begin{bmatrix} 3 & 0 & 4 & 6 \\ 1 & 8 & 2 & 7 \end{bmatrix}$   
 B  $\begin{bmatrix} 3 & 0 & 4 & 6 \\ 7 & 2 & 8 & 1 \end{bmatrix}$   
 C  $\begin{bmatrix} 6 & 4 & 0 & 3 \\ 1 & 8 & 2 & 7 \end{bmatrix}$   
 D  $\begin{bmatrix} 8 & 2 & 7 \\ 0 & 4 & 6 \end{bmatrix}$

2. If  $A = \begin{bmatrix} 5 & 3 & -2 \\ 6 & -1 & 3 \end{bmatrix}$  and  $B = \begin{bmatrix} -1 & -4 & 3 \\ 9 & 6 & 2 \end{bmatrix}$ , evaluate  $A - B$ .

- F  $\begin{bmatrix} 4 & -1 & 1 \\ 15 & 5 & 5 \end{bmatrix}$   
 G  $\begin{bmatrix} 6 & 7 & -2 \\ -3 & -7 & 3 \end{bmatrix}$   
 H  $\begin{bmatrix} 6 & 7 & -5 \\ -3 & -7 & 1 \end{bmatrix}$   
 J  $\begin{bmatrix} 6 & 7 & -5 \\ 6 & -1 & 3 \end{bmatrix}$

3. If  $C = \begin{bmatrix} 2 & -5 \\ 5 & 0 \\ -3 & 7 \end{bmatrix}$  and  $D = \begin{bmatrix} 9 & 2 \\ -3 & 4 \\ -5 & 0 \end{bmatrix}$ ,

evaluate  $3C - 2D$ .

- A  $\begin{bmatrix} -12 & -19 \\ 21 & -8 \\ 1 & 21 \end{bmatrix}$       C  $\begin{bmatrix} 11 & -3 \\ 2 & 4 \\ -8 & 7 \end{bmatrix}$   
 B  $\begin{bmatrix} -7 & -7 \\ 8 & -4 \\ 2 & 7 \end{bmatrix}$       D  $\begin{bmatrix} 24 & -11 \\ 9 & 8 \\ -19 & 21 \end{bmatrix}$

4. For  $S_{2 \times 6}$  and  $T_{6 \times 5}$ , what are the dimensions of  $ST$ ?

- F  $2 \times 2$       H  $5 \times 6$   
 G  $2 \times 5$       J  $6 \times 6$

5. If  $P = \begin{bmatrix} 5 & -1 & 2 \\ 0 & 3 & 0 \end{bmatrix}$  and  $Q = \begin{bmatrix} 2 & 2 \\ -1 & 1 \\ 1 & 0 \end{bmatrix}$ ,

evaluate  $PQ$ .

- A  $\begin{bmatrix} -3 & 3 \\ 13 & 9 \end{bmatrix}$       C  $\begin{bmatrix} 11 & 9 \\ 3 & 3 \end{bmatrix}$   
 B  $\begin{bmatrix} 10 & 10 \\ 2 & -2 \end{bmatrix}$       D  $\begin{bmatrix} 13 & 9 \\ -3 & 3 \end{bmatrix}$

6. If  $A = \begin{bmatrix} 5 & -1 \\ 0 & 2 \end{bmatrix}$ , evaluate  $A^2$ .

- F  $\begin{bmatrix} 10 & -2 \\ 0 & 4 \end{bmatrix}$       H  $\begin{bmatrix} 25 & 1 \\ 0 & 4 \end{bmatrix}$   
 G  $\begin{bmatrix} 25 & -7 \\ 0 & 4 \end{bmatrix}$       J  $\begin{bmatrix} 25 & -7 \\ 25 & -7 \end{bmatrix}$

7. If  $\triangle ABC$  is defined by the matrix

$$P = \begin{bmatrix} -7 & 4 & 2 \\ 3 & -1 & 6 \end{bmatrix},$$

what are the coordinates of  $\triangle ABC$  after it has been reflected

using the reflection matrix  $\begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$ ?

- A  $\begin{bmatrix} -7 & 4 & 2 \\ -3 & 1 & -6 \end{bmatrix}$       C  $\begin{bmatrix} -3 & -1 & -6 \\ -7 & 4 & 2 \end{bmatrix}$   
 B  $\begin{bmatrix} -7 & 4 & 2 \\ -3 & -1 & 6 \end{bmatrix}$       D  $\begin{bmatrix} 3 & -1 & 6 \\ -7 & 4 & 2 \end{bmatrix}$

8.  $\triangle ABC$  has vertices  $A(8, 1)$ ,  $B(3, -4)$ ,

$C(-2, 5)$ . What are the coordinates

of the image of  $\triangle ABC$  after it has been rotated using the rotation matrix  $\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$ ?

- F  $A'(-8, 1)$ ,  $B'(-3, -4)$ ,  $C'(2, 5)$   
 G  $A'(-1, 8)$ ,  $B'(4, 3)$ ,  $C'(-5, -2)$   
 H  $A'(1, 8)$ ,  $B'(-4, 3)$ ,  $C'(5, -2)$   
 J  $A'(8, -1)$ ,  $B'(3, 4)$ ,  $C'(-2, -5)$

**CHAPTER**  
**4** **Chapter Test**  
**Form B** continued

9. Find the determinant of  $\begin{bmatrix} 3 & -6 \\ 5 & 4 \end{bmatrix}$ .
- A** -42                      **C** 18  
**B** -18                      **D** 42
10. Find the determinant of  $\begin{bmatrix} 1 & 3 & -6 \\ 0 & 0 & -1 \\ -1 & 5 & 4 \end{bmatrix}$ .
- F** 8                              **H** 18  
**G** 12                          **J** 21
11. What are the solutions of the system  $\begin{cases} a_1x + b_1y = c_1 \\ a_2x + b_2y = c_2 \end{cases}$ , where  $D = \begin{vmatrix} a_1 & b_1 \\ a_2 & b_1 \end{vmatrix}$ ?
- A**  $x = \frac{\begin{vmatrix} a_1 & c_1 \\ a_2 & c_2 \end{vmatrix}}{D}$ ,  $y = \frac{\begin{vmatrix} c_1 & b_1 \\ c_2 & b_2 \end{vmatrix}}{D}$
- B**  $x = \frac{\begin{vmatrix} b_1 & c_1 \\ b_2 & c_2 \end{vmatrix}}{D}$ ,  $y = \frac{\begin{vmatrix} c_1 & a_1 \\ c_2 & a_2 \end{vmatrix}}{D}$
- C**  $x = \frac{\begin{vmatrix} c_2 & b_2 \\ c_1 & b_1 \end{vmatrix}}{D}$ ,  $y = \frac{\begin{vmatrix} a_2 & c_2 \\ a_1 & c_1 \end{vmatrix}}{D}$
- D**  $x = \frac{\begin{vmatrix} c_1 & b_1 \\ c_2 & b_2 \end{vmatrix}}{D}$ ,  $y = \frac{\begin{vmatrix} a_1 & c_1 \\ a_2 & c_2 \end{vmatrix}}{D}$
12. Which matrix is the inverse of  $\begin{bmatrix} 1 & 2 \\ 1 & 1 \end{bmatrix}$ ?
- F**  $\begin{bmatrix} -2 & -1 \\ -1 & -1 \end{bmatrix}$                       **H**  $\begin{bmatrix} -1 & 2 \\ 1 & -1 \end{bmatrix}$
- G**  $\begin{bmatrix} -1 & -2 \\ -1 & -1 \end{bmatrix}$                       **J**  $\begin{bmatrix} 1 & \frac{1}{2} \\ 1 & 1 \end{bmatrix}$
13. Which matrix is the inverse of  $\begin{bmatrix} 4 & 1 \\ 2 & 3 \end{bmatrix}$ ?
- A**  $\frac{1}{10} \begin{bmatrix} 3 & -1 \\ -2 & 4 \end{bmatrix}$                       **C**  $\frac{1}{10} \begin{bmatrix} 4 & 1 \\ 2 & 3 \end{bmatrix}$
- B**  $\frac{1}{10} \begin{bmatrix} 3 & 1 \\ 2 & 4 \end{bmatrix}$                       **D**  $\begin{bmatrix} 3 & -1 \\ -2 & 4 \end{bmatrix}$
14. What is the augmented matrix for the system  $\begin{cases} -9 - 2y = 7x \\ -4x - 8 = y \end{cases}$ ?
- F**  $\begin{bmatrix} -7 & -2 & 9 \\ -4 & -1 & 8 \end{bmatrix}$                       **H**  $\begin{bmatrix} -4 & -1 & 9 \\ -7 & -2 & 8 \end{bmatrix}$
- G**  $\begin{bmatrix} -7 & -2 & 9 \\ -4 & 0 & 8 \end{bmatrix}$                       **J**  $\begin{bmatrix} 7 & 2 & 9 \\ 4 & 1 & 8 \end{bmatrix}$
15. What is  $\begin{bmatrix} 9 & 3 & -18 \\ 1 & 2 & 8 \end{bmatrix}$  in reduced row-echelon form?
- A**  $\begin{bmatrix} 0 & 0 & -4 \\ 0 & 0 & 6 \end{bmatrix}$                       **D**  $\begin{bmatrix} 9 & 3 & -18 \\ 0 & 1 & 6 \end{bmatrix}$
- B**  $\begin{bmatrix} 1 & 0 & -4 \\ 0 & 1 & 6 \end{bmatrix}$                       **C**  $\begin{bmatrix} 9 & 0 & -36 \\ 0 & 1 & 6 \end{bmatrix}$
16. The system of equations  $\begin{cases} 2x + 2y - z = 13 \\ 4x - y = 8 \\ 10y - 3z = 37 \end{cases}$  represents the number of red, green, and blue cubes you will need to help your younger sister practice her addition and subtraction. Use  $x$  as the number of red cubes,  $y$  as the number of green cubes, and  $z$  as the number of blue cubes. What is the number of each color of cubes you will need to gather to help your sister?
- F** 3 red, 1 green, and 4 blue  
**G** 3 red, 4 green, and 1 blue  
**H** 4 red, 1 green, and 3 blue  
**J** 4 red, 3 green, and 1 blue

**CHAPTER**  
**4**

**Chapter Test**  
**Form C**

Select the best answer.

1. The table shows the number of books three students read each month. Which matrix displays the data in the table?

Number of Books Read per Month				
Student	Jan	Feb	March	April
Jake	3	0	4	6
Erika	1	8	2	7
Bruce	5	8	0	9

- A  $\begin{bmatrix} 3 & 0 & 4 & 6 \\ 1 & 8 & 2 & 7 \\ 5 & 8 & 0 & 9 \end{bmatrix}$       C  $\begin{bmatrix} 3 & 0 & 4 & 6 \\ 1 & 8 & 2 & 7 \end{bmatrix}$
- B  $\begin{bmatrix} 3 & 0 & 4 & 6 \\ 3 & 0 & 4 & 6 \\ 3 & 0 & 4 & 6 \end{bmatrix}$       D  $[5 \ 8 \ 0 \ 9]$

2. If  $A = \begin{bmatrix} 5 & 3 & -2 \\ 6 & -1 & 3 \end{bmatrix}$  and  $B = \begin{bmatrix} -1 & -4 & 3 \\ 9 & 6 & 2 \end{bmatrix}$ , evaluate  $B - A$ .

- F  $\begin{bmatrix} -6 & -7 & 5 \\ -3 & -7 & 1 \end{bmatrix}$       H  $\begin{bmatrix} 4 & -1 & 1 \\ 15 & 5 & 5 \end{bmatrix}$
- G  $\begin{bmatrix} -6 & -7 & 5 \\ 3 & 7 & -1 \end{bmatrix}$       J  $\begin{bmatrix} 6 & 7 & -5 \\ -3 & -7 & 1 \end{bmatrix}$

3. If  $C = \begin{bmatrix} 2 & -5 \\ 5 & 0 \\ -3 & 7 \end{bmatrix}$ ,  $D = \begin{bmatrix} 9 & 2 \\ -3 & 4 \\ -5 & 0 \end{bmatrix}$ , and

$E = \begin{bmatrix} 4 & -1 \\ 0 & 3 \\ -5 & 2 \end{bmatrix}$ , evaluate  $3C - (D - 2E)$ .

- A  $\begin{bmatrix} -11 & -15 \\ 18 & -10 \\ -24 & 17 \end{bmatrix}$       C  $\begin{bmatrix} 7 & -11 \\ 12 & -2 \\ -4 & 17 \end{bmatrix}$
- B  $\begin{bmatrix} 5 & -19 \\ 18 & 2 \\ -14 & 25 \end{bmatrix}$       D  $\begin{bmatrix} 23 & -15 \\ 12 & 10 \\ -24 & 25 \end{bmatrix}$

4. For  $S_{4 \times 3}$ ,  $T_{5 \times 3}$ , and  $V_{3 \times 4}$ , which of the following exists?

- F  $STV$       H  $SVT$   
G  $VST$       J  $TVS$

5. If  $P = \begin{bmatrix} 2 & 2 \\ -1 & 1 \\ 1 & 0 \end{bmatrix}$ , and  $Q = \begin{bmatrix} 5 & -1 & 2 \\ 1 & 4 & -2 \end{bmatrix}$ ,

evaluate  $PQ$ .

- A  $\begin{bmatrix} 13 & 9 \\ -4 & 6 \end{bmatrix}$       C  $\begin{bmatrix} 12 & -4 & 5 \\ 6 & 5 & -1 \\ 0 & -4 & 2 \end{bmatrix}$
- B  $\begin{bmatrix} 12 & 6 & 0 \\ -4 & 5 & -4 \\ 5 & -1 & 2 \end{bmatrix}$       D  $PQ$  does not exist.

6. If  $A = \begin{bmatrix} 1 & 1 \\ -1 & 1 \end{bmatrix}$ , evaluate  $A^3$ .

- F  $\begin{bmatrix} -2 & 2 \\ -2 & -2 \end{bmatrix}$       H  $\begin{bmatrix} 1 & 1 \\ -1 & 1 \end{bmatrix}$
- G  $\begin{bmatrix} -2 & 1 \\ -1 & -2 \end{bmatrix}$       J  $\begin{bmatrix} 3 & 3 \\ -3 & 3 \end{bmatrix}$

7. If  $\triangle ABC$  is defined by the matrix

$P = \begin{bmatrix} -7 & 4 & 2 \\ 3 & -1 & 6 \end{bmatrix}$ , what transformation

will rotate  $\triangle ABC$  90 degrees in a clockwise direction?

- A  $\begin{bmatrix} -1 & 0 \\ 0 & 1 \end{bmatrix}$       C  $\begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$
- B  $\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$       D  $\begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$

8.  $\triangle ABC$  has vertices  $A(0, 2)$ ,  $B(-3, -2)$ , and  $C(2, -4)$ . What are the coordinates of the image of  $\triangle ABC$  after it has been

reflected by the matrix  $\begin{bmatrix} 0 & -1 \\ -1 & 0 \end{bmatrix}$  and then

rotated by the matrix  $\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$ ?

- F  $A'(0, 2)$ ,  $B'(3, -2)$ ,  $C'(-2, -4)$   
G  $A'(0, 2)$ ,  $B'(3, 2)$ ,  $C'(2, 4)$   
H  $A'(-2, 0)$ ,  $B'(2, 3)$ ,  $C'(4, -2)$   
J  $A'(2, 0)$ ,  $B'(-2, -3)$ ,  $C'(-4, 2)$



**CHAPTER**  
**4**

**Chapter Test**  
**Form A**

1. The table shows the number of books two students read each month. Write a matrix that displays the data in the table.

Number of Books Read per Month		
Student	January	February
Bill	4	1
Rene	2	0

2. If  $A = \begin{bmatrix} 4 & 1 & 5 \\ 7 & 2 & 3 \end{bmatrix}$  and  $B = \begin{bmatrix} 3 & 2 & 6 \\ 7 & 8 & 5 \end{bmatrix}$ ,

evaluate  $A + B$ .

3. If  $C = \begin{bmatrix} 3 & 6 \\ 2 & 1 \\ 0 & 6 \end{bmatrix}$  and  $D = \begin{bmatrix} 7 & 1 \\ 5 & 0 \\ 3 & 2 \end{bmatrix}$ , evaluate

$C + 2D$ .

4. For  $S_{2 \times 5}$  and  $T_{5 \times 2}$ , what are the dimensions of  $ST$ ?

5. If  $P = \begin{bmatrix} 4 & 2 \\ 3 & 5 \end{bmatrix}$  and  $Q = \begin{bmatrix} 3 & 7 \\ 0 & 0 \end{bmatrix}$ , evaluate  $PQ$ .

6. If  $A = \begin{bmatrix} 4 & 0 \\ 1 & 3 \end{bmatrix}$ , evaluate  $A^2$ .

7. If  $\triangle ABC$  is defined by the matrix

$$P = \begin{bmatrix} 4 & 3 & 1 \\ 1 & 5 & 2 \end{bmatrix},$$

what are the coordinates of  $\triangle ABC$  after it has been rotated 90 degrees counterclockwise?

8.  $\triangle ABC$  has vertices  $A(1, 0)$ ,  $B(4, 3)$ , and  $C(5, -1)$ . What are the coordinates of the image of  $\triangle ABC$  after it has been reflected using the reflection matrix

$$\begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}?$$

9. Find the determinant of  $\begin{bmatrix} 2 & 4 \\ 3 & 1 \end{bmatrix}$ .

10. Find the determinant of  $\begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 1 & 0 \end{bmatrix}$ .

11. What are the solutions of the system

$$\begin{cases} 4x + 6y = 16 \\ 3x + 7y = 17 \end{cases}, \text{ where } D = \begin{bmatrix} 4 & 6 \\ 3 & 7 \end{bmatrix}?$$

12. If  $\begin{bmatrix} 4 & 2 \\ 6 & x \end{bmatrix}$  has no inverse, what is the value of  $x$ ?

13. What matrix is the inverse of  $\begin{bmatrix} 5 & 3 \\ 3 & 1 \end{bmatrix}$ ?

## CHAPTER

**Chapter Test****4****Form A** continued

14. What is the augmented matrix for the

$$\text{system } \begin{cases} 8x - 3y = 6 \\ 5x - 9 = y \end{cases} ?$$

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15. What is  $\left[ \begin{array}{cc|c} 4 & 1 & 6 \\ 2 & 3 & 8 \end{array} \right]$  in reduced row-echelon form?

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16. The system of equations

$$\begin{cases} 4x + 2y + z = 20 \\ 2x + 3y + 4z = 28 \\ x + 4y + 2z = 19 \end{cases}$$
 represents the

number of red, green, and blue cubes you will need to help your younger sister practice her addition and subtraction.

Use  $x$  as the number of red cubes,  $y$  as the number of green cubes, and  $z$  as the number of blue cubes. What is the number of each color of cubes you will need to gather to help your sister?

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**CHAPTER**  
**4**

**Chapter Test**  
**Form B**

1. The table shows the number of books two students read each month. Write a matrix that displays the data in the table.

Number of Books Read per Month				
Student	Jan	Feb	March	April
Carol	6	3	0	2
Brian	4	7	1	5

2. If  $A = \begin{bmatrix} 6 & 4 & -2 \\ 7 & -1 & 4 \end{bmatrix}$  and  $B = \begin{bmatrix} -1 & -5 & 6 \\ 8 & -2 & 4 \end{bmatrix}$ , evaluate  $A - B$ .

3. If  $C = \begin{bmatrix} 3 & -5 \\ 5 & 0 \\ -3 & 8 \end{bmatrix}$  and  $D = \begin{bmatrix} 8 & 3 \\ -6 & 2 \\ -9 & 1 \end{bmatrix}$ , evaluate  $3C - 2D$ .

4. For  $S_{2 \times 6}$  and  $T_{6 \times 3}$ , what are the dimensions of  $ST$ ?

5. If  $P = \begin{bmatrix} 4 & -3 & 5 \\ 0 & 6 & -1 \end{bmatrix}$  and  $Q = \begin{bmatrix} 3 & 6 \\ -2 & 2 \\ 0 & 1 \end{bmatrix}$ , evaluate  $PQ$ .

6. If  $A = \begin{bmatrix} 4 & -2 \\ 0 & 5 \end{bmatrix}$ , evaluate  $A^2$ .

7. If  $\triangle ABC$  is defined by the matrix

$$P = \begin{bmatrix} -6 & 3 & 7 \\ 2 & -5 & 3 \end{bmatrix},$$

what are the coordinates of  $\triangle ABC$  after it has been reflected using the reflection

$$\text{matrix } \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}?$$

8.  $\triangle ABC$  has vertices  $A(2, 2)$ ,  $B(5, 1)$ , and  $C(6, -3)$ . What are the coordinates of the image of  $\triangle ABC$  after it has been rotated using the rotation matrix  $\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$ ?

9. Find the determinant of  $\begin{bmatrix} 3 & -7 \\ 4 & 6 \end{bmatrix}$ .

10. Find the determinant of  $\begin{bmatrix} 0 & 0 & -1 \\ 2 & 6 & 2 \\ -3 & 7 & 1 \end{bmatrix}$ .

11. Use Cramer's Rule to solve the system of equations  $\begin{cases} 2x + 3y = 2 \\ 5x + 4y = 12 \end{cases}$ .

12. If  $\begin{bmatrix} -4 & 0.5 \\ 6 & x \end{bmatrix}$  has no inverse, what is the value of  $x$ ?

13. What matrix is the inverse of  $\begin{bmatrix} 3 & 2 \\ 4 & 1 \end{bmatrix}$ ?

## CHAPTER

**Chapter Test****4****Form B** continued

14. What is the augmented matrix for

$$\text{the system } \begin{cases} 8 + 3y = -2x \\ -4x + 5 = y \end{cases}?$$

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15. What is  $\left[ \begin{array}{cc|c} 4 & 3 & 17 \\ -2 & 6 & 14 \end{array} \right]$  in reduced row-echelon form?

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16. The system of equations

$$\begin{cases} 3x + 3y - 2z = 19 \\ 3y - 6z = 3 \\ 6x + 4z = 28 \end{cases} \text{ represents the}$$

number of red, green, and blue cubes you will need to help your younger sister practice her addition and subtraction.

Use  $x$  as the number of red cubes,  $y$  as the number of green cubes, and  $z$  as the number of blue cubes. What is the number of each color of cubes you will need to gather to help your sister?

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**CHAPTER**  
**4****Chapter Test**  
**Form C**

1. The table shows the number of books two students read each month. Write a  $2 \times 4$  matrix that displays the data in the table and a  $4 \times 2$  matrix that displays the same data.

Number of Books Read per Month				
Student	Jan	Feb	March	April
Bruce	8	9	2	1
Sharon	0	6	9	0

2. If  $A = \begin{bmatrix} 7 & 5 & -8 \\ 5 & -4 & 6 \end{bmatrix}$  and  $B = \begin{bmatrix} -3 & -6 & 7 \\ 10 & 3 & -9 \end{bmatrix}$ , evaluate  $B - A$ .

3. If  $C = \begin{bmatrix} 3 & -4 \\ 6 & 1 \\ -5 & 8 \end{bmatrix}$ ,  $D = \begin{bmatrix} 8 & 3 \\ -5 & 5 \\ -7 & 1 \end{bmatrix}$ , and  $E = \begin{bmatrix} 5 & -2 \\ 0 & 4 \\ -6 & 3 \end{bmatrix}$ , evaluate  $3C - (D - 2E)$ .

4. If  $S_{3 \times 4}$ ,  $T_{4 \times 3}$ , and  $V_{5 \times 3}$ , name a matrix with 20 entries.

5. If  $P = \begin{bmatrix} 3 & 3 \\ -2 & 2 \\ 0 & 1 \end{bmatrix}$  and  $Q = \begin{bmatrix} 6 & -2 & 4 \\ 2 & 7 & -4 \end{bmatrix}$ , evaluate  $PQ$ .

6. If  $A = \begin{bmatrix} 1 & 0 \\ 1 & -1 \end{bmatrix}$ , evaluate  $A^3$ .

7. If  $\triangle ABC$  is defined by the matrix  $P = \begin{bmatrix} -8 & 5 & 6 \\ 2 & -2 & 7 \end{bmatrix}$ , what rotation matrix should it be multiplied by to rotate it 90 degrees in a clockwise direction?

8.  $\triangle ABC$  has vertices  $A(3, 3)$ ,  $B(7, 2)$ , and  $C(4, -4)$ . What are the coordinates of the image of  $\triangle ABC$  after it has been reflected by the matrix  $\begin{bmatrix} 0 & -1 \\ -1 & 0 \end{bmatrix}$  and then rotated by the matrix  $\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$ ?

9. Find the determinant of  $\begin{bmatrix} 0 & 1 & 1 \\ 1 & 1 & 0 \\ 1 & 0 & 1 \end{bmatrix}$ .

10. Find the determinant of  $\begin{bmatrix} 3 & 2 & 1 \\ 1 & 3 & 2 \\ 2 & 1 & 3 \end{bmatrix}$ .

11. Use Cramer's Rule to solve the system of equations  $\begin{cases} -2x - 5y = 45 \\ 7x - 3y = -14 \end{cases}$ .

12. If  $\begin{bmatrix} x & 2 \\ 6 & x \end{bmatrix}$  has no inverse, what is the value of  $x$ ?

**Chapter Test****Form C** continued

13. What matrix is the inverse of  $\begin{bmatrix} \pi & 1 \\ 2 & \frac{1}{\pi} \end{bmatrix}$ ?

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14. What is the augmented matrix for the system  $\begin{cases} -7 + 3y = -4x \\ 6 - 5x = 4 + y \end{cases}$ ?

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15. What is  $\left[ \begin{array}{cc|c} 3 & -4 & 1 \\ -5 & 7 & 1 \end{array} \right]$  in reduced row-echelon form?

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16. At Harry's Farm Stand, two apples and three pears cost \$4.05. Five apples and two oranges cost \$4.85. Three oranges and four pears cost \$5.05. What is the cost of each type of fruit?

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- 33. D
- 34. J
- 35. C
- 36. F
- 37. B
- 38. H
- 39. D
- 40. H
- 41. A
- 42. H

**CHAPTER 4**

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**Section Quiz: Section A**

- 1. A
- 2. J
- 3. A
- 4. J
- 5. B
- 6. H
- 7. B
- 8. H

**Section Quiz: Section B**

- 1. C
- 2. G
- 3. C
- 4. G
- 5. D
- 6. G
- 7. B
- 8. F

**Chapter Test Form A**

- 1. A
- 2. B

- 3. D
- 4. A
- 5. D
- 6. B
- 7. A
- 8. A
- 9. C
- 10. A
- 11. D
- 12. A
- 13. B
- 14. B
- 15. D
- 16. B

**Chapter Test Form B**

- 1. A
- 2. H
- 3. A
- 4. G
- 5. D
- 6. G
- 7. A
- 8. G
- 9. D
- 10. F
- 11. D
- 12. H
- 13. A
- 14. F
- 15. B
- 16. G

**Chapter Test Form C**

1. A
2. G
3. B
4. J
5. B
6. F
7. C
8. G
9. A
10. G
11. D
12. H
13. A
14. J
15. B
16. F

**Chapter Test Form A**

1.  $\begin{bmatrix} 4 & 1 \\ 2 & 0 \end{bmatrix}$
2.  $\begin{bmatrix} 7 & 3 & 11 \\ 14 & 10 & 5 \end{bmatrix}$
3.  $\begin{bmatrix} 17 & 8 \\ 12 & 1 \\ 6 & 10 \end{bmatrix}$
4.  $2 \times 2$
5.  $\begin{bmatrix} 12 & 28 \\ 9 & 21 \end{bmatrix}$
6.  $\begin{bmatrix} 16 & 0 \\ 7 & 9 \end{bmatrix}$
7.  $\begin{bmatrix} -1 & -5 & -2 \\ 4 & 3 & 1 \end{bmatrix}$
8.  $A'(1, 0), B(4, -3), C(5, 1)$
9.  $-10$
10.  $-2$
11.  $x = \frac{\begin{vmatrix} 16 & 6 \\ 17 & 7 \end{vmatrix}}{D}, y = \frac{\begin{vmatrix} 4 & 16 \\ 3 & 17 \end{vmatrix}}{D}$

12. 3

13.  $\frac{1}{4} \begin{bmatrix} 1 & -3 \\ -3 & 3 \end{bmatrix}$

14.  $\begin{bmatrix} 8 & -3 & 6 \\ 5 & -1 & 9 \end{bmatrix}$

15.  $\begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 2 \end{bmatrix}$

16. 3 red, 2 green, and 4 blue.

**Chapter Test Form B**

1.  $\begin{bmatrix} 6 & 3 & 0 & 2 \\ 4 & 7 & 1 & 5 \end{bmatrix}$

2.  $\begin{bmatrix} 7 & 9 & -8 \\ -1 & 1 & 0 \end{bmatrix}$

3.  $\begin{bmatrix} -7 & -24 \\ 27 & -4 \\ 9 & 22 \end{bmatrix}$

4.  $2 \times 3$

5.  $\begin{bmatrix} 18 & 23 \\ -12 & 11 \end{bmatrix}$

6.  $\begin{bmatrix} 16 & -18 \\ 0 & 25 \end{bmatrix}$

7.  $P' = \begin{bmatrix} -6 & 3 & 7 \\ -2 & 5 & -3 \end{bmatrix}$

8.  $A'(-2, 2), B(-1, 5), C(3, 6)$

9. 46

10.  $-39$

11.  $x = 4, y = -2$

12.  $-0.75$

13.  $-\frac{1}{5} \begin{bmatrix} 1 & -2 \\ -4 & 3 \end{bmatrix}$

14.  $\begin{bmatrix} 2 & 3 & -8 \\ -4 & -1 & -5 \end{bmatrix}$

15.  $\begin{bmatrix} 1 & 0 & 2 \\ 0 & 1 & 3 \end{bmatrix}$

16. 4 red, 3 green, and 1 blue.

**Chapter Test Form C**

1.  $\begin{bmatrix} 8 & 9 & 2 & 1 \\ 0 & 6 & 9 & 0 \end{bmatrix}$  and  $\begin{bmatrix} 8 & 0 \\ 9 & 6 \\ 2 & 9 \\ 1 & 0 \end{bmatrix}$

# Answer Key continued

2.  $\begin{bmatrix} -10 & -11 & 15 \\ 5 & 7 & -15 \end{bmatrix}$

3.  $\begin{bmatrix} 11 & -19 \\ 23 & 6 \\ -20 & 29 \end{bmatrix}$

4. VS

5.  $\begin{bmatrix} 24 & 15 & 0 \\ -8 & 18 & 0 \\ 2 & 7 & -4 \end{bmatrix}$

6.  $\begin{bmatrix} 1 & 0 \\ 1 & -1 \end{bmatrix}$

7.  $\begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$

8.  $A'(3, -3)$ ,  $B'(7, -2)$ , and  $C'(4, -4)$

9. -2

10. 18

11.  $x = -5$ ,  $y = -7$

12.  $\pm\sqrt{12}$

13.  $\begin{bmatrix} -\frac{1}{\pi} & 1 \\ 2 & -\pi \end{bmatrix}$

14.  $\begin{bmatrix} 4 & 3 & 7 \\ -5 & -1 & -2 \end{bmatrix}$

15.  $\begin{bmatrix} 1 & 0 & 11 \\ 0 & 1 & 8 \end{bmatrix}$

16. apple: \$0.75, pear: \$0.85, orange: \$0.55.

## Performance Assessment

1.

	Blue	Green	Red	Points
Kim	4	4	2	54
Pat	3	7	0	56
Robin	5	3	2	56

2.  $\begin{bmatrix} 4 & 4 & 2 & 54 \\ 3 & 7 & 0 & 56 \\ 5 & 3 & 2 & 56 \end{bmatrix}$

3.  $\begin{bmatrix} 1 & 0 & 0 & 7 \\ 0 & 1 & 0 & 5 \\ 0 & 0 & 1 & 3 \end{bmatrix}$

4. blue, 7; green, 5; red, 3.

## Cumulative Test

1. D
2. G
3. B
4. F
5. D
6. J
7. C
8. G
9. B
10. H
11. D
12. G
13. A
14. H
15. D
16. F
17. D
18. F
19. A
20. F
21. D
22. H
23. B
24. J
25. C
26. H
27. A
28. H
29. C
30. H
31. A
32. G
33. C
34. H
35. B