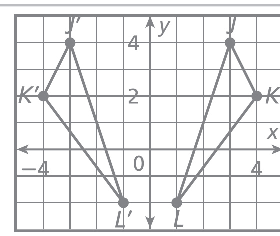
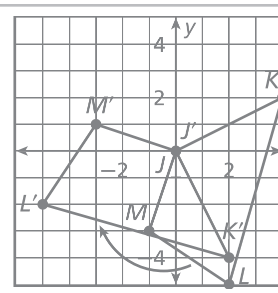
Vocabulary

The table contains important vocabulary terms from Chapter 4. As you work through the chapter, fill in the page number, definition, and a clarifying example.

Term	Page	Definition	Clarifying Example
augmented matrix	287	A matrix that consists of the coefficients and the constant terms in a system of linear equations.	System of equations $3x + 2y = 5$, $2x - 3y = 1$; Augmented matrix $\left(\begin{array}{cc\|c} 3 & 2 & 5 \\ 2 & -3 & 1 \end{array}\right)$
coefficient matrix	271	The matrix of the coefficients of the variables in a linear system of equations.	System of equations $2x + 3y = 11$, $5x - 4y = 16$; Coefficient matrix $\begin{bmatrix} 2 & 3 \\ 5 & -4 \end{bmatrix}$
constant matrix	279	The matrix of the constants in a linear system of equations.	System of equations $2x + 3y = 11$, $5x - 4y = 16$; Constant matrix $\begin{bmatrix} 11 \\ 16 \end{bmatrix}$
determinant	270	A real number associated with a square matrix. The determinant of $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ is $\|A\| = ad - bc$.	$\begin{vmatrix} 2 & -1 \\ 3 & 4 \end{vmatrix} = 2 \cdot 4 - (-1) \cdot 3 = 11$ $\begin{vmatrix} 1 & 4 & 0 \\ 2 & 5 & 3 \\ 3 & 0 & 1 \end{vmatrix} = 1 \cdot \begin{vmatrix} 5 & 3 \\ 0 & 1 \end{vmatrix} - 4 \cdot \begin{vmatrix} 2 & 3 \\ 3 & 1 \end{vmatrix} + 0 \cdot \begin{vmatrix} 2 & 5 \\ 3 & 0 \end{vmatrix} = 33$
dimension of a matrix	246	A matrix with m rows and n columns has dimensions $m \times n$, read "m by n.	$\begin{bmatrix} -3 & 2 & 1 & -1 \\ 4 & 0 & -5 & 2 \end{bmatrix}$ Dimensions 2×4
matrix equation	279	An equation of the form $AX = B$, where A is the coefficient matrix, X is the variable matrix, and B is the constant matrix of a system of equations.	System of equations: $2x + 3y = 7$, $4x - 6y = 5$ Matrix equation: $\begin{bmatrix} 2 & 3 \\ 4 & -6 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 7 \\ 5 \end{bmatrix}$

Term	Page	Definition	Clarifying Example
matrix product	253	The product of two matrices, where each entry in P_{ij} is the sum of the products of consecutive entries in row i in matrix A and column j in matrix B.	$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}\begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix} = \begin{bmatrix} 1(5) + 2(7) & 1(6) + 2(8) \\ 3(5) + 4(7) & 3(6) + 4(8) \end{bmatrix}$
multiplicative identity matrix	255	A square matrix with 1 in every entry of the main diagonal and 0 in every other entry.	$6 \cdot 1 = 6$ $\begin{pmatrix} -2 & 5 \\ 7 & -1 \end{pmatrix}\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} = \begin{pmatrix} -2 & 5 \\ 7 & -1 \end{pmatrix}$
reflection matrix	263	A matrix used to reflect a figure across a specified line of symmetry.	 Matrix $\begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}$ was used to reflect the figure across the y-axis.
rotation matrix	264	A matrix used to rotate a figure about the origin.	 Matrix $\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$ was used to rotate the figure 90°.
square matrix	255	A matrix with the same number of rows as columns.	$\begin{pmatrix} 3 & 1 & 2 \\ 22 & 3 & 7 \\ 13 & 0 & 0 \end{pmatrix}$

6. Get Organized Fill in the augmented matrix for a three-equation system. Then write an example of the given operation in each box. Tell whether the operation produces an equivalent system. (p. 290).

	SYSTEM OF EQUATIONS	AUGMENTED MATRIX
Interchange rows or equations	❶ $x + 3y = 5$ ❷ $2x + y = 8$ ❷ $2x + y = 8$ ❶ $x + 3y = 5$	$\begin{array}{c} \text{❶} \\ \text{❷} \end{array}\left[\begin{array}{cc\|c} 1 & 3 & 5 \\ 2 & 1 & 8 \end{array}\right]$ $\begin{array}{c} \text{❷} \\ \text{❶} \end{array}\left[\begin{array}{cc\|c} 2 & 1 & 8 \\ 1 & 3 & 5 \end{array}\right]$
Replace a row or equation with a multiple.	❶ $x + 3y = 5$ ❷ $2x + y = 8$ 2❶ $\rightarrow 2x + 6y = 10$ $2x + y = 8$	$\begin{array}{c} \text{❶} \\ \text{❷} \end{array}\left[\begin{array}{cc\|c} 1 & 3 & 5 \\ 2 & 1 & 8 \end{array}\right]$ 2❶ $\rightarrow \left[\begin{array}{cc\|c} 2 & 6 & 10 \\ 2 & 1 & 8 \end{array}\right]$
Replace a row or equation with a sum or difference.	❶ $2x + 6y = 10$ ❷ $2x + y = 8$ $2x + 6y = 10$ ❶ − ❷ $\rightarrow 5y = 2$	$\begin{array}{c} \text{❶} \\ \text{❷} \end{array}\left[\begin{array}{cc\|c} 2 & 6 & 10 \\ 2 & 1 & 8 \end{array}\right]$ ❶ − ❷ $\rightarrow \left[\begin{array}{cc\|c} 2 & 6 & 10 \\ 0 & 5 & 2 \end{array}\right]$
Combine the above.	❶ $x + 3y = 5$ ❷ $2x + y = 8$ $x + 3y = 5$ 2❶ − ❷ $\rightarrow 0x + 5y = 2$	$\begin{array}{c} \text{❶} \\ \text{❷} \end{array}\left[\begin{array}{cc\|c} 1 & 3 & 5 \\ 2 & 1 & 8 \end{array}\right]$ 2❶ − ❷ $\rightarrow \left[\begin{array}{cc\|c} 1 & 3 & 5 \\ 0 & 5 & 2 \end{array}\right]$