PRACTICE & PROBLEM SOLVING

Scan for Multimedia

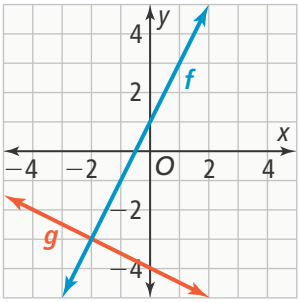
Practice Tutorial

Additional Exercises Available Online

UNDERSTAND

10. **Communicate Precisely** Is the series of row operations performed on a matrix to get it into reduced row echelon form unique? Is the reduced row echelon matrix unique? Explain.

11. **Construct Arguments** Would a matrix be useful to calculate the point of intersection of two linear functions $f(x)$ and $g(x)$? Explain your reasoning.



12. **Error Analysis** Dylan used a matrix to solve the system of equations below. What error did Dylan make?

$$\begin{cases} 5x + 4y = 2 \\ y = x + 5 \end{cases}$$

$$\text{rref} \begin{bmatrix} 5 & 4 & 2 \\ 1 & 1 & 5 \end{bmatrix} = \begin{bmatrix} 1 & 0 & -18 \\ 0 & 1 & 23 \end{bmatrix}$$

13. **Communicate Precisely** What is the operation on equations corresponding to each row operation?

14. **Higher Order Thinking** What would be the result of applying row operations to a matrix representing a system of equations for parallel lines?

15. **Use Appropriate Tools** What characteristics of a system of equations would lead you to use technology to find a reduced row echelon form of a matrix representing the system of equations?

16. **Mathematical Connections** What is a system of two equations with two unknowns that would result in the following matrix in reduced row echelon form?

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

PRACTICE

Solve each linear system of equations as a matrix. SEE EXAMPLES 1 AND 2

17. $\begin{cases} 2x + 3y = 1 \\ -x = 2y + 1 \end{cases}$

18. $\begin{cases} \frac{1}{2}x + y = 4 \\ -\frac{1}{4}x - 2y = -5 \end{cases}$

19. $\begin{cases} x + y + z = 3 \\ -y = x \\ 2z + 3y = 0 \end{cases}$

20. $\begin{cases} z = -4x \\ 2x + y = -3 \\ x - y + z = 5.5 \end{cases}$

Find the reduced row echelon form of each augmented matrix using technology. SEE EXAMPLE 3

21. $\left[\begin{array}{cc|c} 4 & -1 & 8 \\ 0 & 2 & 16 \end{array}\right]$

22. $\left[\begin{array}{cc|c} 0.25 & 4 & 8 \\ 2 & 6 & 12 \end{array}\right]$

23. $\left[\begin{array}{ccc|c} -1 & 1 & -2 & 18 \\ 3 & 0 & -1 & 0 \\ 0 & 6 & 3 & 6 \end{array}\right]$

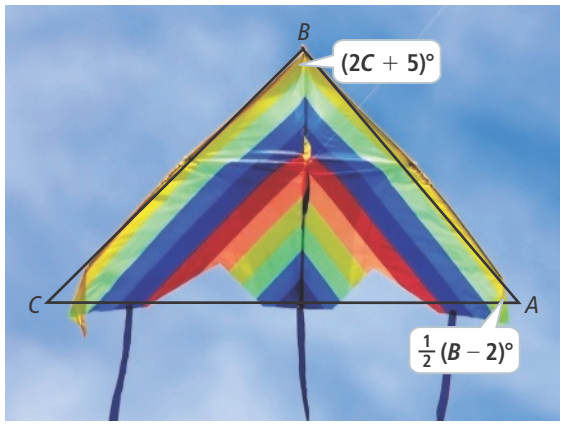
24. $\left[\begin{array}{ccc|c} 1 & 1 & 1 & 17 \\ 1 & 0 & 1 & 1 \\ 1 & -1 & 1 & 3 \end{array}\right]$

Solve each system of equations using technology with matrices. SEE EXAMPLE 4

25. $\begin{cases} 2x + 2y + 2z = 4 \\ -x - y - z = -2 \\ 4z = -4x - 4y + 8 \end{cases}$

26. $\begin{cases} 2x - 2y - 4z = 8 \\ 8x - 8y - 4z = 4 \\ -2x + 2y + 4z = -3 \end{cases}$

27. Write a matrix to represent the system of equations showing the relationships between angles of the triangle. Then use technology to find the reduced row echelon form of the matrix and identify the measures of each angle. SEE EXAMPLES 5



$$\begin{cases} A + B + C = 180 \\ B = 2C + 5 \\ 2A = B - 2 \end{cases}$$

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Mixed Review Available Online

APPLY

28. **Reason** Talisha receives a $25 gift card to a digital application store. Each game download costs $3, and each song download costs $1. Talisha downloads 1 more song than games and uses all of the $25. How many of each application did Talisha download?

29. **Look for Relationships** Noemi, Ines, Deondra, and Carla attend a concert. Noemi purchases 2 posters, 1 shirt, and 1 CD for $35. Ines purchases 1 shirt, 1 poster, and 2 CDs for $43. Deondra purchases 2 shirts and 1 poster for $34. How much will Carla pay if she buys the items shown?

30. **Make Sense and Persevere** An art supply store orders a total of 80 items of a single color at a time. Colored pencils cost the store $0.75 each, markers cost $2.50 each, and acrylic paints cost $4.00 each. The store budgets $161.25 per color. The matrix below represents the store manager's information for ordering blue art supplies.

$$\left[\begin{array}{ccc|c} 1 & 1 & 1 & 80 \\ 0.75 & 2.5 & 4 & 161.25 \\ 0 & 1 & -2 & 0 \end{array}\right]$$

What is the relationship between the number of markers and the number of acrylic paints, based on the third row of the matrix?

ASSESSMENT PRACTICE

31. Complete the table to write matrix A in reduced row echelon form.

$$A = \left[\begin{array}{ccc|c} 2 & 3 & -1 & -6 \\ -1 & 2 & 3 & -5 \\ 3 & 4 & 2 & -4 \end{array}\right]$$

1	0	0	
0	1	0	
0	0	1	

32. **SAT/ACT** Which matrix represents the reduced row echelon form of matrix X?

$$X = \left[\begin{array}{cc|c} 2 & 1 & -1 \\ 1 & -5 & -4 \end{array}\right]$$

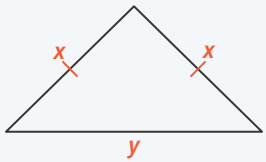
Ⓐ $\left[\begin{array}{cc|c} 1 & 0 & \frac{9}{11} \\ 0 & 1 & -\frac{7}{11} \end{array}\right]$

Ⓑ $\left[\begin{array}{cc|c} 1 & 0 & -\frac{9}{11} \\ 0 & 1 & \frac{7}{11} \end{array}\right]$

Ⓒ $\left[\begin{array}{cc|c} 1 & 0 & \frac{7}{11} \\ 0 & 1 & -\frac{9}{11} \end{array}\right]$

Ⓓ $\left[\begin{array}{cc|c} 1 & 0 & -\frac{7}{11} \\ 0 & 1 & \frac{9}{11} \end{array}\right]$

33. **Performance Task** The triangle has a perimeter of 30 cm, and y is twice the length of x.



Part A Write a system of equations to represent this situation.

Part B Write a matrix to represent the system of equations you wrote in part (a).

Part C Find the reduced row echelon form of the matrix you wrote in part (b).

Part D What does the third column of the matrix you found in part (c) represent?