

# 3.1 Solve Linear Systems by Graphing

TEKS

a.5, a.6,  
2A.3.A, 2A.3.B

**Before**

You solved linear equations.

**Now**

You will solve systems of linear equations.

**Why?**

So you can compare swimming data, as in Ex. 39.



## Key Vocabulary

- system of two linear equations
- solution of a system
- consistent
- inconsistent
- independent
- dependent

A **system of two linear equations** in two variables  $x$  and  $y$ , also called a *linear system*, consists of two equations that can be written in the following form.

$$Ax + By = C \quad \text{Equation 1}$$

$$Dx + Ey = F \quad \text{Equation 2}$$

A **solution** of a system of linear equations in two variables is an ordered pair  $(x, y)$  that satisfies each equation. Solutions correspond to points where the graphs of the equations in a system intersect.

## EXAMPLE 1 Solve a system graphically

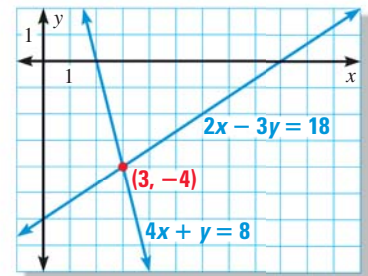
Graph the linear system and estimate the solution. Then check the solution algebraically.

$$4x + y = 8 \quad \text{Equation 1}$$

$$2x - 3y = 18 \quad \text{Equation 2}$$

### Solution

Begin by graphing both equations, as shown at the right. From the graph, the lines *appear* to intersect at  $(3, -4)$ . You can check this algebraically as follows.



**Equation 1**

$$4x + y = 8$$

$$4(3) + (-4) \stackrel{?}{=} 8$$

$$12 - 4 \stackrel{?}{=} 8$$

$$8 = 8 \quad \checkmark$$

**Equation 2**

$$2x - 3y = 18$$

$$2(3) - 3(-4) \stackrel{?}{=} 18$$

$$6 + 12 \stackrel{?}{=} 18$$

$$18 = 18 \quad \checkmark$$

► The solution is  $(3, -4)$ .

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### AVOID ERRORS

Remember to check the graphical solution in *both* equations before concluding that it is a solution of the system.

## GUIDED PRACTICE for Example 1

Graph the linear system and estimate the solution. Then check the solution algebraically.

1.  $3x + 2y = -4$   
 $x + 3y = 1$

2.  $4x - 5y = -10$   
 $2x - 7y = 4$

3.  $8x - y = 8$   
 $3x + 2y = -16$