

5.1 Solve Systems of Linear Equations by Graphing

5.1 Lesson

Core Vocabulary

system of linear equations,
p. 236
solution of a system of linear
equations, p. 236

Previous
linear equation
ordered pair

What You Will Learn

- ▶ Check solutions of systems of linear equations.
- ▶ Solve systems of linear equations by graphing.
- ▶ Use systems of linear equations to solve real-life problems.

Systems of Linear Equations

A **system of linear equations** is a set of two or more linear equations in the same variables. An example is shown below.

$$\begin{cases} x + y = 7 & \text{Equation 1} \\ 2x - 3y = -11 & \text{Equation 2} \end{cases}$$

A **solution of a system of linear equations** in two variables is an **ordered pair** that is a solution of each equation in the system.

(x, y)

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Tell whether the ordered pair is a solution of the system of linear equations.

a. $(2, 5);$ $x + y = 7$ Equation 1
 $2x - 3y = -11$ Equation 2

$$\begin{aligned} 2 + 5 &= 7 \checkmark \\ 2(2) - 3(5) &= -11 \\ 4 - 15 &= -11 \checkmark \end{aligned}$$

Yes

b. $(-2, 0);$ $y = -2x - 4$ Equation 1
 $y = x + 4$ Equation 2

$$\begin{aligned} 0 &= -2(-2) - 4 \\ 0 &= 4 - 4 \checkmark \end{aligned}$$

$$\begin{aligned} 0 &= -2 + 4 \\ 0 &\neq 2 \times \end{aligned}$$

NO

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Solving Systems of Linear Equations by Graphing

The solution of a system of linear equations is the point of intersection of the graphs of the equations.

Core Concept

Solving a System of Linear Equations by Graphing

- Step 1 Graph each equation in the same coordinate plane.
- Step 2 Estimate the point of intersection.
- Step 3 Check the point from Step 2 by substituting for x and y in each equation of the original system.

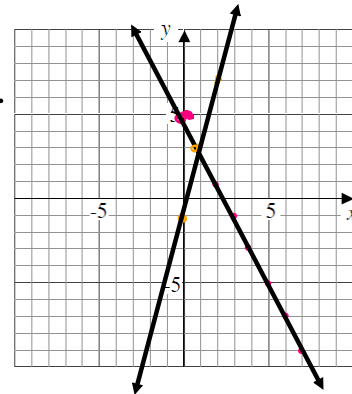
Example 1:

Solve the system of linear equations by graphing.

$y = -2x + 5$ Equation 1
 $y = 4x - 1$ Equation 2

$m = -2$ $b = 5$
 $m = 4$ $b = -1$

$(1, 3)$



$-2(1) + 5$ 3
 $4(1) - 1$ 3

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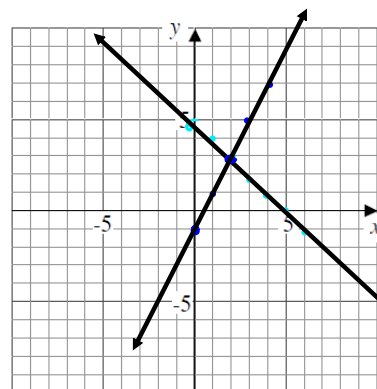
Your Turn:

Solve the system of linear equations by graphing.

$y = -x + 5$ $m = -1$ $b = 5$
 $y = 2x - 1$ $m = 2$ $b = -1$

$(2, 3)$

$- (2) + 5$ 3
 $2(2) - 1$ 3



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Example 2:

Solve:

$$2x + y = 5$$

$$-2x \quad -2x$$

$$3x - 2y = 4$$

$$-3x \quad -3x$$

$$\frac{-2y = -3x + 4}{-2} = \frac{-3x}{-2} + \frac{4}{-2}$$

$$y = \frac{3}{2}x - 2$$

$$y = -2x + 5$$

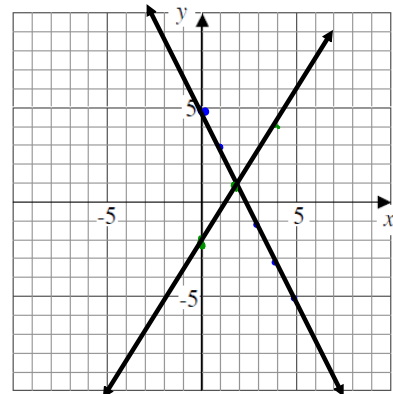
$$m = -2$$

$$b = 5$$

$$(2, 1)$$

$$m = \frac{3}{2}$$

$$b = -2$$



$$2(2) + 1 = 5$$

$$3(2) - 2(1) = 4$$

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Example 3:

A roofing contractor buys 30 bundles of shingles and 4 rolls of roofing paper for \$1040. In a second purchase (at the same prices), the contractor buys 8 bundles of shingles for \$256. Find the price per bundle of shingles and the price per roll of roofing paper.
 \$32 for a bundle of shingles and \$20 for a roll of roofing paper.

x = cost of shingles

y = cost of roofing paper

$$30x + 4y = 1040$$

$$-30x \quad -30x$$

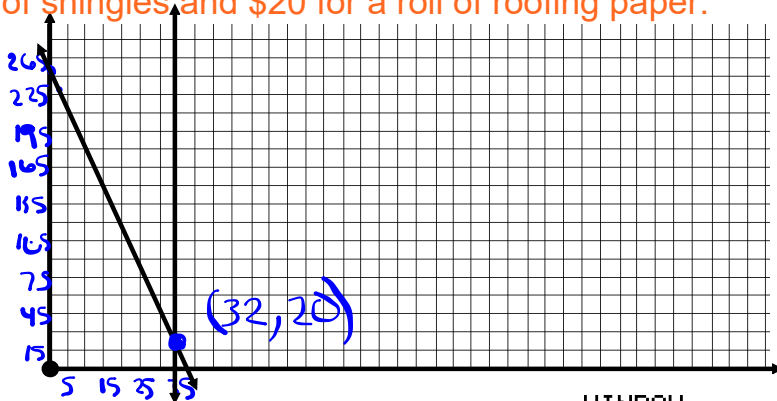
$$8x = 256$$

$$\frac{8x}{8} = \frac{256}{8}$$

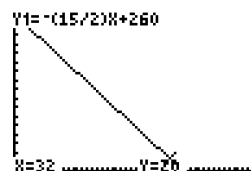
x = 32 → vertical line ↓

$$y = -\frac{30}{4}x + \frac{1040}{4}$$

$$y = -\frac{15}{2}x + 260$$



WINDOW
 Xmin=0
 Xmax=50
 Xscl=1
 Ymin=0
 Ymax=265
 Yscl=15
 Xres=1



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Homework Assignment Worksheet

5.1 WS

A: all

B: all except: 3, 6, & 14

C: 1, 5, 8, 9, 10, 12, 13, 15, 16