

## Warm Up

3/7

Check your homework (from Monday) with your group. What questions do you have?



For Exercises 9–14, write the equation in  $y = mx + b$  form.

9.  $4x + 6y + 12 = 0$

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

10.  $-7x + 9y + 4 = 0$

$$y = \frac{7}{9}x - \frac{4}{9}$$

11.  $-4x - 2y - 6 = 0$

$$y = -2x - 3$$

12.  $-x + 4y = 0$

$$y = \frac{1}{4}x$$

13.  $2x - 2y + 2 = 0$

$$y = x + 1$$

14.  $25x + 5y - 15 = 0$

$$y = -5x + 3$$

15. A sixth-grade class sells pennants and flags. They earn \$1 profit for each pennant sold and \$6 profit for each flag sold. They sell 50 items in total for a profit of \$115.

Totals

- a. Write two equations that represent the relationship between the number of pennants sold  $p$  and the number of flags sold  $f$ .
- b. How many pennants and how many flags were sold?

Let  $x = \#$  of pennants

Let  $y = \#$  of flags

← tells you  
your variables

$$\begin{aligned}x + 6y &= 115 \\x + y &= 50\end{aligned}$$

$\Rightarrow$

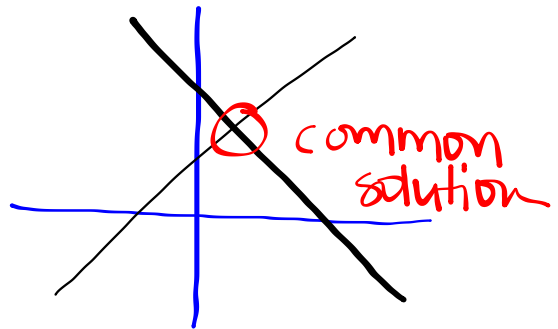
$$\begin{aligned}x &= -6y + 115 \\x &= 50 - y\end{aligned}$$

$$-6y + 115 = 50 - y$$

- 16.** A seventh-grade class sells mouse pads and cell phone cases with their school logo on them. The class earns \$2 profit for each mouse pad sold and \$4 profit for each cell phone case sold. They sell 100 items in total for a profit of \$268.
- Write two equations that represent the relationship between the number of mouse pads sold  $m$  and the number of cell phone cases sold  $c$ .
  - How many mouse pads and how many cell phone cases were sold?

## Ways to solve systems of equations:

1. Graphing



2. Equivalent Eqs.

$$x =$$

$$x =$$

$$y =$$

$$y =$$

# Equivalent Equations Method

$$\begin{cases} y = 6x + 4 \\ y = 4x - 2 \end{cases}$$

Because we are looking for a common solution, we can assume the x-values in the two equations are the same, and the y-values are the same.

$$x = \frac{y}{6} - \frac{2}{3}$$

$$x = \frac{y}{4} + \frac{1}{2}$$

If the y-values are the same ...

$$6x + 4 = 4x - 2$$

$$\frac{y}{6} - \frac{2}{3} = \frac{y}{4} + \frac{1}{2}$$

What we really are doing is "Substitution."

$$\begin{cases} y = 6x + 4 \\ y = 4x - 2 \end{cases}$$

$$\begin{array}{r} 4x - 2 = 6x + 4 \\ -4x \quad -4x \\ \hline -2 = 2x + 4 \\ -4 \quad -4 \\ \hline -6 = 2x \\ \frac{-6}{2} = \frac{2x}{2} \\ -3 = x \end{array}$$

$$\begin{array}{l} y = 6x + 4 \\ y = 6(-3) + 4 \\ y = -14 \\ (-3, -14) \end{array}$$

What is happening when we substitute that will make solving easier?

By substituting we only need to solve for one variable at a time.

## Using Substitution to Solve a System of Equations.

$$2x - 3y = -1 \Rightarrow y = \frac{2}{3}x + \frac{1}{3}$$
$$y = x - 1$$



this tells us  
 $y = x - 1$

We can solve this:

$$\frac{2}{3}x + \frac{1}{3} = x - 1$$

Substitution:  $2x - 3y = -1$   
 $y = x - 1$

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

$$2x - 3x + 3 = -1$$

$$\begin{array}{r} -x + 3 = -1 \\ -3 \quad -3 \\ \hline \end{array}$$

$$\frac{-x = -4}{-1 \quad -1}$$

$$x = 4$$

To find  $y$ : use  $y = x - 1$

$$y = 4 - 1$$

$$y = 3$$

$(4, 3)$



$$-7x - 2y = -13$$

$$x - 2y = 11$$

Best equation to use to isolate a variable

$$x - 2y = 11$$

$$\begin{array}{r} +2y \\ +2y \end{array}$$

$$\hline x = 2y + 11$$

$$-7x - 2y = -13$$

$$-7(2y + 11) - 2y = -13$$

$$-14y - 77 - 2y = -13$$

$$-16y - 77 = -13$$

$$\begin{array}{r} +77 \\ +77 \end{array}$$

$$\hline$$

$$-16y = 64$$

$$\begin{array}{r} -16 \\ -16 \end{array}$$

$$y = -4$$

Find x:

$$x - 2y = 11$$

$$x - 2(-4) = 11$$

$$(3, -4)$$

$$x + 8 = 11$$

$$\begin{array}{r} -8 \\ -8 \end{array}$$

$$\hline x = 3$$

Check:

$$-7x - 2y = -13$$

$$-7(3) - 2(-4) \stackrel{?}{=} -13$$

$$-21 + 8 = -13$$

$$-13 = -13 \checkmark$$

Name \_\_\_\_\_ Date \_\_\_\_\_

### X- and Y-Intercepts

## Solving Systems of Linear Equations by Substitution

$$\begin{aligned}4x + 4y &= 12 \\3x + y &= 9 \longrightarrow y = 9 - 3x \\4x + 4(9 - 3x) &= 12 \\4x + 36 - 12x &= 12 \\36 - 8x &= 12 \\-8x &= -24 \\x &= 3 \\ \text{Solution } (3, 0)\end{aligned}$$

Solve.

1.  $y = 3 - 2x$

$$y = 2 - 3x$$

2.  $x + y = 5$

$$x = y + 7$$

3.  $x - y = 1$

$$2x + y = 8$$

4.  $3x - y = 9$

$$y = x + 5$$

5.  $3x + 4y = 26$

$$-2x + y = 1$$

6.  $y = 2x + 3$

$$y = 4x + 4$$

# Homework

Finish Problems 1-6

# Homework

Finish classwork