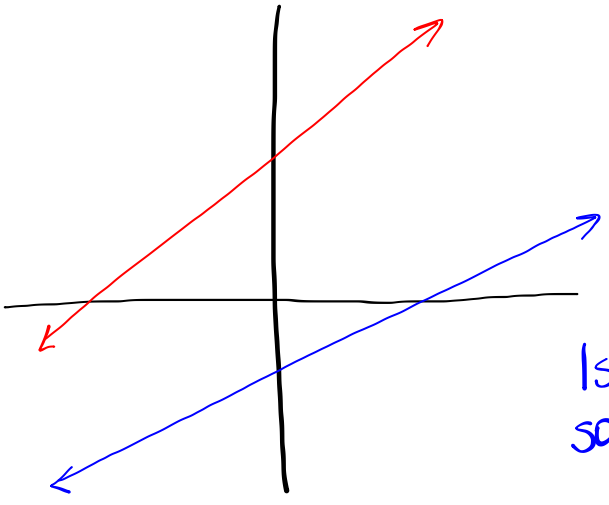
Warm Up

Graph the following two equations on the same graph:

$$x + y = 6$$

$$y = \frac{1}{2}x - 6$$

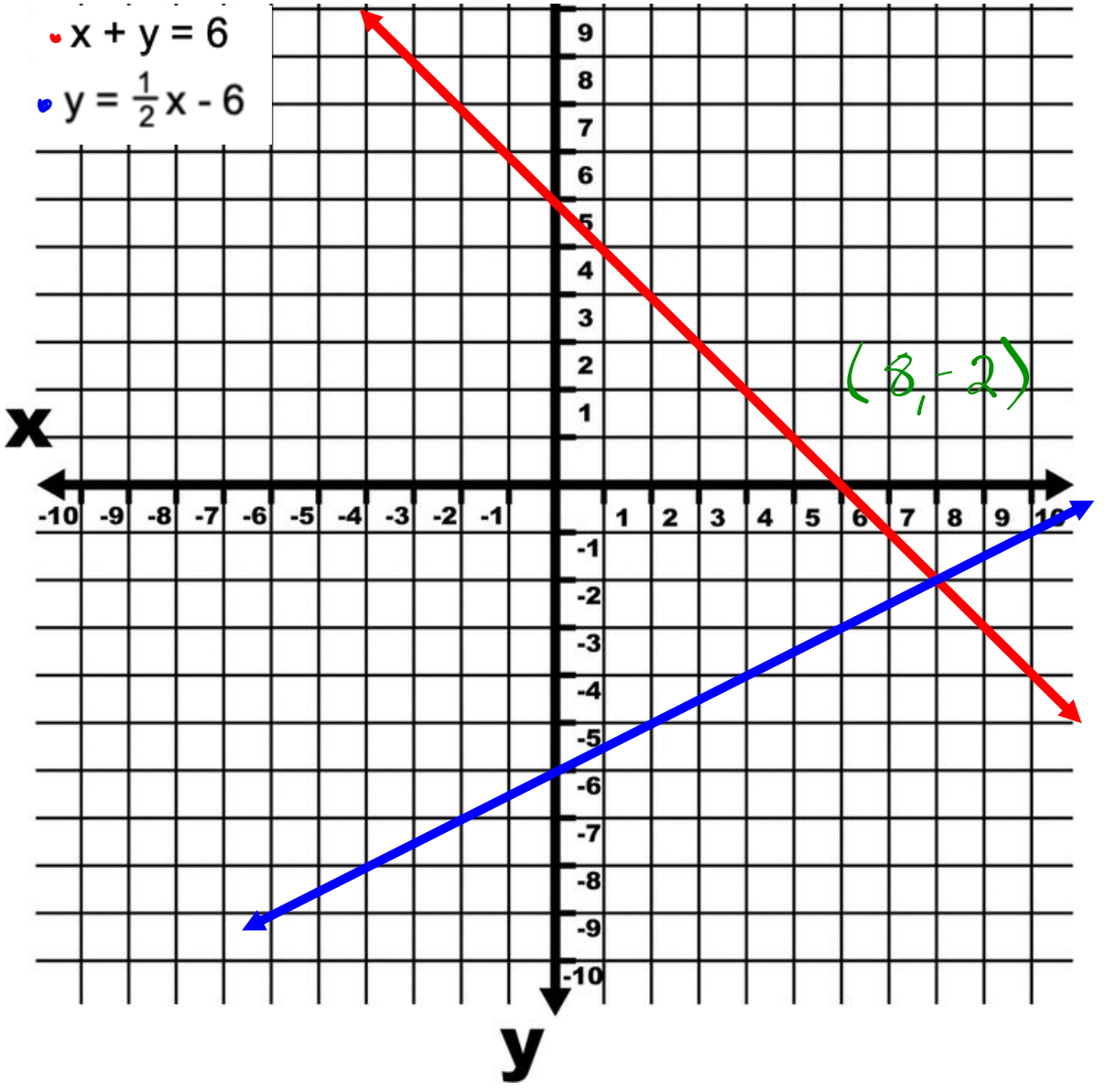
Do they have a common solution?



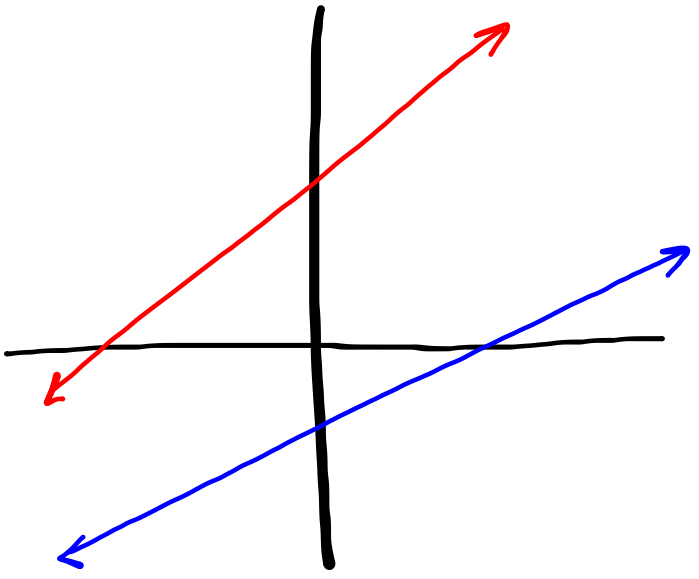
Is there a common solution here?

Just because you can't see the common solution the way you graphed, doesn't mean there is not one.

These lines are clearly <u>not</u> parallel, so they will intersect at some point.


x + y = 6
y = 1/2 x - 6
(8, -2)
x
y

Is there a common solution here?



Just because you can't see the common solution the way you graphed, doesn't mean there is not one.

These lines are clearly not parallel, so they will intersect at some point.

Homework Questions?

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

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

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

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

12. $-x + 4y = 0$

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

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

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.

a. Write two equations that represent the relationship between the number of mouse pads sold m and the number of cell phone cases sold c.

b. How many mouse pads and how many cell phone cases were sold?

Let m = # of mouse pads

Let c = # of cell phones

Isolate m

$$\begin{cases} m + c = 100 \\ 2m + 4c = 268 \end{cases} \Rightarrow \begin{matrix} m = 100 - c \\ m = 134 - 2c \end{matrix}$$

solve $100 - c = 134 - 2c$

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

a. Write two equations that represent the relationship between t
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

$50 = p + f$

$115 = p + 6f$

Ways to solve systems of equations:

We currently have 2!

Looking for common solution

1. Graphing
2. Equivalent Expressions (algebraic method)

2. $x + y = 5$

$x = y + 7$

already telling us what $x =$

we could →

$x + y = 5$

$-y \quad -y$

$x = -y + 5$

We would then have:

$\begin{cases} x = -y + 5 \\ x = y + 7 \end{cases}$

$-y + 5 = y + 7$ and then solve

OR, since we know that x = y + 7 we can substitute y + 7 in for the value of x in the first equation.

$x + y = 5$

$(y + 7) + y = 5$

$2y + 7 = 5$

and then solve

This is substitution!

$x + y = 5$

$x = y + 7$

x is already isolated ✓

We could →

$x + y = 5$

$-y \quad -y$

$x = 5 - y$

Isolate other x

$y + 7 = 5 - y$

$-7 \quad -7$

$y = -2 - y$

$+y \quad +y$

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

$y = -1$ ✓

$x = y + 7$

$x = (-1) + 7$

$x = 6$

and then solve

$(6, -1)$

OR, since we know that x = y + 7 we can substitute y + 7 in for the value of x in the first equation.

$x + y = 5$

$x = \boxed{y + 7}$

$y + 7 + y = 5$

$2y + 7 = 5$

$-7 \quad -7$

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

$y = -1$ ✓

and then solve

This is substitution!

Substitution

1. $y = 3 - 2x$

$y = 2 - 3x$

$2 - 3x = 3 - 2x$

X- and *Y*-Intercepts

Solving Systems of Linear Equations by Substitution

$4x + 4y = 12$
$3x + y = 9 \longrightarrow y = 9 - 3x$
$4x + 4(9 - 3x) = 12$
$4x + 36 - 12x = 12$
$36 - 8x = 12$
$-8x = -24$
$x = 3$
Solution (3, 0)

Solve.

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

2. $x + y = 5$
$x = y + 7$

3. $x - y = 1$
$2x + y = 8$

$x - y = 1$
$+y \quad +y$
$x = 1 + y$

4. $3x - y = 9$
$y = x + 5$

5. $3x + 4y = 26$
$-2x + y = 1$

6. $y = 2x + 3$
$y = 4x + 4$

$2x + y = 8$
$2(1 + y) + y = 8$

7. $2x + 7y = 8$
$x + 5y = 7$

8. $y = 4x + 4$
$y = 2x + 8$

9. $x + 3y = 17$
$2x + 3y = 22$

10. $4x - 7y = 9$
$y = x - 3$

Homework

Finish Problems 1-10