

## Warmup 4/(# of letters in the word "four")

Simplify:

$$1. \left(\frac{4p^2q}{q^8}\right)^2 \cdot \frac{p^3}{2p^{-3}}$$

2. \$800 is put into a savings account with 3% interest, compounded quarterly. Write a compound interest formula for this situation.

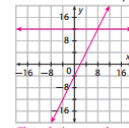
1. In the system of linear equations shown, the value of  $y$  is given. Use this value of  $y$  to find the value of  $x$  and the solution of the system.

$$\begin{cases} y = 12 \\ 2x - y = 4 \end{cases}$$

- a. What is the solution of the system?

The solution is (8, 12).

- b. Graph the system of linear equations. How do the solutions compare?



The solutions are the same.

Solve each system of linear equations by substitution.

$$2. \begin{cases} 5x + y = 8 \\ 2x + y = 5 \end{cases}$$

$$\begin{aligned} y &= -5x + 8 \\ 2x + (-5x + 8) &= 5 \\ -3x + 8 &= 5 \\ -3x &= -3 \\ x &= 1 \end{aligned}$$

$$\begin{aligned} 5(1) + y &= 8 \\ 5 + y &= 8 \\ y &= 3 \end{aligned}$$

The solution is (1, 3).

$$3. \begin{cases} x - 3y = 10 \\ x + 5y = -22 \end{cases}$$

$$\begin{aligned} x &= 3y + 10 \\ (3y + 10) + 5y &= -22 \\ 8y + 10 &= -22 \\ 8y &= -32 \\ y &= -4 \end{aligned}$$

$$\begin{aligned} x - 3(-4) &= 10 \\ x + 12 &= 10 \\ x &= -2 \end{aligned}$$

The solution is (-2, -4).

$$4. \begin{cases} 5x - 3y = 22 \\ -4x + y = -19 \end{cases}$$

$$\begin{aligned} y &= 4x - 19 \\ 5x - 3(4x - 19) &= 22 \\ 5x - 12x + 57 &= 22 \\ -7x + 57 &= 22 \\ -7x &= -35 \\ x &= 5 \end{aligned}$$

$$\begin{aligned} -4(5) + y &= -19 \\ -20 + y &= -19 \\ y &= 1 \end{aligned}$$

The solution is (5, 1).

$$5. \begin{cases} x + 7y = -11 \\ -2x - 5y = 4 \end{cases}$$

$$\begin{aligned} x &= -7y - 11 \\ -2(-7y - 11) - 5y &= 4 \\ 14y + 22 - 5y &= 4 \\ 9y + 22 &= 4 \\ 9y &= -18 \\ y &= -2 \end{aligned}$$

$$\begin{aligned} x + 7(-2) &= -11 \\ x - 14 &= -11 \\ x &= 3 \end{aligned}$$

The solution is (3, -2).

$$6. \begin{cases} 2x + 6y = 16 \\ 3x - 5y = -18 \end{cases}$$

$$\begin{aligned} 2x &= -6y + 16 \\ x &= -3y + 8 \\ 3(-3y + 8) - 5y &= -18 \\ -9y + 24 - 5y &= -18 \\ -14y + 24 &= -18 \\ -14y &= -42 \\ y &= 3 \end{aligned}$$

$$\begin{aligned} 2x + 6(3) &= 16 \\ 2x + 18 &= 16 \\ 2x &= -2 \\ x &= -1 \end{aligned}$$

The solution is (-1, 3).

$$7. \begin{cases} 7x + 2y = 24 \\ -6x + 3y = 3 \end{cases}$$

$$\begin{aligned} 3y &= 6x + 3 \\ y &= 2x + 1 \\ 7x + 2(2x + 1) &= 24 \\ 7x + 4x + 2 &= 24 \\ 11x + 2 &= 24 \\ 11x &= 22 \\ x &= 2 \end{aligned}$$

$$\begin{aligned} -6(2) + 3y &= 3 \\ -12 + 3y &= 3 \\ 3y &= 15 \\ y &= 5 \end{aligned}$$

The solution is (2, 5).

$$8. \begin{cases} x + y = 3 \\ -4x - 4y = 12 \end{cases}$$

$$\begin{aligned} x &= -y + 3 \\ -4(-y + 3) - 4y &= 12 \\ 4y - 12 - 4y &= 12 \\ -12 &= 12 \end{aligned}$$

There is no solution.

$$9. \begin{cases} 3x - 3y = -15 \\ -x + y = 5 \end{cases}$$

$$\begin{aligned} y &= x + 5 \\ 3x - 3(x + 5) &= -15 \\ 3x - 3x - 15 &= -15 \\ -15 &= -15 \end{aligned}$$

There are infinitely many solutions.

$$10. \begin{cases} x - 8y = 17 \\ -3x + 24y = -51 \end{cases}$$

$$\begin{aligned} x &= 8y + 17 \\ -3(8y + 17) + 24y &= -51 \\ -24y - 51 + 24y &= -51 \\ -51 &= -51 \end{aligned}$$

There are infinitely many solutions.

CHECK WORKSHEET

NEXT PAGE OF NOTES:

Solving Systems using Elimination



For Your Notes:

$$5x - 2y = 17$$

$$x + 2y = 13$$

$$(5, 4)$$

MAIN IDEA:

- You **can't** completely solve an equation that still has 2 variables in it. There are unlimited solutions.
- You **can** solve an equation that has only 1 variable.

• **Elimination Strategy:**

- Make sure you have opposite coefficients on a variable
- Add the 2 equations together so that one of the variables gets "eliminated."
- Solve for the first variable, then plug the answer back in to find the second

Ok...when would adding equations together help me???

$$9a + 10b = 16$$

$$+ 4a - 6b = 28$$

$$13a + 4b = 44$$

$$x + y = 20$$

$$+ 2x + 2y = 40$$

$$3x + 3y = 60$$

$$p + q = 4$$

$$+ p - q = -27$$

$$2p = -23$$

$$\$ -4 = 11$$

$$-4m + 2n = 5$$

$$+ 4m + 3n = 10$$

$$5n = 15$$

$$+ ? + 7 = 12$$

$$\$ + ? + 3 = 23$$

$$5x + 6y = 37$$

$$+ 5x + 2y = 29$$

$$10x + 8y = 66$$

Question:

- What happens if you don't have opposite coefficients???

$$9a + 10b = 16$$

$$+ 4a - 6b = 28$$

$$x + y = 20$$

$$+ 2x + 2y = 40$$

$$5x + 6y = 37$$

$$+ 5x + 2y = 29$$

Another legal math move...

- You are allowed to multiply an entire equation by any number.

$$2x = 10$$

$$3(2x = 10)$$

$$6x = 30$$

What would you multiply them by to make them opposites???

**3** and **-1**

**•3**

**3** and **-3**

What would you multiply them by to make them opposites???

**-2 and 8**

•4

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**-8 and 8**

What would you multiply them by to make them opposites???

**1 and -5**

•5

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**5 and -5**

What would you multiply them by to make them opposites???

**3 and 3**

•-1

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**3 and -3**

What would you multiply them by to make them opposites???

**2 and 6**

•-3

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**-6 and 6**

What would you multiply them by to make them opposites???

**-5 and -10**

•-2

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**10 and -10**

What would you multiply them by to make them opposites???

**-2 and 3**

•3

•2

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**-6 and 6**

What would you multiply them by to make them opposites???

**-4** and **6**

$$\begin{array}{r} \cdot 3 \qquad \cdot 2 \\ \hline -12 \text{ and } 12 \end{array}$$

Don't write, just watch:

$$\begin{array}{r} 6a + b = 15 \longrightarrow 6a + b = 15 \\ 2(-3a + 4b = 6) \longrightarrow \underline{-6a + 8b = 12} \\ \qquad \qquad \qquad \qquad \qquad \qquad 9b = 27 \end{array}$$

and the rest is the same...

For Your Notes

$$\begin{array}{r} -2x + 4y = 8 \longrightarrow -2x + 4y = 8 \\ 4(3x - y = 3) \longrightarrow \underline{12x - 4y = 12} \\ \qquad \qquad \qquad \qquad \qquad \qquad 10x \qquad = 20 \\ \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad x = 2 \end{array}$$

$$\begin{array}{r} \text{Find } y: -2x + 4y = 8 \\ -2(2) + 4y = 8 \\ -4 + 4y = 8 \\ \qquad \qquad 4y = 12 \\ \qquad \qquad \qquad y = 3 \end{array}$$

**(2, 3)**

For Your Notes:

$$\begin{array}{r} x + 4y = 5 \\ x + 2y = 1 \end{array}$$

**(-3, 2)**

For Your Notes:

$$\begin{array}{r} 3(-5x + 3y = 2) \longrightarrow -15x + 9y = 6 \\ 5(3x - 2y = -2) \longrightarrow \underline{15x - 10y = -10} \\ \qquad \qquad \qquad \qquad \qquad \qquad -1y = -4 \\ \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad y = 4 \end{array}$$

$$\begin{array}{r} \text{Find } x: 3x - 2y = -2 \\ 3x - 2(4) = -2 \\ 3x - 8 = -2 \\ \qquad \qquad 3x = 6 \\ \qquad \qquad \qquad x = 2 \end{array}$$

**(2, 4)**

**HOMEWORK**

• Worksheet