

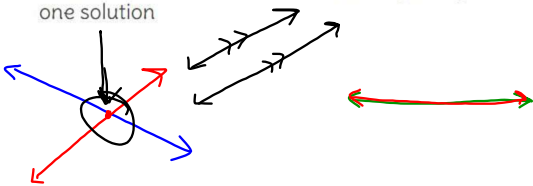
Unit 6 - Systems of Equations

Do you remember these?

$2x - 9 = 9$ $+9$ $2x = 18$ 2 $x = 9$	$3x - 5 = 3x$ $-3x$ $-3x$ $-5 = 0$ No Sol.	$4x + 3 = 4x + 3$ -3 -3 $4x = 4x$ Infinite Sol.
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What do these solutions look like graphically?

$2x - 9 = 9$ $2x = 18$ $x = 9$ one solution	$3x - 5 = 3x$ $0 = 5$ no solution	$4x + 3 = 4x + 3$ $4x = 4x$ infinitely many solutions
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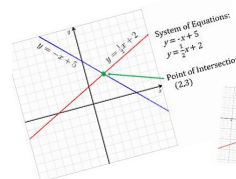
What if we thought about these same equations as two separate equations? $y = mx + b$

$2x - 9 = 9$ $\begin{cases} y = 2x - 9 \\ y = 9 \end{cases}$	$3x - 5 = 3x$ $\begin{cases} y = 3x - 5 \\ y = 3x \end{cases}$	$4x + 3 = 4x + 3$ $\begin{cases} y = 4x + 3 \\ y = 4x + 3 \end{cases}$
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These are what we call...
systems of equations

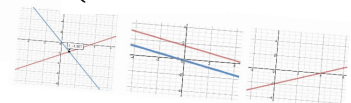
Systems of Equations

Two or more equations that have the same variables



$$\begin{cases} 4x + 2y = 9 \\ 3x - 2y = 10 \end{cases}$$

$$\begin{aligned} 12x - 9y &= 31 \\ 8x + 9y &= 23 \\ \hline 20x &= 60 \end{aligned}$$



3 Methods to Solving Systems:

<p>GRAPHING: Both equations must be written as $y = mx + b$ Graph both lines and see where they meet!</p>	<p>SUBSTITUTION: Single out x or y and create a blob $x = \text{blob}$ or $y = \text{blob}$</p>	<p>ELIMINATION: LINE 'EM UP! Look for matching coefficients. add/subtract to eliminate!</p>
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Today, we focus on graphing

Steps to graphing linear equations

- 1) Plot the y-intercept (this ALWAYS happens on the y-axis)
- 2) Use the Slope to plot more points (rise THEN run)

GRAPHING:
BOTH equations must be written as $y = mx + b$
Graph both lines and see where they meet!

Let's Practice

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

$\frac{3}{1} \uparrow$
 \downarrow

$(2, 3)$

You Try

$-1 = \frac{1}{1}$

$(-3, 1)$

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

What's different about this one?

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

~~$4x + y = 2$~~
 ~~$-4x$~~
 $y = -4x + 2$
 $y = 2 - 4x$

~~$x - y = 3$~~
 ~~$-x$~~
 $-y = -x + 3$
 $y = x - 3$

You Try!

$-7x + 2y = 18$
 $6x + 6y = 0$

$7x + 2y = 18$
 $+7x$
 $2y = 18 + 7x$
 $\frac{2y}{2} = \frac{18 + 7x}{2}$
 $y = 9 + \frac{7}{2}x$

$6x + 6y = 0$
 $-6x$
 $6y = 0 - 6x$
 $\frac{6y}{6} = \frac{0 - 6x}{6}$
 $y = 0 - x$

$(-2, 2)$

Duh, your calculator can do this!

Steps:

- Step 1: hit y=, insert equations into y1 and y2
- Step 2: hit graph, can you see the solution? If not need to change window
 - Hit window, change parameters for ymin/ymax and xmin/xmax
- Step 3: second, trace, intersect
- Step 4: left bound? (use arrows to be on one line) enter
 Right bound? (use arrows to be on other line) enter
 Guess? Just hit enter and intersection point should appear

Method 2: Substitution

This is an algebraic method!

SUBSTITUTION:

Single out x or y
and create
a blob.

x = or

y =

Watch me...

$$2y + x = -15$$

$$x = 3y$$

Let's do this one together

$$4x + 7y = 19$$

$$y = x + 9$$

You try

$$2x - 8y = 6$$

$$y = -7 - x$$

Last one!

$$\begin{aligned} -7x - 2y &= -13 \\ x - 2y &= 11 \end{aligned}$$

Word Problems: The Fun Stuff!

For each problem you will need to...

- Define the variables in WORDS. (Let $x = \dots$ Let $y = \dots$)
- Write the system of equations
- Use substitution or elimination to solve: SHOW WORK
- State your solution in sentence form.

Example 1

Last season two running backs on the Steelers football team rushed for a combined total of 1550 yards. One rushed 4 times as many yards as the other. How many yards were rushed by each player?

Example 2

A particular Algebra text has a total of 1382 pages which is broken into two parts. The second part of the book has 64 more pages than the first part. How many pages are in each part of the book.

Example 3

Dennis mowed his next door neighbor's lawn for a handful of dimes and nickels, 80 coins in all. Upon completing the job he counted out the coins and it came to \$6.60. How many of each coin did he earn?

Example 4

On Monday Joe bought 10 cups of coffee and 5 doughnuts for his office at the cost of \$16.50. It turns out that the doughnuts were more popular than the coffee. On Tuesday he bought 5 cups of coffee and 10 doughnuts for a total of \$14.25. How much was each cup of coffee?