BE-Alg. 1 | Monday 11-14-11

1. On the SAME graph (large, at least $\frac{1}{2}$ page), graph the following two lines:

   A. $y = -2x + 5$

   b. $y = 4x - 1$

2. Is $(2, 1)$ on either line?

3. Is $(-1, -5)$ on either line?

4. Is $(0, 0)$ on either line?

5. Is $(1, 3)$ on either line?

---

2. $(2, 1)$ is an $(x, y)$ Pair on $y = -2x + 5$

   pick $x = 2$, $y = -2(2) + 5 = 1$

3. $(-1, -5)$ is on $4x - 1$

4. $(0, 0)$ is on Neither line.

5. $(1, 3)$ is on BOTH Lines!

Every $(X, Y)$ pair on a line is a <u>solution</u> to its linear equation since substituting the $(X, Y)$ pair into the linear equation (in any form such as $y = mx + b$ or $Ax + By = C$ or others) makes a <u>true</u> expression.

---

Two lines on the same graph, or two lines "taken together" form a "<u>System of Linear Equations.</u>"

---

Normal Algebra ⇒ use braces

Ex $\begin{cases} Y = -2x + 5 \\ Y = 4x - 1 \end{cases}$

---

*d The $(X, Y)$ pair where the two lines cross is <u>the</u> solution to the system of linear equations.

You can solve a system of linear equations by graphing... why is this not a good way to do so?

---

* NOT accurate
* SLOW

---

How can you solve $\begin{cases} y = -2x + 5 \\ y = 4x - 1 \end{cases}$ using Algebra?

---

Two ways, both use (they must) both equations, and both start out by ELIMINATING one of the variables.

---

- Elimination By Substitution (EBS)
- Elimination By Addition (EBA)

# Elimination By Substitution

- Solve one of the equations for x or y (4 choices) and then SUBTITUTE into the other.

Ex
$$\begin{cases} y = -2x+5 \\ y = 4x-1 \end{cases}$$

← Already solved for y, how convenient!

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

Look, the y has been eliminated, you can solve this!!!

$$+2x \qquad +2x$$

$$5 = 6x - 1$$

$$+1 \qquad +1$$

$$\frac{6}{6} = \frac{6x}{6}$$

$$\boxed{1 = x}$$

$$y = 4(1) - 1 = \boxed{3 = y}$$

Use either Eq. to find y, they both must work $\boxed{(1, 3)}$

# Elimination By Addition

- Get the x, y, and numbers lined up (if they are not already) then multiply ONE equation to get equal and opposite x terms or y terms (usually only 2 choices, usually one is better)

---

Ex

$$y = -2x + 5 \xrightarrow{(2)} 2y = -4x + 10$$

$$y = 4x - 1 \longrightarrow \quad y = 4x - 1$$

$$\oplus \; \overline{\phantom{2y = -4x + 10}}$$

When you add these, the x is eliminated! You can solve this!! →

$$\frac{3y}{3} = \frac{9}{3}$$

$$y = 3$$

Use either equation to find x

$$3 = 4x - 1$$

$$+1 \qquad +1$$

$$\frac{4}{4} = \frac{4x}{4} \quad \therefore \; x = 1$$

$$\boxed{(1, 3)} \checkmark$$

Both EBS and EBA will work for any system of linear equations, usually one way will be easier.

---

Tip: if a variable is already "by itself" use EBS, if the x, y, and numbers are already lined up (in the same order), use EBA.

---

Many options exist:

$$y = -2x + 5 \xrightarrow{(-1)} -y = 2x - 5$$

$$y = 4x - 1 \longrightarrow \oplus \quad y = 4x - 1$$

$$0 = 6x - 6$$

$$+6 \qquad +6$$

$$\frac{6}{6} = \frac{6x}{6}$$

$$1 = x \quad \therefore \quad y = 3$$

Determine best method to solve, then solve using both methods.

$$2x - y = 6 \xrightarrow{(4)} 8x - 4y = 24$$
$$3x + 4y = -2 \longrightarrow 3x + 4y = -2$$

$$11x = 22$$

$$x = 2$$

$$\therefore 2(2) - y = 6$$
$$4 - y = 6$$
$$-6 + y \quad -6 + y$$
$$-2 = y$$

$$\boxed{(2, -2)}$$

$$2x - y = 6 \longrightarrow y = 2x - 6$$
$$3x + 4y = -2$$

$$3x + 4(2x - 6) = -2$$

$$3x + 8x - 24 = -2$$

$$11x = 22$$

$$x = 2 \quad \therefore y = -2$$

Look over Ch. 7-1 to 7-4

---

Homework: Pg. 390 # 5 and 6

Solve using both EBB and EBA

---