Created by Max Robinson

Warmup 12/(# of digits in $\pi - \infty + 10$)

*****Make sure you have a whiteboard, marker, and eraser inside your desk*****

1. Solve using the substitution method:

$$\begin{cases} 2x - 8y = 14 \\ x = 4y + 2 \end{cases}$$

$2(4y+2)-8y=14$

$8y+4-8y=14$

$-4 \quad -4$

$8y-8y=10$

$0=10$

NO SOLUTION

Story Problem

- **Tommy and Chuckie have 60 bottles all together. Chuckie has 3 times as many bottles as Tommy. How many bottles do they each have?**

- **T + C = 60**
- ***IS IT: T = 3C or C = 3T??? Discuss.**

- $\begin{cases} T + C = 60 \\ C = 3T \end{cases}$

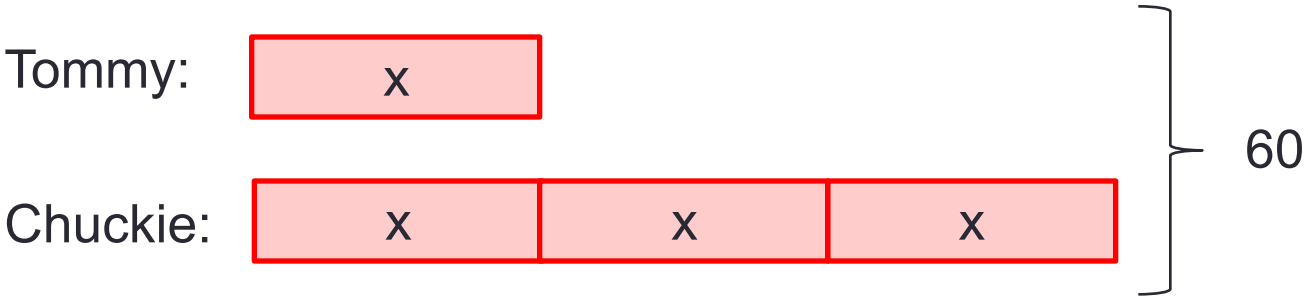
$T + 3T = 60$
$4T = 60$
$T = 15$

Tommy has 15 bottles, Chuckie has 45 bottles

$C = 3(15)$
$C = 45$

Using a bar diagram…

- **Tommy and Chuckie have 60 bottles all together. Chuckie has 3 times as many bottles as Tommy. How many bottles do they each have?**



$$x + 3x = 60$$

Story Problem

- **Phil and Lil have 42 pacifiers all together. Phil has 8 more pacifiers than Lil. How many pacifiers do they each have?**

- $$\begin{cases} P + L = 42 \\ L + 8 = P \end{cases}$$

$L+8+L=42$

$2L+8=42$

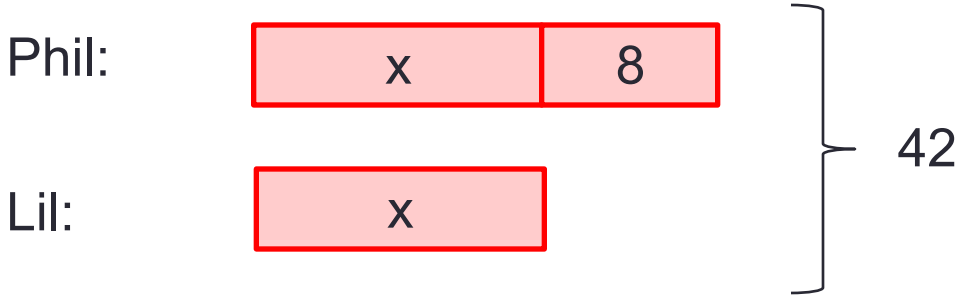
$-8 \quad -8$

$\frac{2L}{2} = \frac{34}{2}$ $L=17$ $P=17+8$ $P=25$

Phil has 25 pacifiers,
Lill has 17 pacifiers

Using a bar diagram…

- **Phil and Lil have 42 pacifiers all together. Phil has 8 more pacifiers than Lil. How many pacifiers do they each have?**

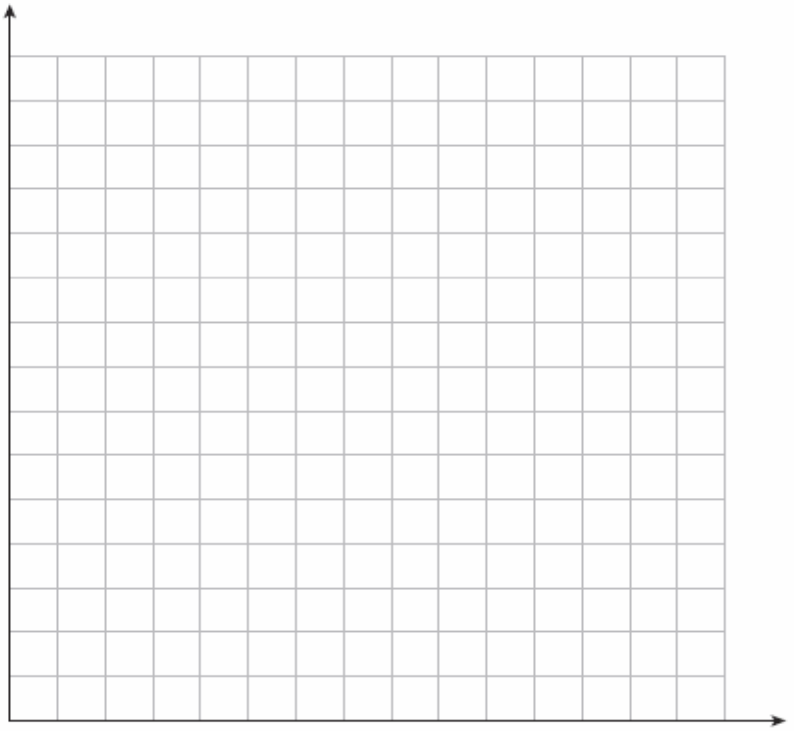


2x+ 8 = 42

Phil has 25 pacifiers,
Lill has 17 pacifiers

Story Problem if Time:

- Bowl-o-Rama charges $3 per game plus $2 for shoe rental, and Bowling Pinz charges $2 per game plus $5 for shoe rental. For how many games will the cost to bowl be the same at both places? What is the cost?



5 minutes: do #9 and 10 on p.247

p.247 (1 - 10, 14, 15)

1. $(1, 6)$
2. $(-30, -18)$
3. $(-2, -12)$
4. $(15, 30)$
5. $(7, 11)$
6. $(4, 1)$
7. $\left(\frac{1}{2}, 12\frac{1}{2}\right)$
8. $\left(\frac{1}{4}, 5\frac{1}{2}\right)$
9. $\begin{cases} S + P = 15 \\ S = P + 7 \end{cases}$

   11 shirts, 4 pairs of pants

10. $\begin{cases} P + H = 49 \\ H = P + 11 \end{cases}$

    Horatio has 30 games, Preston has 19 games

14. Possible answers: When you don't have a graph, when the intersection point is off the graph, when the intersection point is a fraction, when the equations are simple and easy to work out without a graph.

15. The third one doesn't belong. Its solution is (-2, 1). The solution of the other three is (1, -2).

What would you do here???

- $2x + 2y = 18$
- $3x - 2y = 12$

Substitution is tough...
don't have x= or y= !

Table of Contents

Solve Systems with Elimination

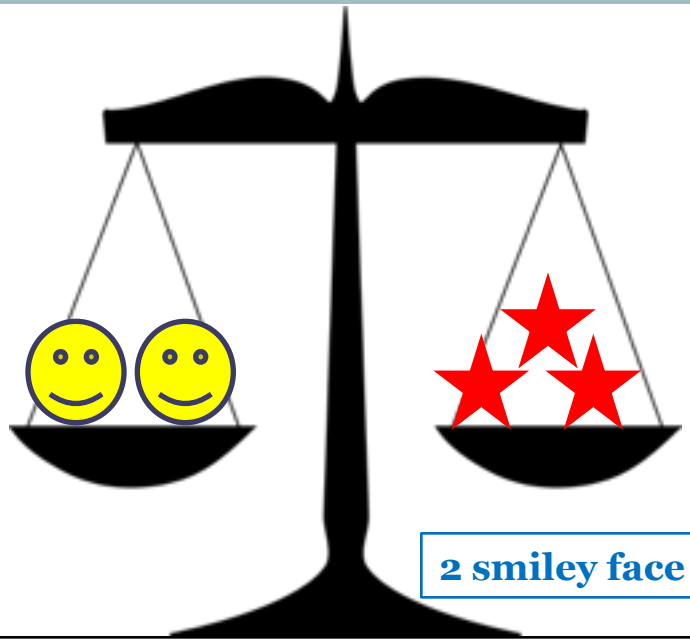
Objective:

- Use a new strategy (elimination) to solve systems of equations
  - Most useful when BOTH equations have x and y on the same side

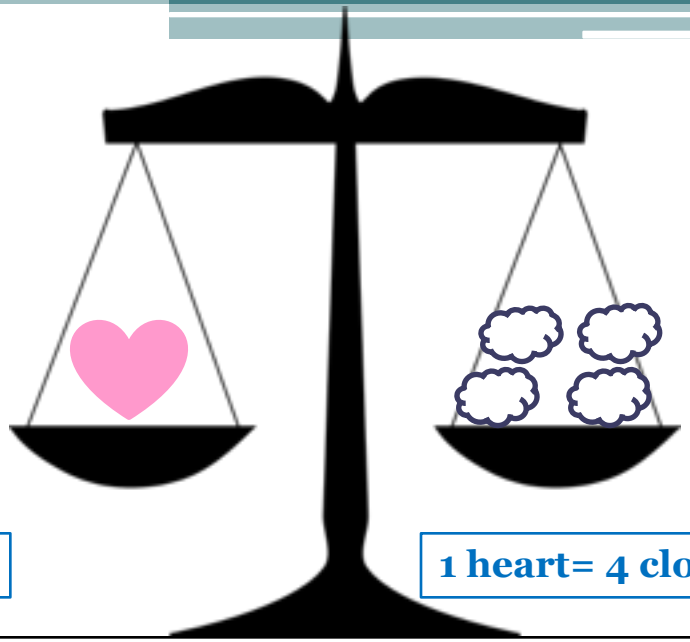
- Today, we are going to learn a strategy to solve systems where both equations are in STANDARD FORM, such as:

$$2x + y = 18$$

$$3x - y = -3$$



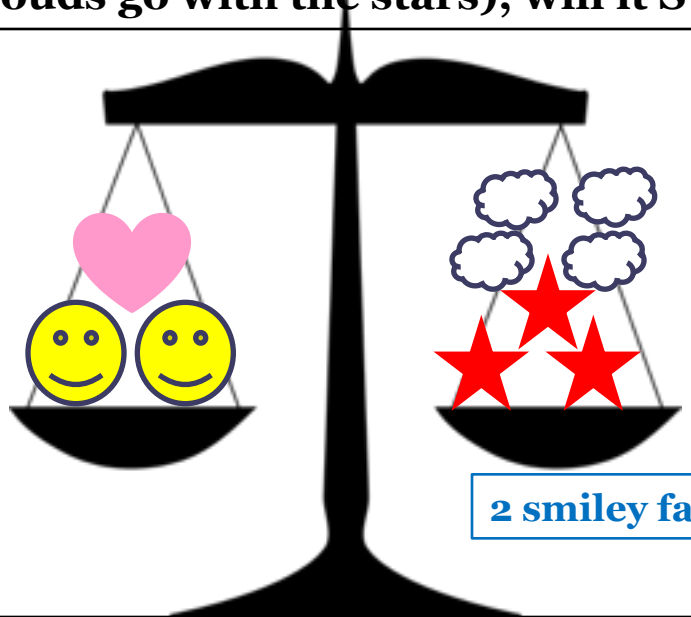
2 smiley face = 3 star



1 heart= 4 cloud

<u>IMPORTANT Q:</u> If I combine the two balance scales together (hearts go with the smiley faces, clouds go with the stars), will it STILL be balanced???

Yes



2 smiley face + 1 heart= 3 star + 4 cloud

SO:

- You can **add** 2 equations together and the third equation will still be true.
- Ok…but how would that help me???

$$2x + y = 18$$

$$+\ 3x - y = -3$$

$$5x + 0y = 15$$

$$5x = 15$$

$$x = 3$$

- Now substitute the first variable back in to either equation to find the second.

$2x + y = 18 \longrightarrow 2(3) + y = 18 \longrightarrow 6 + y = 18$

$3x - y = -3 \longrightarrow 3(3) - y = -3 \longrightarrow 9 - y = -3$

either way… $y = 12$

Together, with me:

$$5x - 2y = 17$$
$$+\ x + 2y = 13$$
$$6x = 30$$
$$\frac{6x}{6} = \frac{30}{6}$$
$$x = 5$$

$5 + 2y = 13$

$2y = 8$

$y = 4$

$(5, 4)$

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

Try these:

$-3x + y = 6$

$+\ 3x + 2y = 30$

$3y = 36$

$y = 12$

$3x + 2(12) = 30$

$3x + 24 = 30$

$3x = 6$ $\quad x = 2$

$(2, 12)$

$10x - y = 5$

$+\ -6x + y = -9$

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

$x = -1$

$-6(-1) + y = -9$

$6 + y = -9$

$-6 \quad -6$

$y = -15$

$(-1, -15)$

When you show me a correct answer + work for one of the problems, you may volunteer to put it on the board.

$4x - 2y = 30$

$-4x + 6y = -38$