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:

$$
\begin{gathered}
\left\{\begin{array}{c}
2 x-8 y=14 \\
x=(4 y+2
\end{array}\right. \\
\begin{array}{c}
2(4 y+2)-8 y=14 \\
8 y+4-8 y=14 \\
-4
\end{array} \\
\hline 8 y-8 y=10 \\
0=10
\end{gathered}
$$

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?
- $\mathrm{T}+\mathrm{C}=60$
. Is it: $T=3 C$ or $\underline{C=3 T}$ ??? Discuss.

$$
\left\{\begin{aligned}
& T+C_{\kappa}=60 \\
& C=3 T
\end{aligned}\right.
$$

Tommy has 15 bottles, Chuckie has 45 bottles

$$
\begin{aligned}
T+3 T & =60 \\
4 T & =60 \\
T & =15
\end{aligned}
$$

$$
c=3(15)
$$

$$
c=4 \mathrm{~s}
$$

## 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?


$$
x+3 x=60
$$

## Story Problem

- Phil and LiI have 42 pacifiers all together. Phil has 8 more pacifiers than LiI. How many pacifiers do they each have?
$\cdot\left\{\begin{array}{l}P+L=42 \\ L+B=P\end{array}\right.$

$$
\begin{aligned}
& L+8+L=42 \\
& 2 L+8=42 \\
& \frac{18}{8}=-8 \\
& \frac{2 L}{2}=\frac{34}{2} \quad L=17 \\
& P=17+8 \\
& P=25
\end{aligned}
$$

## 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?

Phil:

Lil:


$$
2 x+8=42
$$

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. $\left\{\begin{array}{c}S+P=15 \\ S=P+7\end{array}\right.$

11 shirts, 4 pairs of pants
10. $\left\{\begin{array}{l}P+H=49 \\ H=P+11\end{array}\right.$

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???

- $2 \mathrm{x}+2 \mathrm{y}=18$
- $3 \mathrm{x}-2 \mathrm{y}=12$

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

## Table of Contents

p. 1 Converting Fractions and Decimals (1.1)
p. 2 Roots (1.8 \& 1.9)
p. 3 Solving $x^{2}$ and $x^{3}$ Equations (1.8)
p. 4 Rational vs. Irrational (1.1)
p. 5 What is a function?
p. 6 Function Notation: $f(x)$
p. 7 Linear vs. Nonlinear Functions
p. 8 Constant Rate of Change
p. 9 Slope
p. 10 Graphing Linear Functions - Looking for Patterns
p. 11 Slope-Intercept Form
p. 12 Linear/Nonlinear Tables and Proportional Relationships
p. 13 Slope-Intercept Story Problems
p. 141 and 2-Step Equations
p. 15 Equations w/ Variables on Both Sides
p. 16 Equations with Distributive Property
p. 17 Equations with No Solution or Infinite Solutions
p. 18 Solving Systems of Equations by Graphing
p. 19 Solving Systems by Substitution
p. 20 Solving Systems by Elimination

## 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:

$$
\begin{aligned}
& 2 x+y=18 \\
& 3 x-y=-3
\end{aligned}
$$



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


## SO:

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

$$
\begin{gathered}
2 x+y=18 \\
+3 x-y=-\mathbf{3} \\
\hline 5 x+0 y=15 \\
5 x=15 \\
x=3
\end{gathered}
$$

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

$$
\begin{aligned}
& \mathbf{2 x}+\mathrm{y}=\mathbf{1 8} \longrightarrow \mathbf{2}(3)+\mathrm{y}=18 \longrightarrow \mathbf{6}+\mathrm{y}=18 \\
& 3 x-y=-3 \longrightarrow 3(3)-y=-3 \longrightarrow 9-y=-3 \\
& \downarrow \\
& \text { either way... } y=12
\end{aligned}
$$

Together, with me:

$$
\begin{gathered}
5 x-2 \not y=17 \\
\begin{array}{c}
\mathbf{x}+2 \mathbf{y}=\mathbf{1 3} \\
\frac{6 x}{6} \quad \frac{30}{6} \\
x=5
\end{array} \rightarrow 5+2 y=13 \\
2 y=8 \\
y=4
\end{gathered}
$$

## 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:

$$
3 x+2(12)=30
$$

$$
(2,12)
$$

$$
\begin{gathered}
3 x+24=30 \\
3 x=6
\end{gathered}
$$

$$
\begin{aligned}
3 & =36 \\
4 & =12
\end{aligned}
$$

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

$$
\begin{array}{lll}
\frac{x}{4}=-1 & h_{>}-6(-1)+y=-9 \\
6+y=-9 \\
4 x-2 y=30 & -6+-6
\end{array} \quad(-1,-15)
$$

