Name:_____ Date:_____

Homework sheet: Alg2H
Systems of equations: Intro

1. (Book1 362**) Consider the system of equations:

$$\begin{cases} 9x - 2y = 16 \\ 3x + 2y = 8 \end{cases}$$

Jess took one look at these equations and knew right away what to do. "Just add the equations and you will find out quickly what x is." Follow this advice, and find X and Y.

$9x - 2y = 16$
$3x + 2y = 8$
$12x + 0y = 24 \rightarrow x = \frac{24}{12} \rightarrow \boxed{x = 2}$

$9 \cdot 2 - 2y = 16$
$18 - 2y = 16$
$\boxed{y = 1}$

Check your answer:

$\begin{cases} 9 \cdot 2 - 2 \cdot 1 \stackrel{?}{=} 16 \checkmark \\ 3 \cdot 2 + 2 \cdot 1 \stackrel{?}{=} 8 \checkmark \end{cases}$

2. (Book1 371**) Consider the system of equations:

$$\begin{cases} 3x + 2y = 11 \\ 3x - 4y = 5 \end{cases}$$

Jess took one look at these equations and knew right away what to do. "Just subtract the equations and you will find out quickly what x is." Follow this advice, and find X and Y.

$\begin{cases} 3x + 2y = 11 \\ 3x - 4y = 5 \end{cases}$
$0x + 6y = 6 \rightarrow \boxed{y = 1}$

$3x + 2 \cdot 1 = 11$
$3x = 9 \rightarrow \boxed{x = 3}$

Check your answer:

$\begin{cases} 3 \cdot 3 + 2 \cdot 1 \stackrel{?}{=} 11 \checkmark \\ 3 \cdot 3 - 4 \cdot 1 \stackrel{?}{=} 5 \checkmark \end{cases}$

Problems denoted with ** mark are taken from Exeter Phillips Academy (NH) math curriculum.

3. (Book1 389**) Consider the system of equations:

$$\begin{cases} 4x + 3y = 5 \\ 3x - 2y = -9 \end{cases}$$

Lee took one look at these equations and announced a plan: "Just multiply the first equation by 2 and the second equation by 3.". Follow this advice, and find X and Y.

$$\begin{cases} 8x+6y=10 \\ 9x-6y=-27 \end{cases}$$

$17x + 0y = -17 \rightarrow \boxed{x=-1}$

$8(-1)+6y=10$

$6y=18 \rightarrow \boxed{y=3}$

Check your answer:

$$\begin{cases} 8\cdot(-1)+6\cdot 3 \stackrel{?}{=} 10 \checkmark \\ 9\cdot(-1)-6(3)\stackrel{?}{=}-27 \checkmark \end{cases}$$

4. (Book1 402**) Consider the system of equations:

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

Min took one look at these equations and offered a plan: "The second equation says you can substitute 2x-2 for y in the first equation. Then you have only one equation to solve." Carry out the plan and find x and y.

$4x-3(2x-2)=10$

$4x-6x+6=10$

$-2x=4$

$\boxed{x=-2}$

$y=2(-2)-2=-6$

$\boxed{y=-6}$

Check your answer:

$4\cdot(-2)-3\cdot(-6)\stackrel{?}{=}10$

$-8+18\stackrel{?}{=}10$ ✓

5. (Book1 389**) Solve:

$$\begin{cases} 2x + y = 5 \\ 5x - 2y = 17 \end{cases}$$

$\begin{cases} 4x+2y=10 \\ 5x-2y=17 \end{cases}$

$9x+0y=27 \rightarrow \boxed{x=3}$

$y=5-2\cdot 3=-1$

$\boxed{y=-1}$

Check:

$\begin{cases} 2\cdot 3+(-1)\overset{?}{=}5 \checkmark \\ 5\cdot 3-2(-1)\overset{?}{=}17 \checkmark \end{cases}$

6. (Book1 456**) Start with the equations

$$\begin{cases} 2x - y = 3 \\ 3x + 4y = 1 \end{cases}$$

Create a third equation by adding any multiple of the first equation to any multiple of the second equation. When you compare equations with your classmates, you will probably not agree. What is certain to be true about the graphs of all these third equations, however?

(Feel free to use desmos of course)

2*first + 1*second =

$4x-2y=6$

$3x+4y=1$

$\boxed{7x+2y=7}$

x, y pass through the same point!