Solving Systems by Graphing: Review
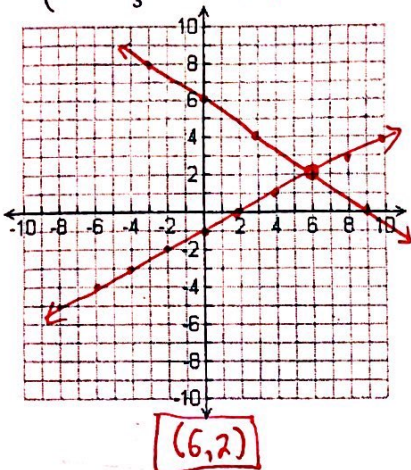
$\dfrac{rise}{run}$
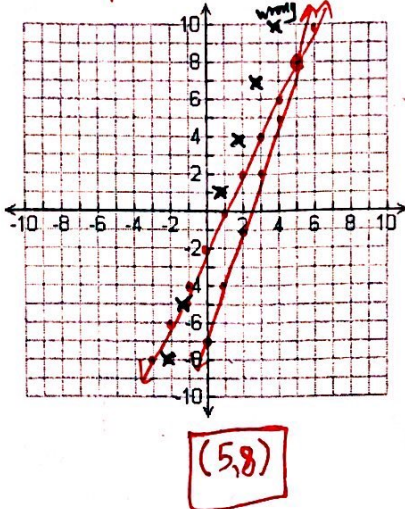
pos up/right   neg down/right

If you need help with these: Go to lischwe.weebly.com and look at the lesson on December [?]. Look at December [?] for help with getting y by itself.
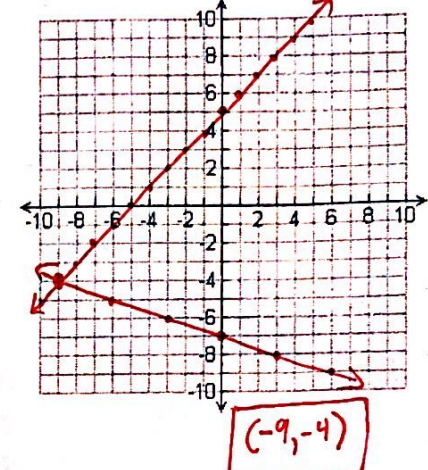
Solve the system by graphing.

1) $\begin{cases} y = \frac{1}{2}x - 1 & (0,1),\ \text{up 1 right 2} \\ y = -\frac{2}{3}x + 6 & (0,6),\ \text{down 2 right 3} \end{cases}$
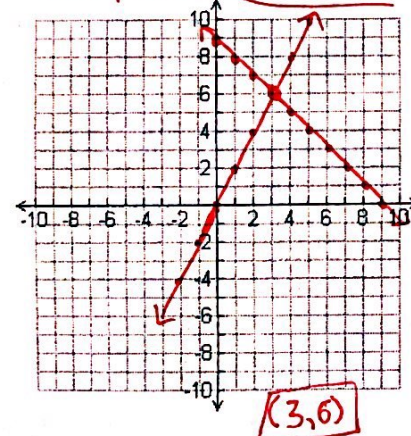

$(6,2)$

2) $\begin{cases} y = 2x - 2 & (0,-2)\ \text{up 2 right 1} \\ y = \frac{3}{1}x - 7 & (0,-7)\ \text{up 3 right 1} \end{cases}$
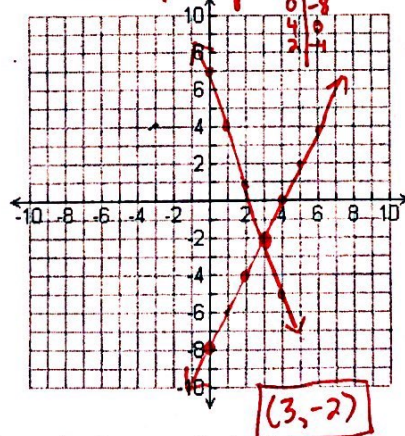
wrong ✗

$(5,8)$

3) $\begin{cases} y = \frac{1}{1}x + 5 & (0,5)\ \text{up 1 right 1} \\ y = -\frac{1}{3}x - 7 & (0,-7)\ \text{down 1 right 3} \end{cases}$

$(-9,-4)$

4) $\begin{cases} x + y = 9 \rightarrow y = 9 - x \\ y = 2x + 0 \end{cases}$

Solve for y   or   Table

X	Y
0	9
1	8
2	7	etc.

$(0,0)$, up 2 right 1

$(3,6)$

5) $\begin{cases} -4x + 2y = -16 \rightarrow 2y = -16 + 4x \\ y = -3x + 7 \end{cases}$

Solve for y
$\frac{2y}{2} = \frac{-16}{2} + \frac{4x}{2}$
$y = -8 + 2x$

$(0,7)$
down 3 right 1

Table

X	Y
0	-8
4	0
2	-4

$(3,-2)$

6) Reynold has $20 in his bank account and deposits $60 per month. Keith has $560 in his bank account but withdraws $30 per month.
a) Write a system of equations.
b) Graph them and find the intersection.
c) Explain what the numbers in your solution represent.
d) Check your answer.

a) $\begin{cases} y = 20 + 60x \\ y = 560 - 30x \end{cases}$

b)

$(6, 380)$

c) After 6 weeks, both Reynold and Keith have $380 in their accounts.
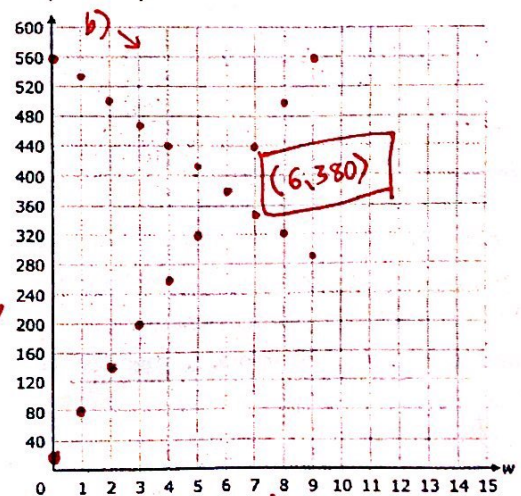
7) Choose two problems from #1 – 6, then check your solution by substituting the numbers back into both original equations.

① $2 = \frac{1}{2}(6) - 1$ $2 = -\frac{2}{3}(6) + 6$
$2 = 3 - 1$ $2 = -\frac{12}{3} + 6$
$2 = 2\ \checkmark$ $2 = -4 + 6$
                          $2 = 2\ \checkmark$

② $8 = 2(5) - 2$ $8 = 3(5) - 7$
$8 = 10 - 2$ $8 = 15 - 7$
$8 = 8\ \checkmark$ $8 = 8\ \checkmark$

③ $-4 = -9 + 5$ $-4 = -\frac{1}{3}(-9) - 7$
$-4 = -4\ \checkmark$ $-4 = \frac{9}{3} - 7$
                      $-4 = 3 - 7$
                      $-4 = -4\ \checkmark$

④ $3 + 6 = 9$ $6 = 2(3)$
$9 = 9\ \checkmark$ $6 = 6\ \checkmark$

⑤ $-4(3) + 2(-2) = -16$
$-12 + -4 = -16$
$-16 = -16\ \checkmark$

$-2 = -3(3) + 7$
$-2 = -9 + 7$
$-2 = -2\ \checkmark$

⑥ $380 = 20 + 60(6)$
$380 = 20 + 360$
$380 = 380\ \checkmark$

$380 = 560 - 30(6)$
$380 = 560 - 180$
$380 = 380\ \checkmark$

d)

Solving Systems by Substitution: Review

Solve by substitution. Use the back if necessary. Don't forget to find both x and y!!!

1) $\begin{cases} y = -x + 10 \\ y = 6x + 59 \end{cases}$

$-x + 10 = 6x + 59$
$\underline{+x \qquad\quad +x}$
$10 = 7x + 59$
$\underline{-59 \qquad -59}$
$\dfrac{-49}{7} = \dfrac{7x}{7}$
$-7 = x$

Find y
$y = -(-7) + 10$
$y = 7 + 10$
$y = 17$

$\boxed{(-7, 17)}$

2) $\begin{cases} y = 3x \\ x - 2y = 15 \end{cases}$

$x - 2(3x) = 15$
$x - 6x = 15$
$\dfrac{-5x}{-5} = \dfrac{15}{-5}$
$x = -3$

Find y
$y = 3(-3)$
$y = -9$

$\boxed{(-3, -9)}$

3) $\begin{cases} x = 5y - 12 \\ x + 3y = 12 \end{cases}$

$5y - 12 + 3y = 12$
$8y - 12 = 12$
$\underline{+12 \quad +12}$
$\dfrac{8y}{8} = \dfrac{24}{8}$
$y = 3$

Find x
$x = 5(3) - 12$
$x = 15 - 12$
$x = 3$

$\boxed{(3, 3)}$

4) $\begin{cases} -3x + 5y = 0 \\ y = x - 6 \end{cases}$

$-3x + 5(x - 6) = 0$
$-3x + 5x - 30 = 0$
$2x - 30 = 0$
$\underline{+30 \; +30}$
$\dfrac{2x}{2} = \dfrac{30}{2}$
$x = 15$

Find y
$y = 15 - 6$
$y = 9$

$\boxed{(15, 9)}$

5) There are 100 members in the US Senate. Currently, there are four times as many men as women. Write a system of equations, solve it, and describe what the numbers in your solution represent. Make sure to check your answer.

$M = \#$ of men
$W = \#$ of women

$\begin{cases} M + W = 100 \\ M = 4W \end{cases}$

Diagram Method

Men $\boxed{W}\boxed{W}\boxed{W}\boxed{W}$
Women $\boxed{W}$

$4w + w = 100$
etc.

$4W + W = 100$
$\dfrac{5W}{5} = \dfrac{100}{5}$
$W = 20$

$M = 4(20)$
$M = 80$

$\boxed{80 \text{ men}, 20 \text{ women}}$

Check: $80 + 20 = 100$ ✓

6) $\begin{cases} y = \frac{3}{2}x \\ y = -1x + 10 \end{cases}$ common denominators

$\frac{3}{2}x = -1x + 10$
$\frac{3}{2}x = -\frac{2}{2}x + 10$
$\underline{\frac{2}{2}x \quad +\frac{2}{2}x}$
$\frac{2}{5} \cdot \frac{5}{2}x = 10 \cdot \frac{2}{5}$
$x = 4$

Find y
$y = -1(4) + 10$
$y = -4 + 10$
$y = 6$

$\boxed{(4, 6)}$

7) $\begin{cases} 4x - 2y = -14 \\ y = -3x + 2 \end{cases}$

$4x - 2(-3x + 2) = -14$
$4x + 6x - 4 = -14$
$10x - 4 = -14$
$\underline{+4 \qquad +4}$
$\dfrac{10x}{10} = \dfrac{-10}{10}$
$x = -1$

Find y
$y = -3(-1) + 2$
$y = 3 + 2$
$y = 5$

$\boxed{(-1, 5)}$
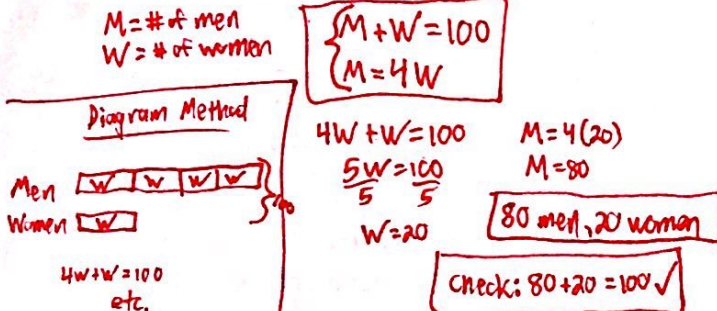
Solving Systems by Elimination: Review

Solve by elimination. Use the back if necessary. Don't forget to find both x and y!!!

1) $\begin{cases} x + 4y = 9 \\ 3x - 4y = 19 \end{cases}$ don't need to multiply

$\dfrac{4x}{4} = \dfrac{28}{4}$
$x = 7$

Find y
$7 + 4y = 9$
$\underline{-7 \qquad -7}$
$\dfrac{4y}{4} = \dfrac{2}{4}$
$y = \frac{1}{2}$ or 0.5

$\boxed{\left(7, \frac{1}{2}\right)}$

2) $\begin{cases} 2(-x + 2y = -7) \to -2x + 4y = -14 \\ 2x - 3y = 8 \to 2x - 3y = 8 \end{cases}$
$y = -6$

Find x
$2x - 3(-6) = 8$
$2x + 18 = 8$
$\underline{-18 \; -18}$
$\dfrac{2x}{2} = \dfrac{-10}{2}$
$x = -5$

$\boxed{(-5, 6)}$

3) $\begin{cases} 5x + 3y = -14 \to 5x + 3y = -14 \\ -1(5x - 4y = 42) \to -5x + 4y = -42 \end{cases}$
$\dfrac{7y}{7} = \dfrac{-56}{7}$
$y = -8$

Find x
$5x + 3(-8) = -14$
$5x - 24 = -14$
$\underline{+24 \quad +24}$
$\dfrac{5x}{5} = \dfrac{10}{5}$
$x = 2$

$\boxed{(2, -8)}$

4) Farmer Ben has 22 animals – all are either ducks or cows. Each cow has 4 legs, each duck has 2 legs, and there are 56 legs all together. Write and solve a system to find out how many of each type of animal Farmer Ben has. Make sure to check your answer.

$-2(D + C = 22) \to -2D - 2C = -44$
$2D + 4C = 56 \to 2D + 4C = 56$
$\dfrac{2C}{2} = \dfrac{12}{2}$
$C = 6$

$\dfrac{22}{-6}$
$D = 16$

$\boxed{16 \text{ ducks}, 6 \text{ cows}}$

check: $16 \cdot 2 + 6 \cdot 4 = 56$
$32 + 24 = 56$
$56 = 56$ ✓

5) $\begin{cases} 3(2x + 6y = 22) \to 6x + 18y = 66 \\ -2(3x - 4y = 7) \to -6x + 8y = -14 \end{cases}$
$\dfrac{26y}{26} = \dfrac{52}{26}$
$y = 2$

Find x
$2x + 6(2) = 22$
$2x + 12 = 22$
$\underline{-12 \quad -12}$
$\dfrac{2x}{2} = \dfrac{10}{2}$
$x = 5$

$\boxed{(5, 2)}$

6) Check your answer for one of the problems from #1-3 or 5 by plugging the numbers into both original equations.

① $7 + 4(\frac{1}{2}) = 9$
$7 + 2 = 9$
$9 = 9$ ✓
$3(7) - 4(\frac{1}{2}) = 19$
$21 - 2 = 19$
$19 = 19$ ✓

② $-(-5) + 2(6) = -7$
$5 + 12 = -7$
$-7 = -7$ ✓
$2(-5) - 3(-6) = 8$
$-10 + 18 = 8$
$8 = 8$ ✓

③ $5(2) + 3(-8) = -14$
$10 + -24 = -14$
$-14 = -14$ ✓
$5(2) - 4(-8) = 42$
$10 + 32 = 42$
$42 = 42$ ✓

⑤ $2(5) + 6(2) = 22$
$10 + 12 = 22$
$22 = 22$ ✓
$3(5) - 4(2) = 7$
$15 - 8 = 7$
$7 = 7$ ✓