| **Solving Systems of Equations Review** | Name:___*Key*_____ |

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1. Which is the solution to the following system of equations?

$$y = \frac{3}{2}x - 2$$

$$y = -x + 3$$

A)

B)

$y = -x + 3$

$y = \frac{3}{2}x - 2$

C)

D)
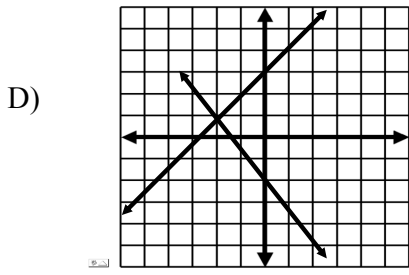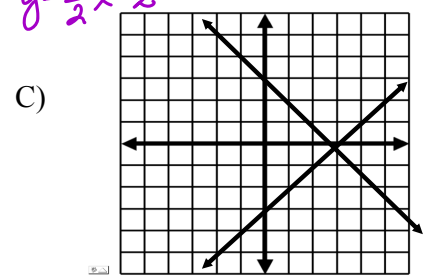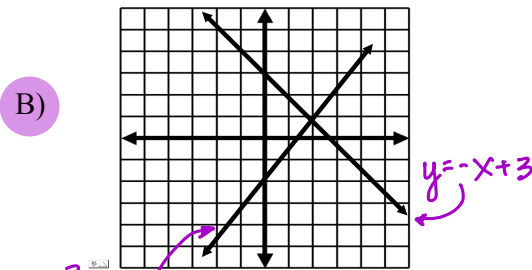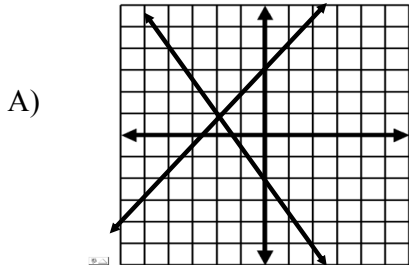
E) None of the above

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2. Solve the system using substitution.
- x + 2y = -1
- y = -3x – 8

$$x + 2(-3x - 8) = -1 \qquad x + 2y = -1$$
$$x - 6x - 16 = -1 \qquad -3 + 2y = -1$$
$$-5x - 16 = -1 \qquad +3 \qquad +3$$
$$+16 \ +16 \qquad \frac{2y}{2} = \frac{2}{2}$$
$$\frac{-5x}{-5} = \frac{15}{-5} \qquad y = 1$$
$$x = -3$$

A) (2, -1)
B) (-3, -1)
C) (2, -2)
D) (-3, -17)
E) None of the above

$(-3, 1)$

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3. The equations of two lines are:

$2[4x + y = 10] \to 8x + 2y = 20$

$3x - 2y = 13$

What is the intersection of these two lines?

$$8x + 2y = 20$$
$$+ \quad 3x - 2y = 13$$
$$\frac{11x}{11} = \frac{33}{11}$$
$$x = 3$$

$(3, -2)$

A) (2, 3)
B) (3, -2)
C) (-1, 14)
D) (3, -6)
E) None of the above

$$4x + y = 10$$
$$4(3) + y = 10$$
$$12 + y = 10$$
$$-12 \qquad -12$$
$$y = -2$$

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4. Graph the given system and determine which best describes the number of solutions it has.

- y = 2x + 1

- $y = \frac{3}{2}x$
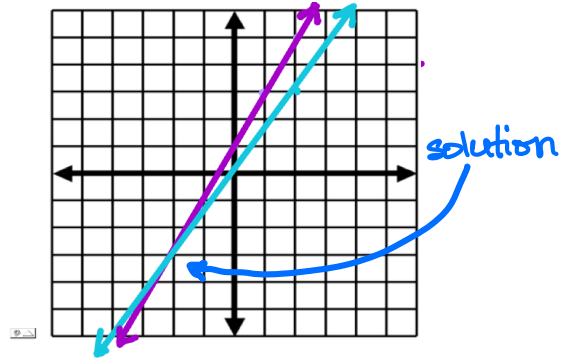
solution

A) No solutions   B) infinite solutions

C) 1 solution   D) 2 solutions

5. Which might be your first step if you want to solve the system by elimination?

1st equation: $5x + 4y = 7$
2nd equation: $2x - 3y = 3$

    A) Substitute $-10y + 7$ for x in the second equation.
    B) Substitute $3y + 3$ for x in the second equation.
    C) Multiply the first equation by 3, multiply the second equation by 4, then add the resulting equations together.
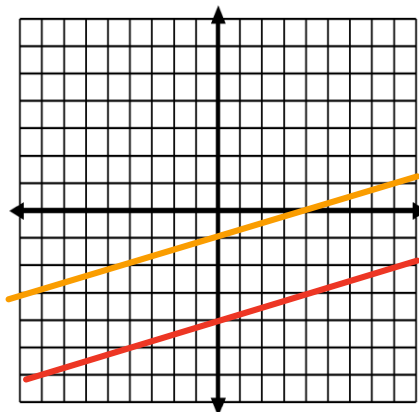   D) Multiply the first equation by 2, multiply the second equation 5, then add the resulting equations together.

6. Which is the solution for the system below.

$x = -4y + 10$
$x = 2y - 14$

$$-4y + 10 = 2y - 14$$
$$\underline{-10 \quad -10}$$
$$-4y = 2y - 24$$
$$\underline{-2y \quad -2y}$$
$$\frac{-6y}{-6} = \frac{-24}{-6}$$
$$y = 4$$

$$x = -4y + 10$$
$$x = -4(4) + 10$$
$$x = -16 + 10$$
$$x = -6$$

  A) $(-6, 4)$
  B) $(4, -6)$
  C) $(6, -2)$
  D) $(-2, 6)$
  E) None of the above

$(-6, 4)$

7. Graph and determine which is the solution.

$y = \frac{1}{4}x - 4$

$2x - 8y = 8$
$$\underline{-2x \qquad -2x}$$
$$\frac{-8y}{-8} = \frac{-2x}{-8} + \frac{8}{-8}$$
$$y = \frac{1}{4}x - 1$$

Parallel lines. Same slope as first equation.

A) $(0, -4)$ B) $(-4, 0)$ C) No solution   D) Infinite Solutions

9. Which is the solution to the system shown below.

$-3x + 2y = 17$
$+\ 3x - 7y = -37$
$$\frac{-5y}{-5} = \frac{-20}{-5}$$
$$y = 4$$

$$3x + 2(4) = 17$$
$$-3x + 8 = 17$$
$$\underline{-8 \quad -8}$$
$$\frac{-3x}{-3} = \frac{9}{-3}$$
$$x = -3$$

$(-3, 4)$

  A) $(4, -3)$
  B) $(-3, 4)$
  C) $(-3, -4)$
  D) $(-4, -3)$
  E) None of the above

8. Solve the given system.

$4x - 5y = 40$
$x = 3y + 24$

$$4(3y + 24) - 5y = 40$$
$$12y + 96 - 5y = 40$$
$$7y + 96 = 40$$
$$\underline{-96 \quad -96}$$
$$\frac{7y}{7} = \frac{-56}{7}$$
$$y = -8$$

$$x = 3y + 24$$
$$x = 3(-8) + 24$$
$$x = -24 + 24$$
$$x = 0$$

$(0, -8)$

  A) $(0, 8)$
  B) $(8, 0)$
  C) $(-8, 0)$
  D) $(0, -8)$
  E) None of the above

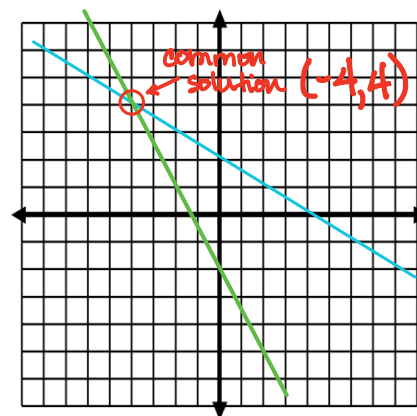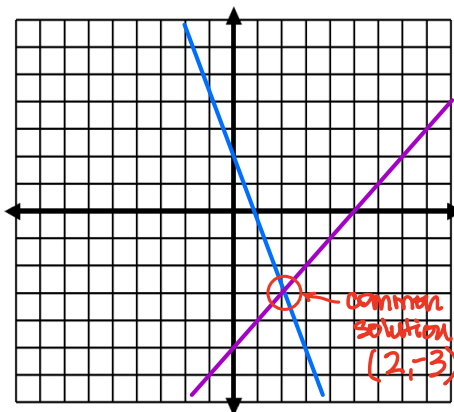|	
10. Solve using Substitution 4x = -8y + 20 y = -2x + 7 *(handwritten:)* $(3,1)$ $4x = -8(-2x+7)+20$ $4x = 16x - 56 + 20$ $4x = 16x - 36$ $\underline{-16x \quad -16x}$ $\dfrac{-12x}{-12} = \dfrac{-36}{-12}$ $x = 3$ $y = -2x+7$ $y = -2(3)+7$ $y = -6+7$ $y = 1$	**11. Graph the given system and determine which is the solution.** $y = -\dfrac{1}{2}x + 2$ $y = -\dfrac{3}{2}x - 2$ *(handwritten on graph:)* common solution $(-4,4)$ A) (1, 2) B) (2, 1) C) (-4, 4) *(circled)* D) (4, -4) E) None of the above
12. Solve the given systems 5x − 10y = 7 5[x − 2y = 3] *(handwritten:)* $5x - 10y = 7$ $\underline{-\ 5x - 10y = 15}$ $0 = -8$ $5x - 10y = 7$ $\underline{-5x \qquad -5x}$ $\dfrac{-10y}{-10} = \dfrac{-5x+7}{-10} \quad \dfrac{}{-10}$ $y = \frac{1}{2}x - \frac{7}{10}$ $x - 2y = 3$ $\underline{-x \qquad -x}$ $\dfrac{-2y}{2} = \dfrac{-x}{2} + \dfrac{3}{2}$ $y = -\frac{1}{2}x + \frac{3}{2}$ A) No Solution *(circled)* B) Infinite Solutions C) (5, 0) D) (1, 2) *(handwritten:)* They are parallel lines. Same slopes, different y-ints.	**13. Which would be a good first step to use to solve this system?** 1st equation: y = 6x + 4 2nd equation: 5x + 2y = 12 A) Multiply the first equation by 2, and add the result to the second equation. B) Substitute 5x + 12 for for y in first equation. C) Substitute 6x + 4 for x in the second equation. D) Substitute 6x + 4 for y in the second equation. *(circled)*
14. Solve using Elimination 4[3x − 3y = -9] 3[-4x + 5y = 8] *(handwritten:)* $12x - 12y = -36$ $\underline{+\ -12x + 15y = 24}$ $\dfrac{3y}{3} = \dfrac{-12}{3}$ $y = -4$ $(-7,-4)$ $3x - 3y = -9$ $3x - 3(-4) = -9$ $3x + 12 = -9$ $\underline{-\ 12 \quad -12}$ $\dfrac{3x}{3} = \dfrac{-21}{3}$ $x = -7$	**15. Solve the given system.** 3y = -4x − 22 y = -5x − 11 *(handwritten:)* $3(-5x-11) = -4x-22$ $-15x - 33 = -4x - 22$ $\underline{+33 \qquad +33}$ $-15x = -4x + 11$ $\underline{+4x \qquad +4x}$ $\dfrac{-11x}{-11} = \dfrac{11}{-11}$ $x = -1$ $(-1,-6)$ A) (1, 16) B) (16, 1) C) (-6, -1) D) (-1, -6) *(circled)* E) none of the above $y = -5x - 11$ $y = -5(-1) - 11$ $y = 5 - 11$ $y = -6$

16. Solve by graphing

$5x + 2y = 4$
$4x - 4y = 20$

$5x + 2y = 4$
$-5x \quad -5x$
$\dfrac{2y}{2} = \dfrac{-5x}{2} + \dfrac{4}{2}$
$y = -\dfrac{5}{2}x + 2$

$4x - 4y = 20$
$4(0) - 4y = 20$
$-4y = 20$
$\dfrac{-4y}{-4} = \dfrac{20}{-4}$
$y = -5$

$4x - 4(0) = 20$
$\dfrac{4x}{4} = \dfrac{20}{4}$
$x = 5$

Intercepts
$(0, -5)$
$(5, 0)$

common solution $(2, -3)$

Solution: __$(2, -3)$__

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17. Solve the given system.

$5[3x + 7y = 5]$
$3[5x + 2y = -11]$

$15x + 35y = 25$
$15x + 6y = -33$

$\dfrac{29y}{29} = \dfrac{58}{29}$
$y = 2$

$(-3, 2)$

$3x + 7y = 5$
$3x + 7(2) = 5$
$3x + 14 = 5$
$-14 \quad -14$
$\dfrac{3x}{3} = \dfrac{-9}{3}$
$x = -3$

A) (-2, -3)
B) (-3, -2)
C) (3, -5)
D) (-5, 3)
E) none of the above

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18. How many solutions does the given system have?

• $y = 3x - 1$
$6x - 2y = 2$

$6x - 2(3x - 1) = 2$
$6x - 6x + 2 = 2$
$2 = 2$

For infinite solutions the equations must be the same. Let's check:

$6x - 2y = 2$
$-6x \quad -6x$
$\dfrac{-2y}{-2} = \dfrac{-6x}{-2} + \dfrac{2}{-2}$
$y = 3x - 1$ ✓

A) one solution
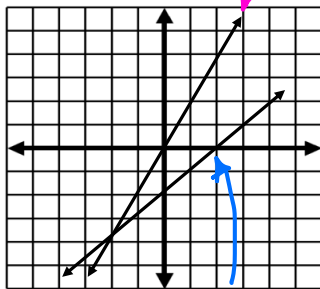B) two solutions
C) infinite solutions
D) no solution

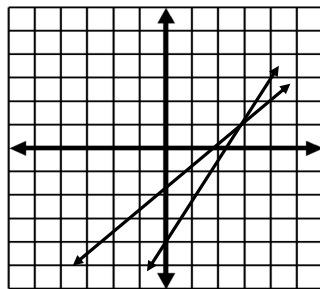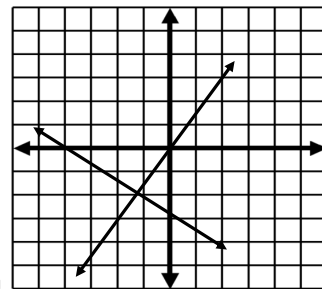19. Which two lines represent the solution for the given system: $2x - y = 0$
$y = x - 2$

A)

B)

$2x - y = 0$

$y = x - 2$

C)

D)
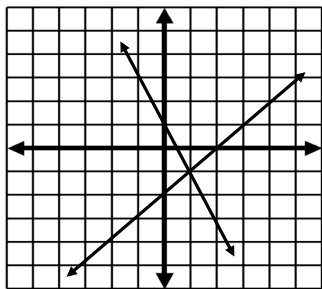
20. Solve the given system.

$4x - 4y = 20$
$3x - 4y = 15$

$$x = 5$$

$4x - 4y = 20$
$4(5) - 4y = 20$
$20 - 4y = 20$
$-20 \qquad -20$
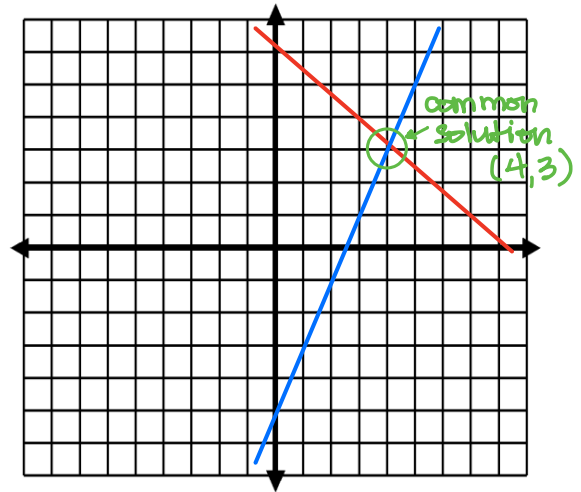$\overline{\qquad}$
$-4y = 0$
$-4 \quad -4$
$y = 0$

$(5, 0)$

A) (5, 0)
B) (-4, 7)
C) (5, 10)
D) (-4, 4)
E) none of the above

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21. Solve by graphing:

● $y = -\dfrac{3}{4}x + 6$

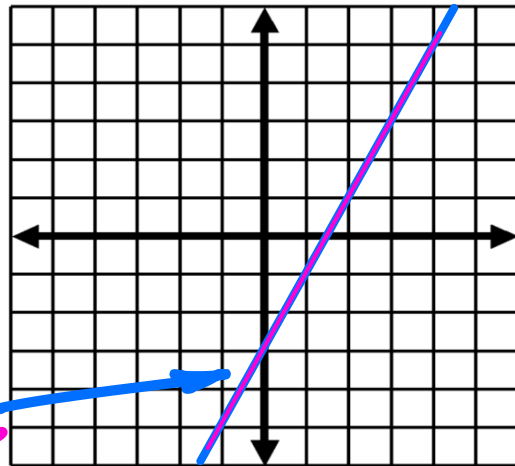● $y = 2x - 5$

common solution (4,3)

Solution $(4,3)$

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22. A) Graph the given system of equations and **explain** what your answer means.

● $6x + 3y = -9$
● $2x + y = -3$

$2x + y = -3$
$-2x \qquad -2x$
$\overline{\qquad}$
$y = -2x - 3$

$6x + 3y = -9$
$-6x \qquad -6x$
$\overline{\qquad}$
$\dfrac{3y}{3} = \dfrac{-6x - 9}{3}$
$y = -2x - 3$

Same Lines

Infinite Solutions

B) Solve your system mathematically and explain **how you got your answer.**

$-3[2x + y = -3]$

$6x + 3y = -9$

$6x + 3y = -9$
$+ \quad -6x - 3y = 9$
$\overline{\qquad}$
$0 = 0$

Using elimination, both variables were eliminated and I ended up with a true statement (0=0). Because the resulting statement is true, the equations must be equal which means there are infinite solutions.

Solve the following systems of equations. Don't forget to define variables! Feel free to use extra paper if needed.

1. The senior classes at High School A and High School B planned separate trips to the indoor climbing gym. The senior class at High School A rented and filled 3 vans and 13 buses with 612 students. High School B rented and filled 3 vans and 6 buses with 297 students. Each van and each bus carried the same number of students. Find the number of students in each van and in each bus

Let x = # of students in a van
Let y = # of students in a bus

$$3x + 13y = 612$$
$$- \quad 3x + 6y = 297$$
$$\overline{\qquad\qquad}$$
$$\frac{7y}{7} = \frac{315}{7}$$
$$y = 45$$

$$3x + 6y = 297$$
$$3x + 6(45) = 297$$
$$3x + 270 = 297$$
$$\underline{\quad -270 \quad -270}$$
$$\frac{3x}{3} = \frac{27}{3}$$
$$x = 9$$

9 students/van and 45 students/bus

2. Alberto and Ryan each improved their yards by planting hostas and geraniums. They bought their supplies from the same store. Alberto spent $13 on 2 hostas and 1 geranium. Ryan spent $83 on 10 hostas and 7 geraniums. Find the cost of one hosta and the cost of one geranium.

Let x = cost of 1 hosta
Let y = cost of 1 geranium

$$-5 \begin{bmatrix} 2x + y = 13 \end{bmatrix} \longrightarrow -10x - 5y = -65$$
$$10x + 7y = 83 \qquad + \underline{\quad 10x + 7y = 83 \quad}$$
$$\frac{2y}{2} = \frac{18}{2}$$
$$y = 9$$

$$2x + y = 13$$
$$2x + 9 = 13$$
$$\underline{\quad -9 \quad -9}$$
$$\frac{2x}{2} = \frac{4}{2}$$
$$x = 2$$

$2/hosta and $9/geranium

3. Shawna and Mark each improved their yards by planting rose bushes and ornamental grass. They bought their supplies from the same store. Shawna spent $16 on 1 rose bush and 6 bunches of ornamental grass. Mark spent $36 on 4 rose bushes and 10 bunches of ornamental grass. What is the cost of one rose bush and the cost of one bunch of ornamental grass?

Let x = cost of a rose bush
Let y = cost of an ornamental grass

$$4[x + 6y = 16] \rightarrow 4x + 24y = 64$$
$$4x + 10y = 36 \qquad - \; 4x + 10y = 36$$
$$\frac{14y}{14} = \frac{28}{14}$$
$$y = 2$$

$$x + 6y = 16$$
$$x + 6(2) = 16$$
$$x + 12 = 16$$
$$\underline{-12 \quad -12}$$
$$x = 4$$

$4/rose bush and $2/bunch of grass

4. Jack and Shanice are selling flower bulbs for a school fundraiser. Customers can buy bags of windflower bulbs and packages of crocus bulbs. Jack sold 4 bags of windflower bulbs and 10 packages of crocus bulbs for a total of $166. Shanice sold 13 bags of windflower bulbs and 2 packages of crocus bulbs for a total of $82. Find the cost each of one bag of windflower bulbs and one package of crocus bulbs.

Let x = cost of a bag of windflower bulbs
Let y = cost of a package of crocus bulbs

$$4x + 10y = 166 \rightarrow 4x + 10y = 166$$
$$5[13x + 2y = 82] \quad - \; 65x + 10y = 410$$
$$\frac{-61x}{-61} = \frac{-244}{-61}$$
$$x = 4$$

$$4x + 10y = 166$$
$$4(4) + 10y = 166$$
$$16 + 10y = 166$$
$$\underline{-16 \qquad -16}$$
$$\frac{10y}{10} = \frac{150}{10}$$
$$y = 15$$

Windflower Bulbs = $4
Crocus Bulbs = $15