

## Systems of Equations

MGSE8.EE.8.a-c – Analyze and solve systems of simultaneous linear equations.

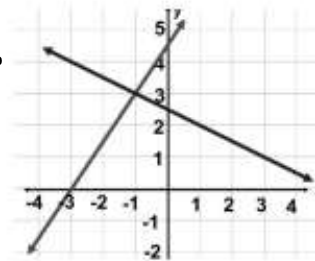
### Systems Review Tips:

- I. A **solution** to a system means “the point  $(x,y)$  where the two lines intersect on a graph” or the  $(x,y)$  pair that the two equations would share.
- II. **Graphing** – systems set up for graphing will both start with “ $y =$ ” [Example:  $y = 2x - 7$  and  $y = -3x$ ]
- III. **Substitution**: systems set up for substitution will have one equation starting with “ $y =$ ” or “ $x =$ ” and one in standard form [Example:  $4x - y = 9$  and  $y = -3x + 1$ ]
- When solving using *substitution*, “plug in” what  $y$  equals to the other equation [Example:  $4x - (-3x + 1) = 9$ ]
  - Solve the equation for  $x$ . When finished, plug your solution back into either equation for  $x$ , to solve for  $y$ .
  - Your final answer will be two numbers in coordinate pair format:  $(x, y)$ .
- IV. **Elimination**: systems set up for elimination will have both equations in standard form.
- [Example:  $3x - 2x = 9$  and  $7x + 2x = 10$ ].
- In order to solve using *elimination*, either the  $x$ 's or  $y$ 's must “eliminate” when combining the two equations.
  - After eliminating one variable, solve for the other.
  - After solving for one variable, plug the solution back in to either equation to solve for the other.
  - Your final answer will be two numbers in coordinate pair format  $(x,y)$ .
- V. **Word Problems**: when attempting to set up a system of equations from a word problem, follow these steps:
- First, identify the two totals. Put them at the end of the equation, after the equals signs.
  - Second, identify the variables you need to find and decide how they interact  $(+, -, x, /)$  to get your totals.
  - Third, identify if the variables will have any coefficients in either equation.
  - Finally, solve using either elimination or substitution, whichever would be more appropriate.

### Practice Problems:

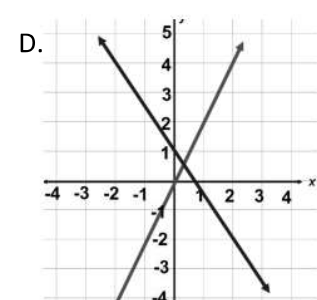
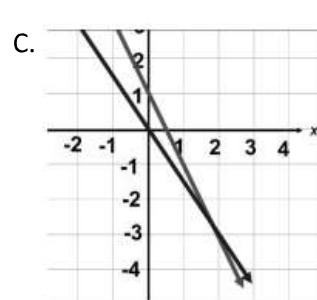
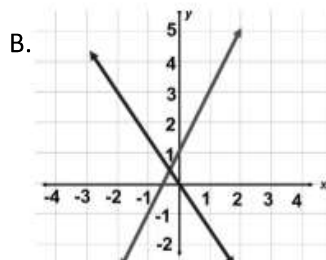
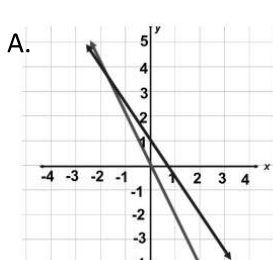
❶ What is the solution to the system of equations graphed below?

- A.  $(3, -1)$                       B.  $(-1, 3)$   
 C.  $(4.5, 2.5)$                   D.  $(-3, 2.5)$



❷ Which graph shows the solution to the system of equations?

$y = -2x + 1$     and     $y = -\frac{3}{2}x$



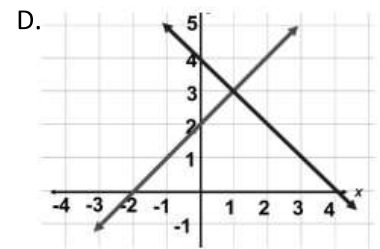
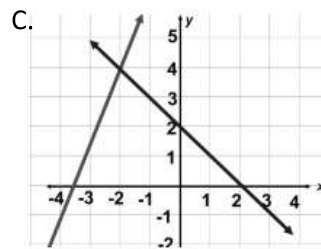
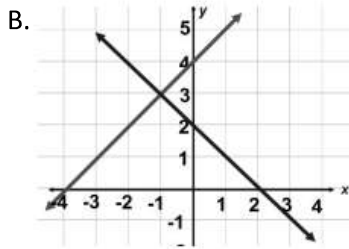
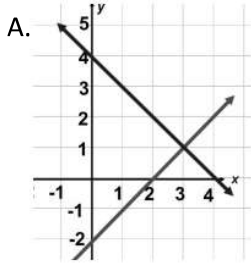
3 What is the solution to the system of equations?

$$y = -2x + 1 \quad \text{and} \quad 2x + 3y = 19$$

- A. (-4, 9)                      B. (4, -7)                      C. (4, 9)                      D. (9, -4)

4 Which graph shows the solution to the system of equations?

$$\begin{aligned} x + y &= 4 \\ x - y &= -2 \end{aligned}$$



5 Which step could be completed in order to prepare the system of equations below for the *elimination* method?

- A. Multiply the 1<sup>st</sup> equation by -2.  
B. Multiply the 2<sup>nd</sup> equation by 2.  
C. Multiply the 1<sup>st</sup> equation by 2  
D. Multiply the 2<sup>nd</sup> equation by -2

$$\begin{aligned} \text{1<sup>st</sup> Equation: } &5x - 3y = 10 \\ \text{2<sup>nd</sup> Equation: } &8x + 6y = 15 \end{aligned}$$

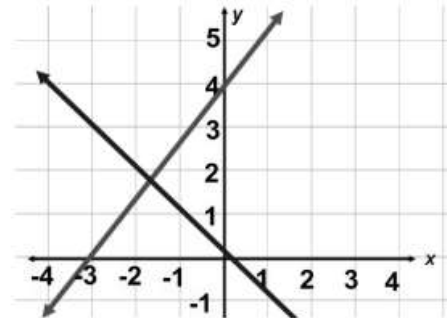
6 What is the solution to the system of equations?

$$y = -2x + 1 \quad \text{and} \quad y = -\frac{4}{7}x + 1$$

- A. (0, 1)                      B. (1, 0)                      C. (-2, 1)                      D.  $(-2, -\frac{4}{7})$

7 What is the best estimate of the solution to the system of equations graphed below?

- A. (-2.3, 1.8)  
B. (-1.8, 1)  
C. (-1.8, 1.8)  
D. (-2.8, 1.8)



8 In a barn there are 17 animals. Some are cows and some are ducks. There are 54 legs in all. Which system of equations below could be used to find how many cows and how many ducks are in the barn?

- A.  $c + d = 17$                       B.  $c + d = 54$                       C.  $c + d = 17$                       D.  $c + d = 17$   
 $4c + 2d = 54$                        $4c + 2d = 17$                        $2c + 4d = 54$                        $4c + 2d = 6cd$

9 The sum of two numbers is 3. Their difference is 13. What are the two numbers?

- A. 8 and 5                      B. 8 and -5                      C. 1 and 2                      D. 20 and 7