

# RAFT

I will take up the spring question after RAFT

## Minds on

### Exploring Linear Systems

**T/P/S:** How many ways can 2 lines intersect?

- intersect once  $\rightarrow$  1 solution
- intersect always  $\rightarrow$   $\infty$  solutions
- never intersect  $\rightarrow$  0 solutions

**T/P/S:** How many solutions can a linear system have?

**Action!**

Solve each system of linear equations algebraically. Record the number of solutions you determine.

	A	B	C
Linear System	$2x + 3y = -4$ $-4x - 3y = -1$	$3x + 2y = 6$ $6x + 4y = 5$	$x - y = 5$ $3x - 3y = 15$
Number of Solutions	1	0	$\infty$

$$2x + 3y = -4 \quad \textcircled{1}$$

$$-4x - 3y = -1 \quad \textcircled{2}$$

$$\begin{array}{r} \textcircled{1} + \textcircled{2} + \quad 2x + 3y = -4 \\ \quad \quad \quad -4x - 3y = -1 \\ \hline \quad \quad \quad -2x = -5 \\ \quad \quad \quad \frac{-2x}{-2} = \frac{-5}{-2} \\ \quad \quad \quad \boxed{x = 2.5} \end{array}$$

Sub  $x = 2.5$  into  $\textcircled{1}$

$$\begin{array}{r} 2(2.5) + 3y = -4 \\ 5 + 3y = -4 \\ 3y = -9 \\ \boxed{y = -3} \end{array}$$

$\therefore (2.5, -3)$  is the solution

$$\begin{array}{r} \text{Sub } x = 2.5 \text{ into } \textcircled{2} \\ -4(2.5) - 3y = -1 \\ -10 - 3y = -1 \\ -3y = 9 \\ \boxed{y = -3} \end{array}$$

**Action!**

## System A

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

**Action!**

## System B

$$3x + 2y = 6 \quad \textcircled{1}$$

$$6x + 4y = 5 \quad \textcircled{2}$$

$$\textcircled{1} \times 2 \quad 6x + 4y = 12 \quad \textcircled{3}$$

$$\begin{array}{r} \textcircled{2} - \textcircled{3} \\ 6x + 4y = 5 \\ - \quad 6x + 4y = 12 \\ \hline 0 = -7 \end{array}$$

$0 \text{ never equals } -7$

No solutions!  
 $\therefore$  lines are parallel

**Action!**

## System C

$$x - y = 5 \quad \textcircled{1}$$

$$3x - 3y = 15 \quad \textcircled{2}$$

Rearrange  $\textcircled{1}$ 

$$x - y = 5$$

$$\boxed{x = 5 + y} \quad \textcircled{3}$$

Sub  $\textcircled{3}$  into  $\textcircled{2}$ 

$$3(5 + y) - 3y = 15$$

$$15 + 3y - 3y = 15$$

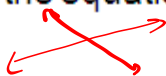
$$15 = 15$$

∴ infinite solutions

15 always equals 15

**Action!**

2. Examine your algebraic solution for each system. How do you think the lines that represent the equations in this system intersect?

1 solution 

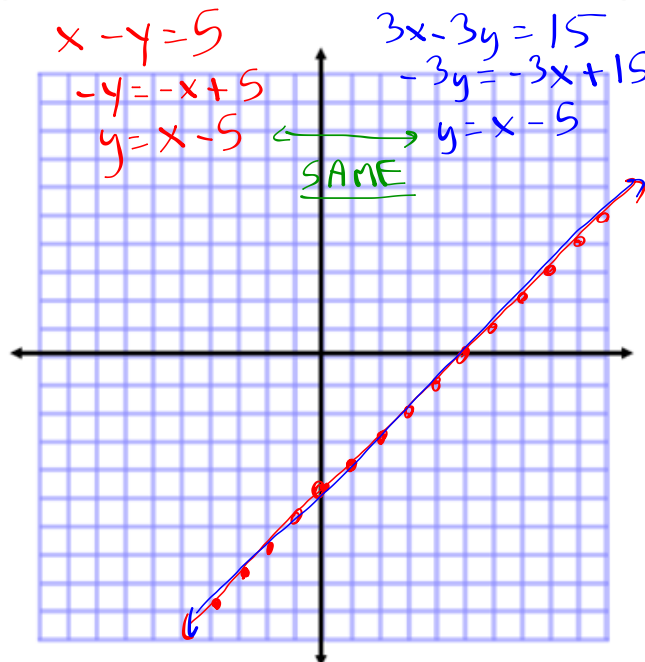
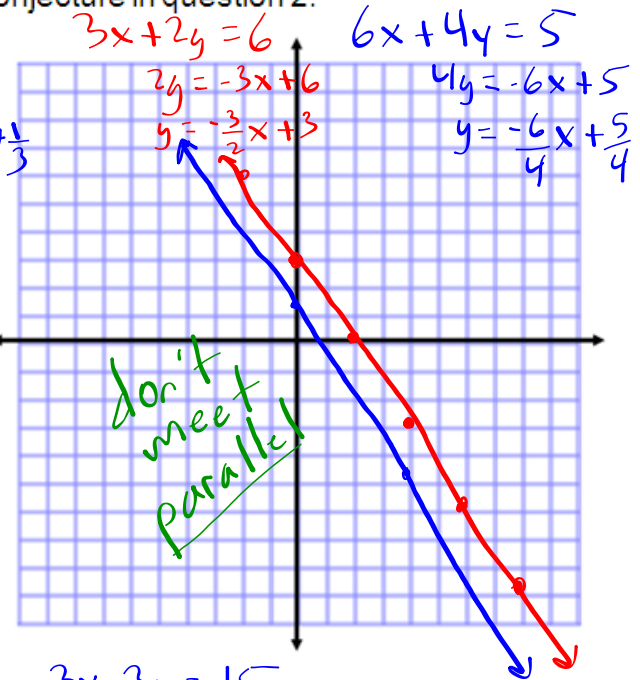
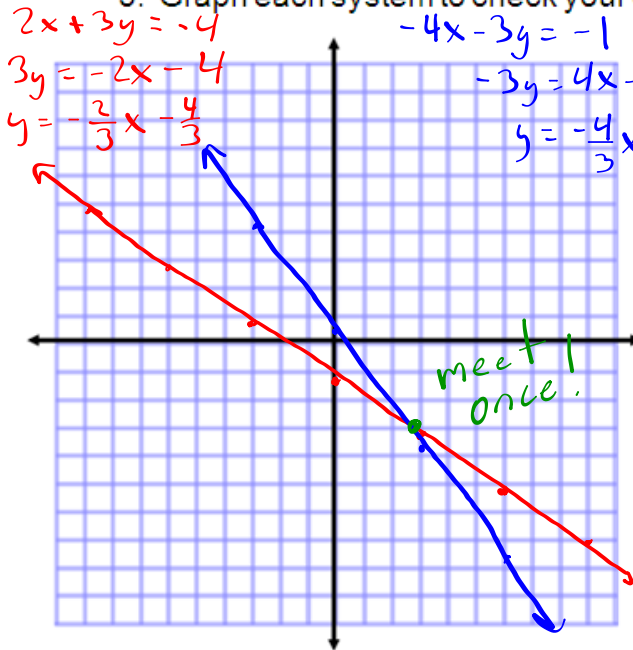
0 solutions 

$\infty$  solutions 



## Action!

3. Graph each system to check your conjecture in question 2.

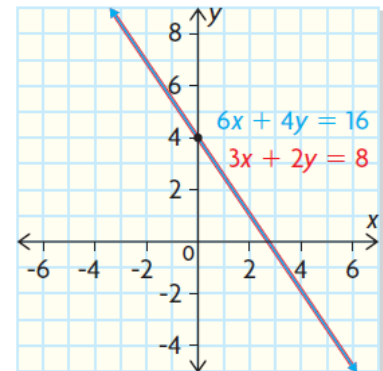
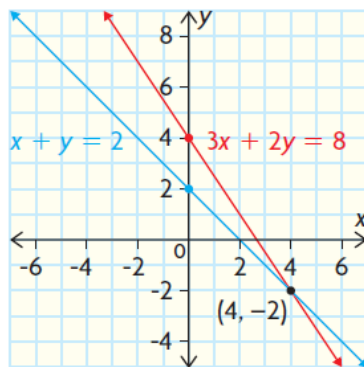
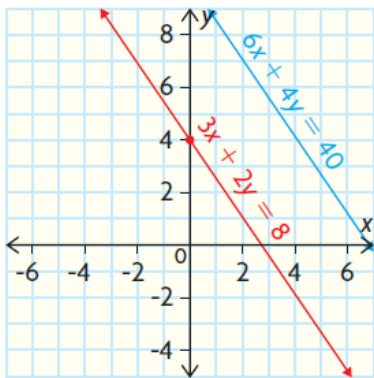


## Consolidation

### 4. Examine the equations in each system. Are there clues that tell you how the lines will intersect?

#### Need to Know

- When a linear system has no solution, the graphs of both lines are parallel and never intersect. The coefficients in the equations are multiplied by the same amount, but the constants are not.
- When a linear system has one solution, the graphs of the two lines intersect at a single point. The coefficients and constants in the equations are not multiplied by the same amount.
- When a linear system has an infinite number of solutions, the graphs of both equations are identical and intersect at every point. The coefficients and constants in the equations are multiplied by the same amount.



No solutions: - variable coefficients are multiples of each other  
- constants not same multiple

$\infty$  solutions: - variable coefficients AND constants are all same multiple

1 solution: - all values are different multiples of each other

## Consolidation

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