Name: KEY Hour: ____________ Date: ____________

NOTES: Section 7.5 – Special Types of Linear Systems

Goals: #1 - I can identify how many solutions a linear system has.

Homework: Section 7.5 Worksheet

Exploration #1: Work with a partner. Graph both linear equations on the same graph.

$4x + y = 8$

$-4x \qquad -4x$

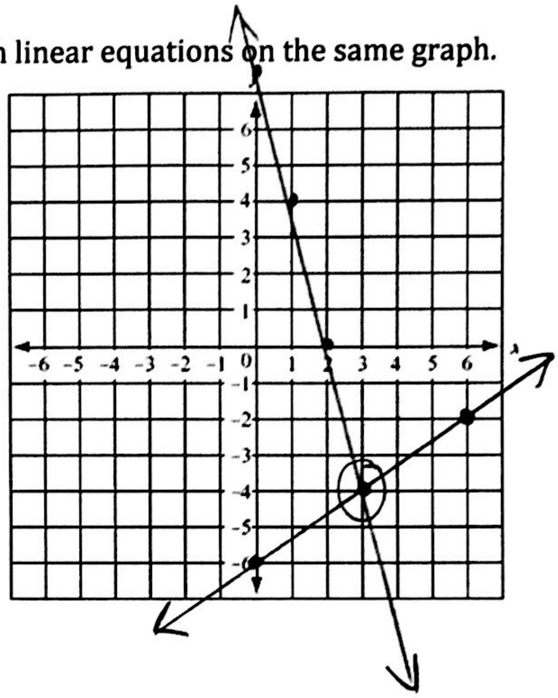
$y = -4x + 8$

$2x - 3y = 18$

$-2x \qquad -2x$

$\frac{-3y}{-3} = \frac{-2x}{-3} + \frac{18}{-3}$

$y = \frac{2}{3}x - 6$



Circle where these lines intersect. Can you check if your answer is correct?

$(3, -4)$

$4(3) + (-4) \stackrel{?}{=} 8$

$12 - 4 \stackrel{?}{=} 8$

$8 = 8$ ✓

$2(3) - 3(-4) \stackrel{?}{=} 18$

$6 + 12 \stackrel{?}{=} 18$

$18 = 18$ ✓

Notes:

A linear system, consists of two linear equations.

A solution of a system of linear equations, is an ordered pair (x, y) where the graphs of the equations in a system intersect.

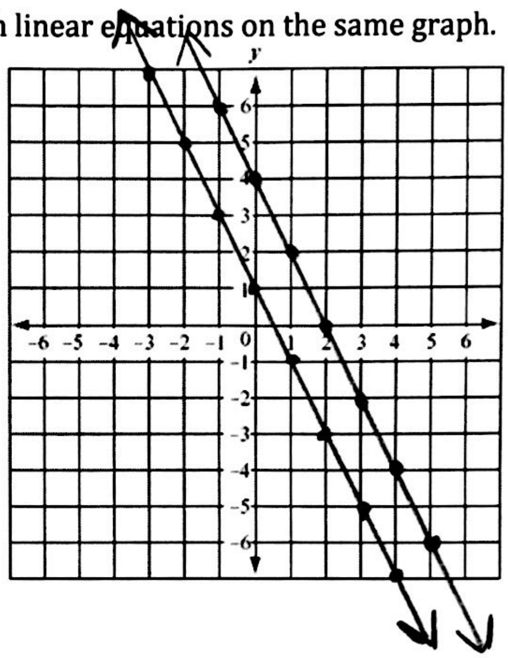
Scanned by CamScanner

Name:________________________ Hour: __________ Date: __________

Exploration #2: Work with a partner. Graph both linear equations on the same graph.

$2x + y = 4$
$-2x \quad -2x$
$y = -2x + 4$

$2x + y = 1$
$-2x \quad -2x$
$y = -2x + 1$



Circle where these lines intersect. Can you check if your answer is correct?

They don't ☹

Notes:

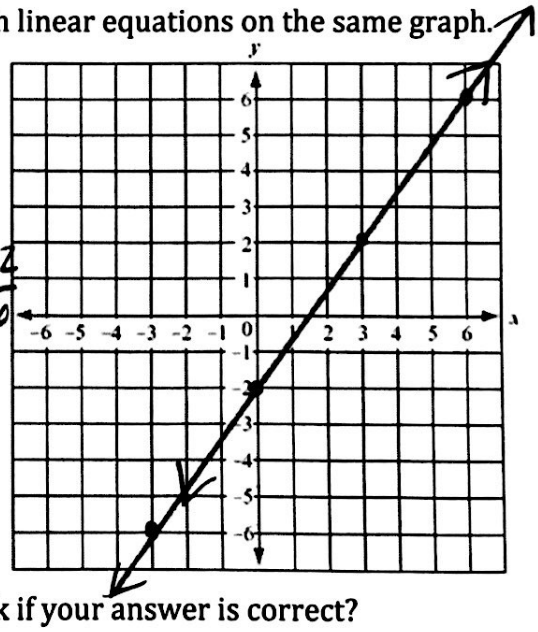
Lines that never intersect are called <u>parallel lines</u>.

Since the graphs of the system do <u>NOT</u> intersect, we have <u>no solution</u>.

Exploration #3: Work with a partner. Graph both linear equations on the same graph.

$4x - 3y = 6$
$-4x \quad -4x$
$\frac{-3y}{-3} = \frac{-4x}{-3} + \frac{6}{-3}$
$y = \frac{4}{3}x - 2$

$8x - 6y = 12$
$-8x \quad -8x$
$\frac{-6y}{-6} = \frac{-8x}{-6} + \frac{12}{-6}$
$y = \frac{4}{3}x - 2$



Circle where these lines intersect. Can you check if your answer is correct?

at every point!

Scanned by CamScanner

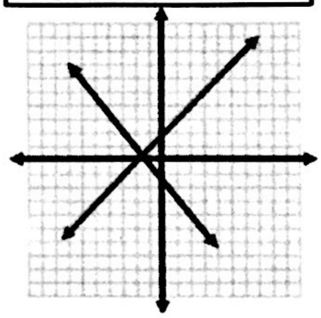
Name:________________________ Hour: __________ Date: __________

Notes:

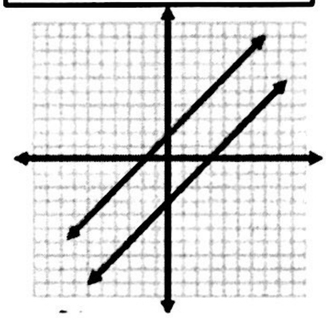
Lines that intersect at every point are the same line!.

Since the graphs of the system intersect at EVERY point, we have infinitely many solutions.

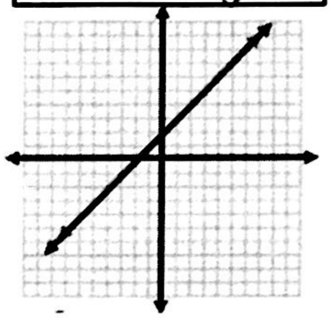
One solution



No solution

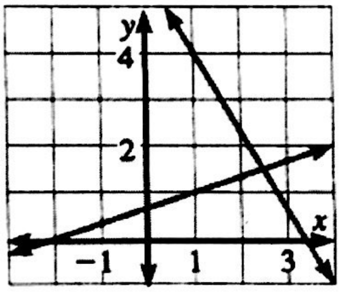


Infinitely Many



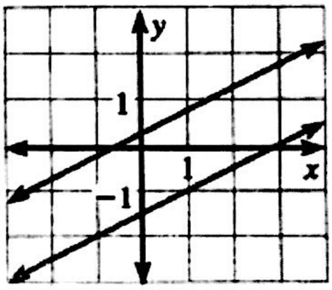
Example #1: Tell how many solutions the system has.

1.



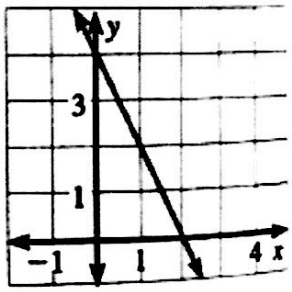
ONE

2.



NO SOLUTION

3.



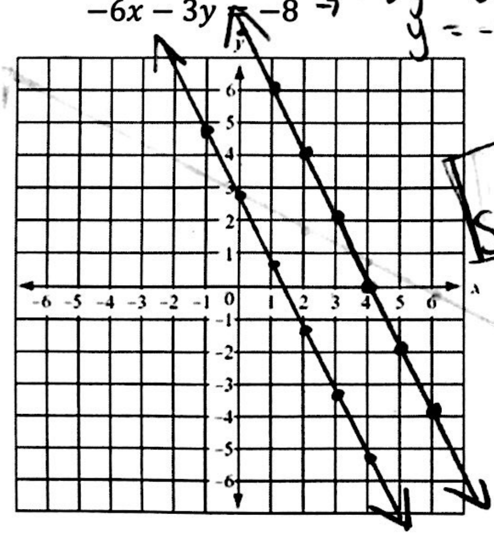
INFINITELY MANY

Example #2: Use the graphing method to tell how many solutions the system has.

1. $2x + y = 8$ → $y = -2x + 8$

$-6x - 3y = -8$ → $-3y = 6x - 8$

$y = -2x + \frac{8}{3}$

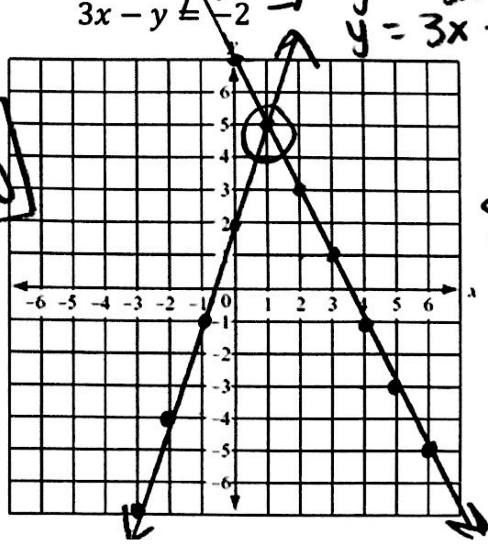


NO SOLUTION

2. $2x + y = 7$ → $y = -2x + 7$

$3x - y = -2$ → $-y = -3x - 2$

$y = 3x + 2$



ONE SOLUTION (1,5)

Name:______________________ Hour: __________ Date: __________

Warm Up: Use the graphing method to tell how many solutions the system has.

1. $-6x + 2y = 4$

$+6x \qquad +6x$

$2y = 6x + 4$

$y = 3x + 2$

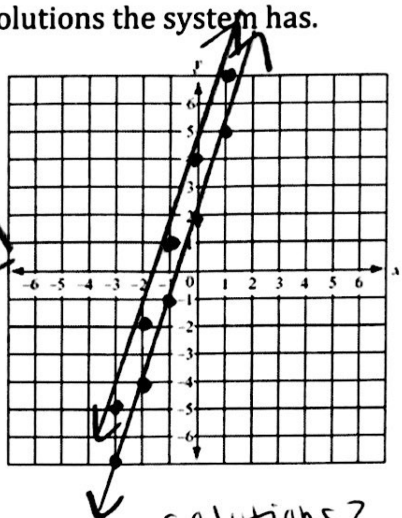
$-9x + 3y = 12$

$+9x \qquad +9x$

$3y = 9x + 12$

$y = 3x + 4$

NO SOLUTION



2. When would a linear system have infinitely many solutions?

when they are the same line!

Review:

We know that when we solve linear systems, we could have ONE solution, NO solution, or INFINITELY MANY solutions.

What does this look like algebraically?

ONE SOLUTION | **NO SOLUTION** | **INFINITELY MANY SOLUTIONS**

$x = 3$

$y = -1$

$(3, -1)$

when variables drop out

$12 \neq 8$

$0 = 0$

Example #3: Use substitution or elimination to solve the linear system.

a. $x - 2y = 4$ → $x = 4 + 2y$

$3x - 6y = 8$

$3(4 + 2y) - 6y = 8$

$12 + 6y - 6y = 8$

$12 \neq 8$

NO SOLUTION

b. $3(3x + y = -1)$

$-9\cancel{x} - 3\cancel{y} = 3$

$+ \; \cancel{9}x + \cancel{3}y = -3$

$0 = 0$

INFINITELY MANY SOLUTIONS

Name:________________________ Hour: __________ Date: __________

Example #4: Use substitution or elimination to solve the linear system. Then describe the graph of the system.

1. $-x + y = 7$ → $y = 7 + x$

   $2x - 2y = -18$

$2x - 2(7 + x) = -18$

$2x - 14 - 2x = -18$

$-14 \neq -18$

NO SOLUTION

These lines would be parallel lines.

2. $-3(-4x + y = -8)$

   $-12x + 3y = -24$

$+ \quad \cancel{12}x - \cancel{3}y = 24$

$0 = 0$

INFINITELY MANY SOLUTIONS

These lines would be the same line.

3. $-4x + y = -8$

   $4(2x - 2y = -14)$

$4x - 4y = -28$

$+ \quad -4x + y = -8$

$3y = -36$

$\boxed{y = 12}$

ONE SOLUTION (5, 12)

$-4x + 12 = -8$

$-4x = -20$

$\boxed{x = 5}$

These lines would intersect at (5, 12)