Name: Key

Lesson 6.4 – Solving Systems

System = more than one equation

Solving = find the intersection where ALL equations in system are true

Examples: Determine whether the ordered pair is a solution to the linear system.

a) ① $3x+y=11$ ② $x-2y=6$ $(4,-1)$

① $3(4)+(-1)=11$?
$12-1=11$ ✓

② $(4)-2(-1)=6$?
$4+2=6$? ✓

Yes
(4,-1) is a solution

b) $3x+y=11$ $x-2y=6$ $(-1,1)$

① $3x+y=11$
$3(-1)+(1)=11$?
$-3+1=11$?
$-2 \neq 11$

No
(-1,1) is NOT a solution

Assignment:

Determine whether the ordered pair is a solution to the linear system.

a) $3x + y = 17$ $(5, 2)$
$2x + 3y = 17$

$3(5)+2=17$ ✓
$2(5)+3(2)=17$ NO
$16 \neq 17$

b) $2x + y = 11$ $(3, 5)$
$3x + 2y = 19$

$2(3)+(5)=11?$ ✓
$3(3)+2(5)=19?$ Yes
$19 = 19$ ✓

c) $x + 2y = -2$ $(2, -4)$
$2x + 5y = 23$

$(2)+2(-4)=-2$
$-6 \neq -2$ NO

d) $4x = 72 - y$ $(6, -2)$
$3x = -7y - 4$

$4(6)=72-(-2)$
$24 \neq 74$ No

e) $-2y = x + 10$ $(-6, -2)$
$3x = 6y - 6$

$-2(-2)=(-6)+10$ ✓ Yes
$4=4$
$3(-6)=6(-2)-6$ ✓

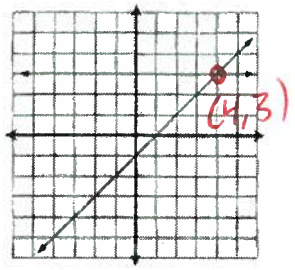
f) $x = 2$ $(3, 2)$
$y = 3$

$(3)=2$ ✗
$(2)=3$ ✗ No

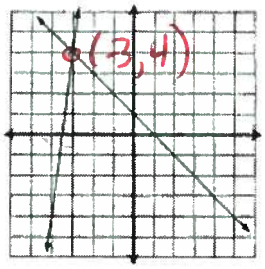
Match each system of linear equations with its solution.

a) $(-3, 4)$ ii
b) $(2, -3)$ iv
c) $(-3, 1)$ iii
d) $(4, 3)$ i

i)



ii)



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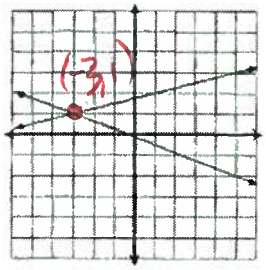
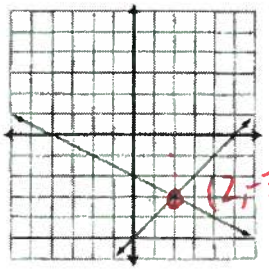


iv)



a) no **b)** yes **c)** no **d)** no **e)** yes **f)** no

a) *ii* **b)** *iv* **c)** *iii* **d)** *i*

Solving a Linear System Graphically:

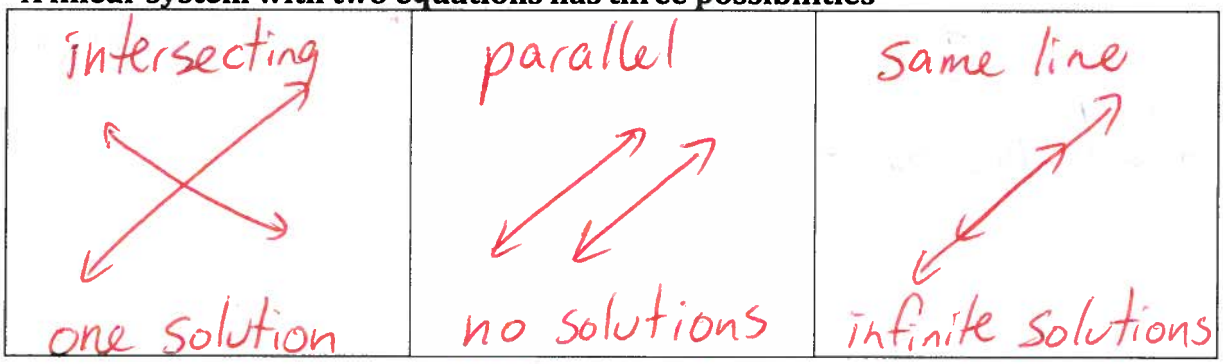
STEP #1 Re-write each equation in slope-intercept form: y = mx + b

STEP #2 Graph both equations on the same grid.

STEP #3 The solution to the system of equations is the ordered pair (x,y) of the point of intersection.

STEP #4 Verify your answer by substituting the ordered pair into the original system to see if that point satisfies both equations.

A linear system with two equations has three possibilities



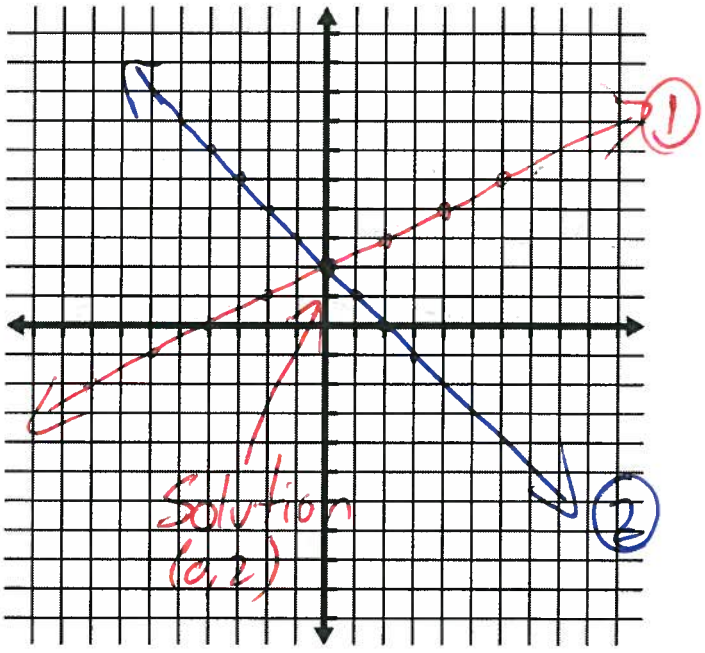
Example #1 Solve the following system of equations

① $y = \frac{1}{2}x + 2$ m = 1/2 yint = 2

② $y = -x + 2$ m = -1 yint = 2

Solution = Intersection (0, 2)

x = 0
y = 2



Example #2 Solve the following system of equations

① $2x-y=3$

② $-4x+2y=4$

① $2x-y=3$

$x_{int}: 1.5$

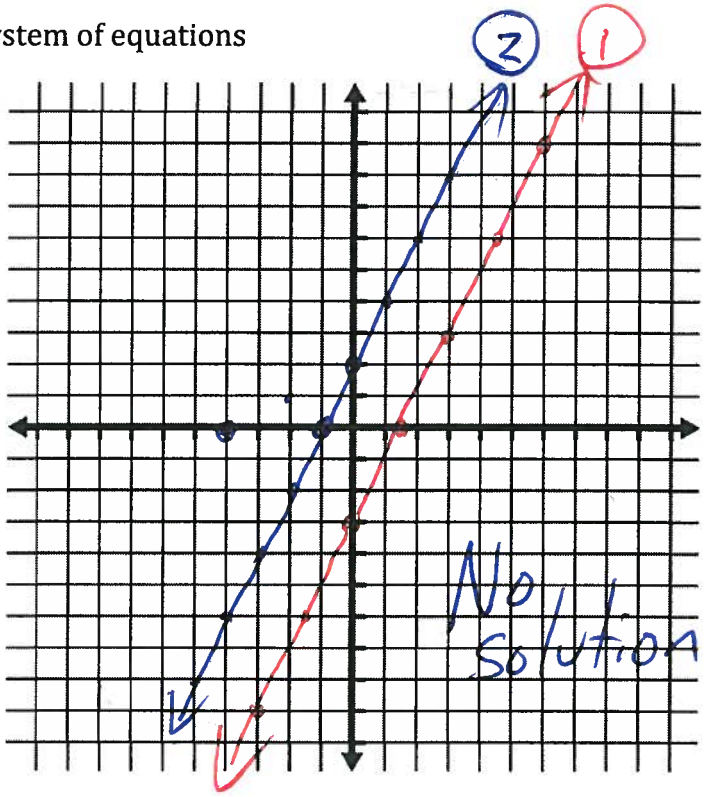
$y_{int}: -3$

② $-4x+2y=4$

$x_{int}: -1$

$y_{int}: 2$

Parallel – No solutions



Example #3 Solve the following system of equations

① $y=-x+3$ $m=-1$ $b=3$

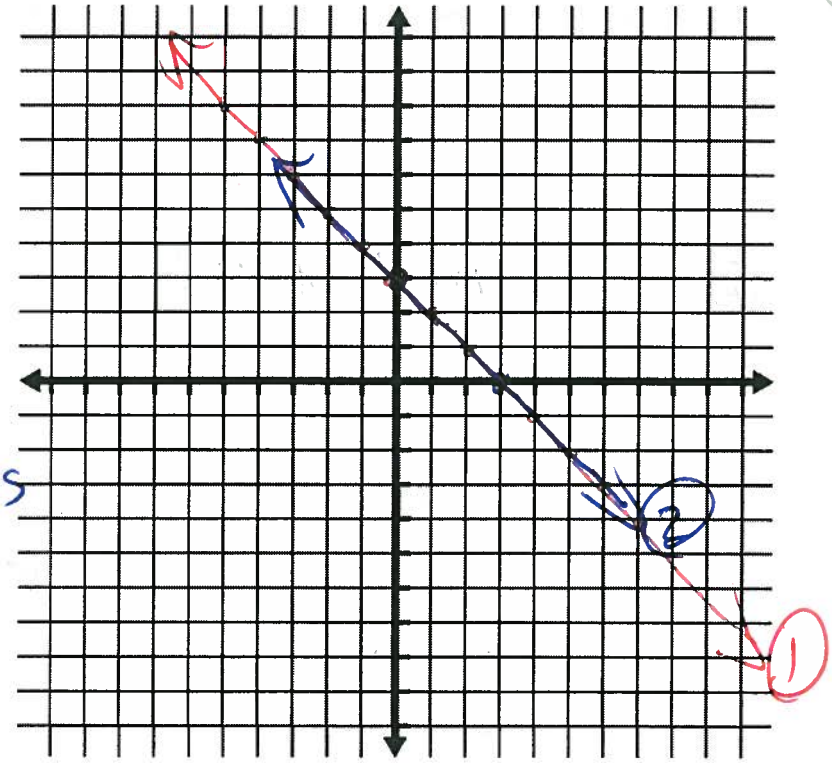
② $2x+2y=6$

$x_{int}=3$

$y_{int}=3$

Same Line

= Infinite Solutions



Assignment:

1) $2x - y = 3$

2) $x + y = 3$

① $2x - y = 3$

$x_{int} : 1.5$

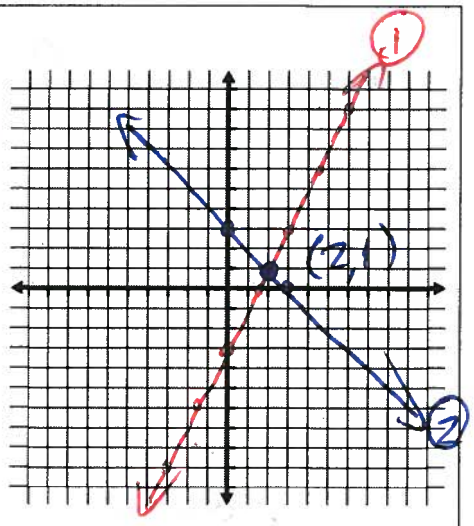
$y_{int} : -3$

② $x + y = 3$

$x_{int} = 3$

$y_{int} = 3$

Intersection = (2, 1)



1) $x + 2y = -4$

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

① $x + 2y = -4$

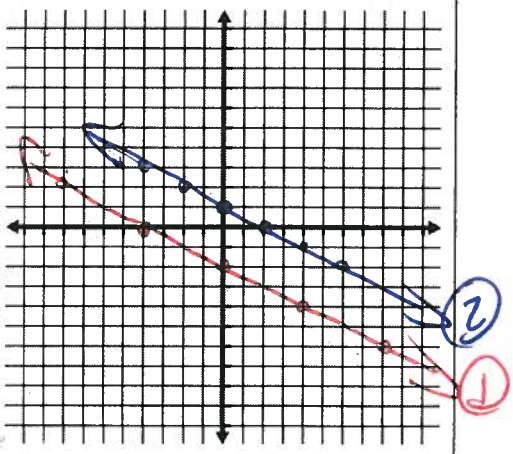
$x_{int} : -4$

$y_{int} : -2$

② $y = -\frac{1}{2}x + 1$

slope $= \frac{1}{2}$ $y_{int} = 1$

Parallel : No Solutions



1) $y = 2x - 4$

2) $x - \frac{1}{2}y = 2$

① $y = 2x - 4$

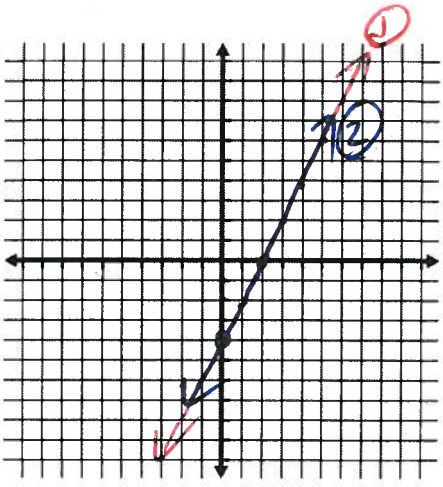
slope $= 2$ $y_{int} = -4$

② $x - \frac{1}{2}y = 2$

$x_{int} = 2$

$y_{int} = -4$

Same Line : Infinite Solutions



Assignment:

1) $x + y = -5$

2) $-2x + y = 1$

① $x+y=-5$

$x_{int}: -5$

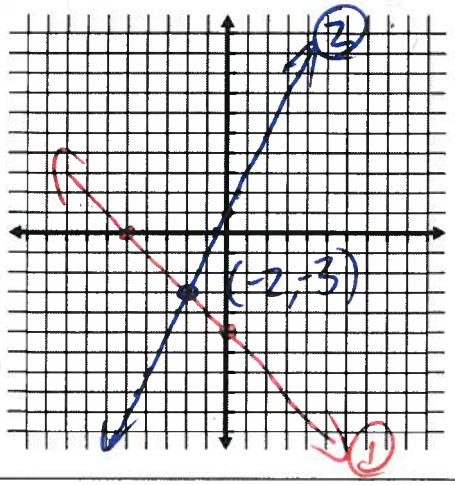
$y_{int}: -5$

② $-2x+y=1$

$x_{int}: -1/2$

$y_{int}: 1$

Solution = $(-2, -3)$



1) $2x - 3y = -1$

2) $4x - y = 3$

① $2x-3y=-1$

$x_{int}: -1/2$

$y_{int}: 1/3$

ugly numbers

OR $-3y = -2x - 1$

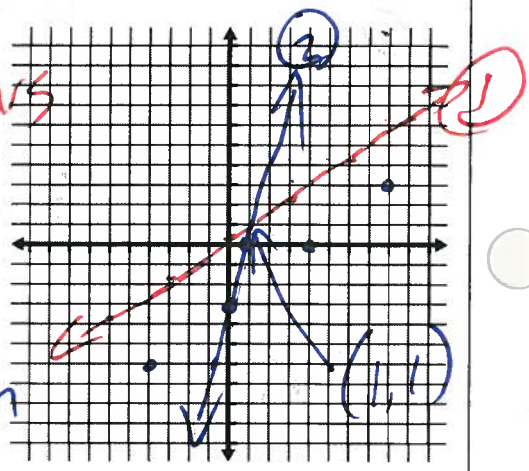
$y = \frac{2}{3}x + \frac{1}{3}$ (m, b)

② $4x-y=3$

$x_{int}: 3/4$

$y_{int}: -3$

Solution $(1, 1)$



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

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

① $2x-y=-6$

$x_{int}: -3$

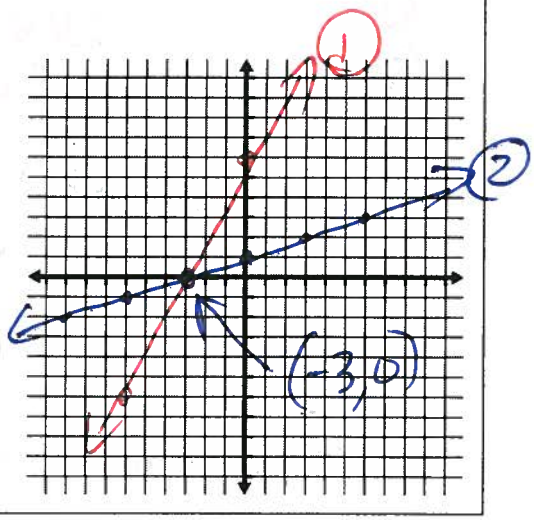
$y_{int}: 6$

② $x-3y=-3$

$x_{int}: -3$

$y_{int}: 1$

Solution $x=-3$ $y=0$



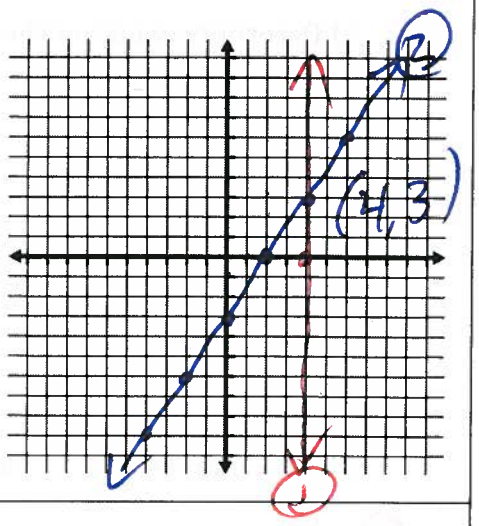
Assignment:

1) $x = 4$

2) $3x - 2y = 6$

y int: -3

x int: 2



Intersection = (4, 3)

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

2) $y = -2$

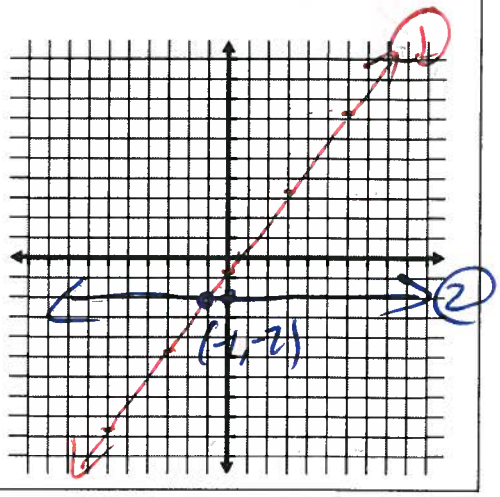
1) $4x - 3y = 2$

x int: 1/2

y int: -2/3

OR $-3y = -4x + 2$

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



Solution (-1, -2)

Answer Key

a) (2,1) b) no solution c) infinite solutions d) (-3,-3) e) (1,1) f) (-3,0) g) (4,3) h) (-1,-2)

Practice Quiz:

1) Determine whether the ordered pair is a solution to the linear system.

a) $\begin{cases} 3x+y=11 \\ x-2y=6 \end{cases}$ $(4,-1)$

$3(4)+(-1)=11?$

$12-1=11?$ ✓

$(4)-2(-1)=6$

$4+2=6?$ ✓

Yes

2) Solve the following system of equations. Show your work

① $x-2y=-8$

② $y-x=6$

① $x-2y=-8$

$x_{int}: -8$

$y_{int}: 4$

② $y-x=6$

$x_{int}: -6$

$y_{int}: 6$

Solution $= (-4,2)$