Systems of Linear Equations

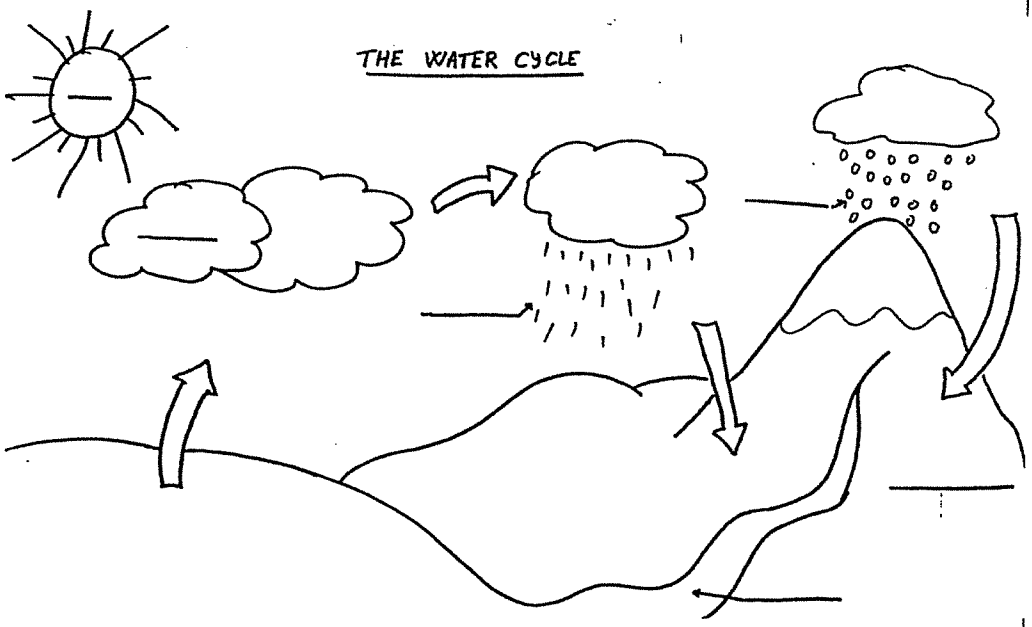
SOLVE SYSTEMS BY GRAPHING

Objectives:

1. After this lesson I will be able to solve a system of equation by graphing.
2. After this lesson I will be able to identify the number of solutions a system of equation has, by graphing.

So what is a system and why is it messing with our linear equations?

A system is when many things work together. We see examples of systems ALL THE TIME in science class! The WATER CYCLE is a system because everything has to work together!



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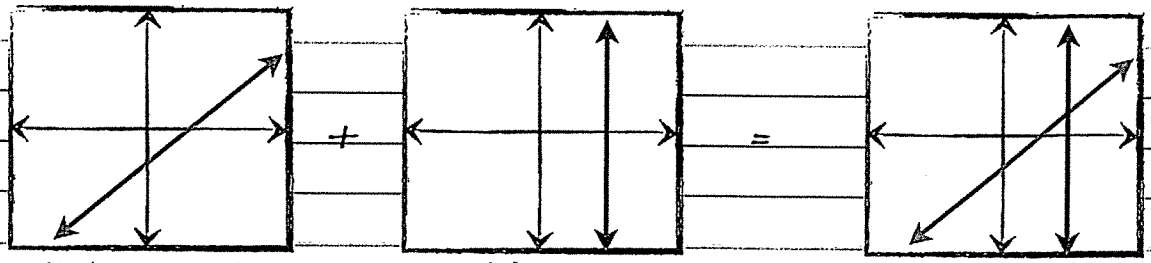
A system of linear equations is when two lines "work together" or touch when graphed on the same coordinate plane.



If they do "touch", the point[s] at which they touch are the solution[s]:

(x , y)

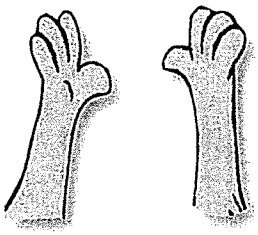
EXPLORE: How many ways can straight lines cross? TRY using your arms:

your left arm as one LINEAR EQUATION,
and the right arm as the other LINEAR EQUATION.

How many ways can you get them to cross?

SCENARIO 1:

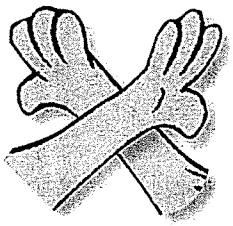
Well, we know we can DEFINITELY have our arms NEVER touching! If we graph two lines on the same coordinate plane and they do not cross, we say the system consists of two parallel lines and has No solutions.



No Solutions

SCENARIO 2:

We also OBVIOUSLY know that we can have our arms cross only at one point! If we graph two lines on the same coordinate plane and they cross at one points, we say that point (x,y) is the solution to the system of linear equations.



One Solution

SCENARIO 3:

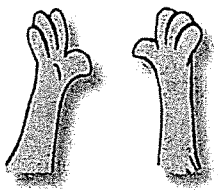
But did you think of the scenario where your arms would be lying on top of one another? This is when a system has an infinite amount of solutions. HINT – it means the lines are the same.

Infinite Solutions

Systems of Linear Equations

Keep in mind, SYSTEMS OF LINEAR EQUATIONS allow for us to evaluate two linear equations at the same time!!!

Remember how we found out how many solutions a system had by using our arms?



NONE

ONE

INFINITE

PRACTICE: Use the graph to the right to determine whether the system of linear equations has NONE, ONE, or INFINITE solutions.

① $y = -x - 3$
$y = x - 1$

ANSWER:

② $2x + 2y = -6$
$y = -x - 3$

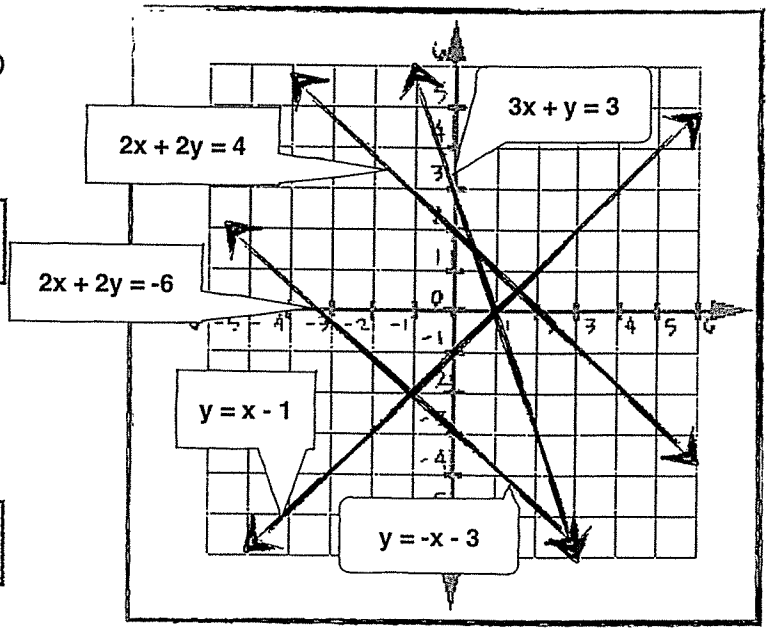
ANSWER:

③ $y = -x - 3$
$2x + 2y = 4$

ANSWER:

④ $2x + 2y = -6$
$3x + y = 3$

ANSWER:



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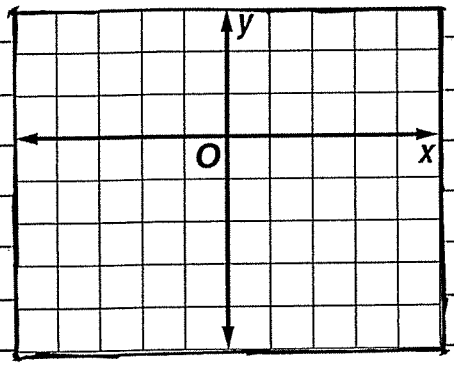
Sometimes they will make us graph our own linear equations to discover how many solutions the system has.

(5) $y = -2x + 1$

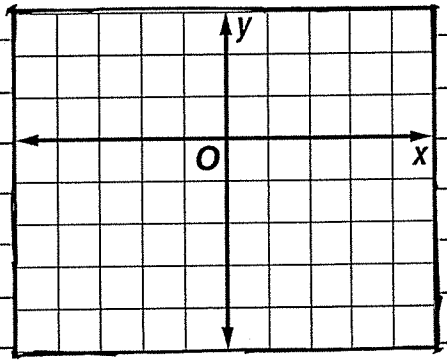
$y = 3x - 1$



ANSWER:

(6) $y = -2x - 1$

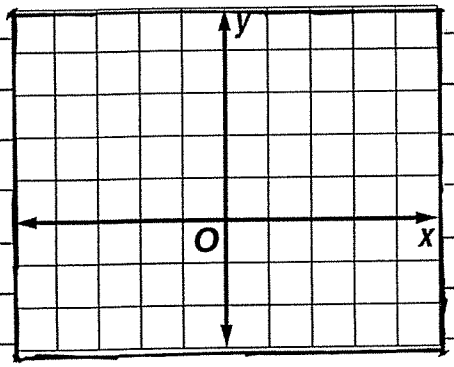
$y = -2x + 2$



ANSWER:

(7) $y = {}^{1}/_{2}x + 0$

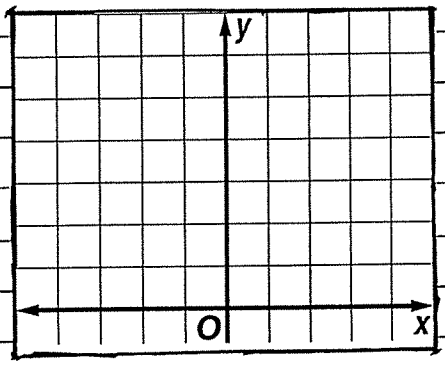
$y = -{}^{2}/_{3}x - 1$



ANSWER:

(8) $y = -2x + 6$

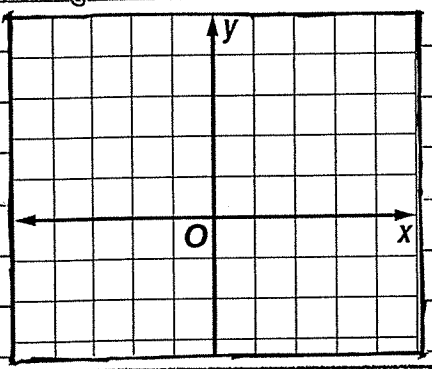
$y = 2x + 2$



ANSWER:

(9) $y = {}^{2}/_{3}x + 3$

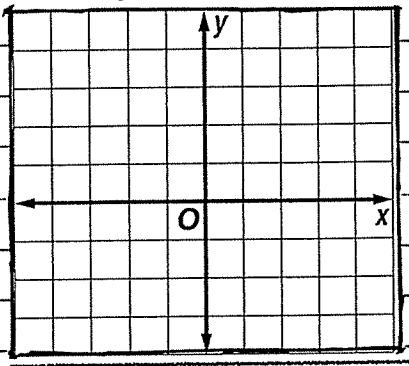
$y = {}^{2}/_{3}x - 2$



ANSWER:

(10) $y = -2x + 2$

$y = -2x + 2$



ANSWER:

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Practice on your own:
Graphing Systems of Linear Equations

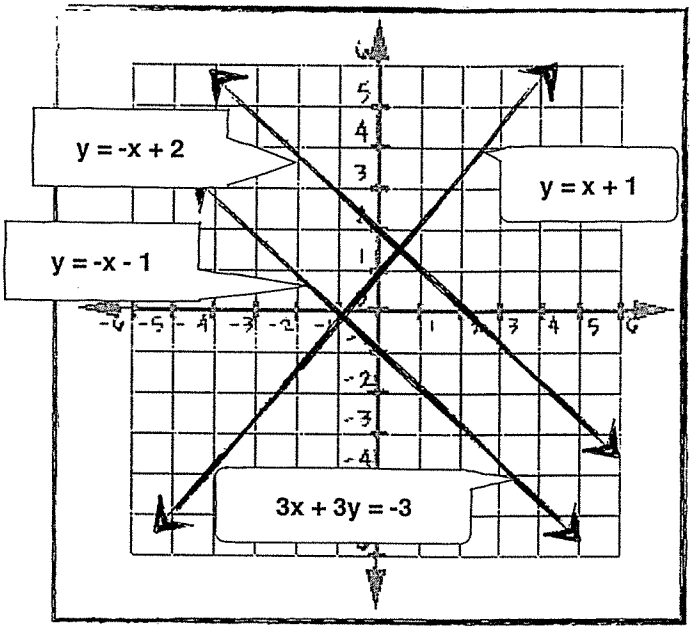
Use the graph below to determine whether the system of linear equations has NONE, ONE, or INFINITE solutions.

① $y = -x + 2$
$y = x + 1$

ANSWER:

② $y = -x + 2$
$3x + 3y = -3$

ANSWER:

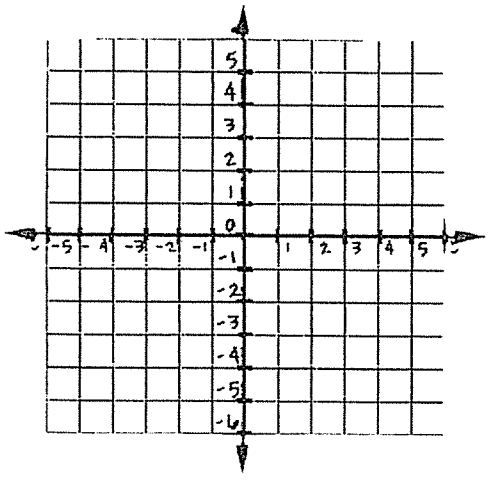


③ $3x + 3y = -3$
$y = -x - 1$

ANSWER:

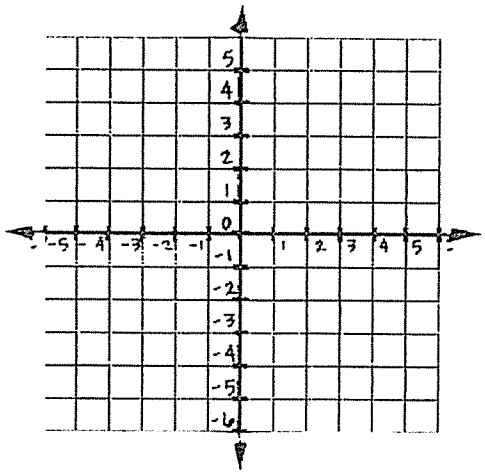
Graph the systems below, stating how many solutions the system has:

④ $y = 3x - 4$
$y = -3x + 2$



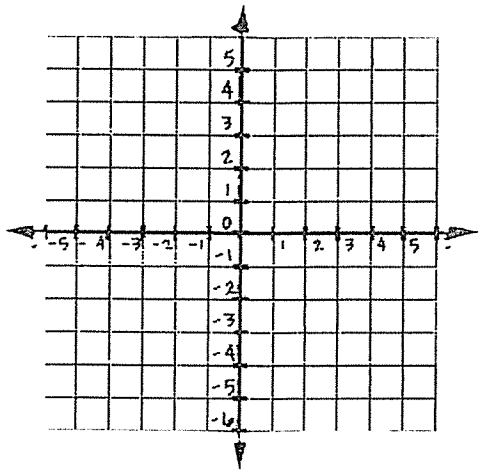
ANSWER:

⑤ $y = 1/3x + 3$
$y = -2/3x - 3$



ANSWER:

⑥ $y = 5/4x - 2$
$y = 5/4x - 1$



ANSWER:

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