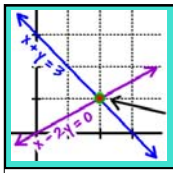
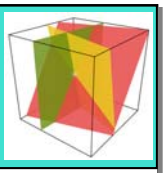


Unit 6: Systems of Equations

2 equations



6.1 Solving Systems of Equations by Graphing

The Smith and Harper families are going to a book fair. Mr. Smith pays entry fees of $11 for three adults and one child. Mrs. Harper pays $12 for two adults and three children.

We can determine the cost of an adult and child ticked by forming two linear equations and graphing them.

Let x represent the cost of an adult's ticket. Let y represent the cost of a child's ticket.

a c

The Smith family can be modelled by the equation: $11 = 3a + 1c$

The Harper family can be modelled by the equation: $12 = 2a + 3c$

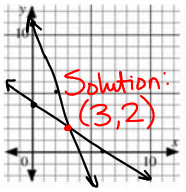
Draw the graphs of $11 = 3x + y$ and $12 = 2x + 3y$ on the grid without using technology.

$y_1 = 11 - 3x$

$y_1(x)$

$\frac{12}{3} - \frac{2x}{3} = \frac{3y}{3}$

$y_2 = 4 - (2/3)x$



The graphs of the equations intersect at a point. State the coordinates of this point and explain what it means in the context of this question.

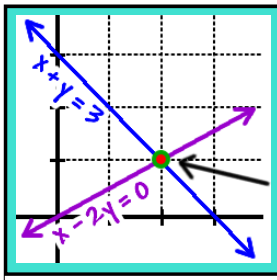
(3,2)

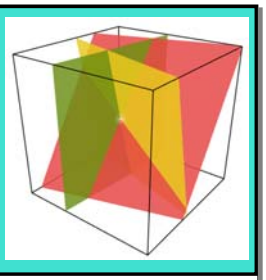
x y

a c

$a = \$3$

$c = \$2$





The equations $3x + y = 11$ and $2x + 3y = 12$, considered at the same time, are called a system.

The solution to the system is (x , y). This is because x = 3 and y = 2 satisfy each equation.

Graphically, the solution to the system is the point of intersection between the two lines.

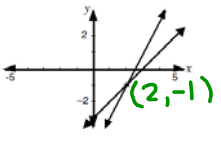
Example

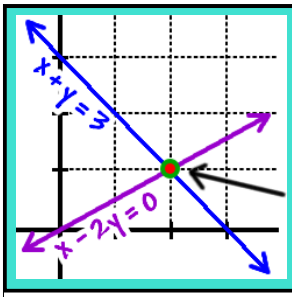
A system of equations has been represented on this grid. The system has an integral solution.

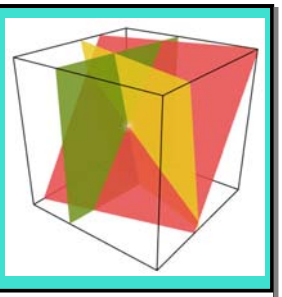
a) State the solution x = 2, y = -1.

b) Write the solution as an ordered pair.

(2,-1)







Steps:

How to solve systems by graphing:

1) Write each in slope-intercept form.
2) Enter equation 1 in y_1. Enter equation 2 in y_2.
3) Adjust window if needed to see intersection point.
4) 2nd Trace Intersect Enter Enter Enter

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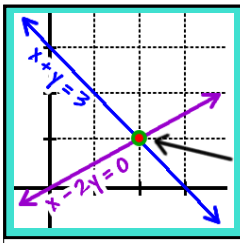
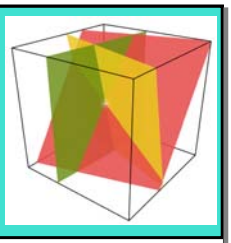




Example Consider the system of equations $2x+y=2$ $x-3y=15$

a) Graph the system of equations using technology.

$2x+y=2$

$-2x \quad -2x$

$y=-2x+2$

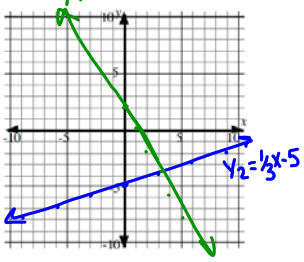
$x-3y=15$

$-x \quad -x$

$\frac{-3y}{-3}=\frac{-1x}{-3}+\frac{15}{-3}$

$y_2=(\frac{1}{3})x-5$

$y_1=-2x+2$



b) State the solution to the system of equations.

$(3,-4)$

c) Algebraically verify your solution.

Sub x and y into original equations.

$2x+y \stackrel{?}{=} 2$

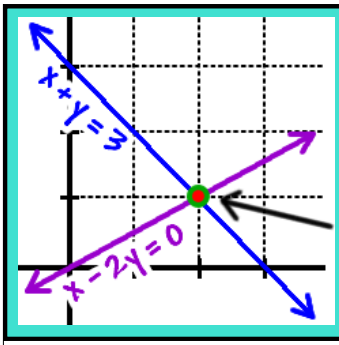
$2(3)+-4 \stackrel{?}{=} 2$

$2=2$ ✓

$x-3y \stackrel{?}{=} 15$

$3-3(-4) \stackrel{?}{=} 15$

$15=15$ ✓


x + y = 3
x - 2y = 0