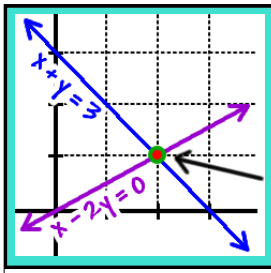
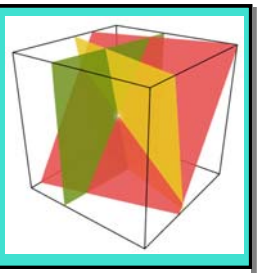


Unit 6: Systems of Equations

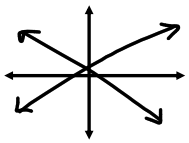


6.2 Determining Number of Solutions

Graph each system of equations on the grid provided. State the number of solutions for each system.

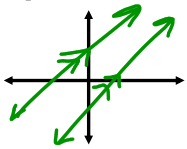
intersection points

$y_1 = x + 5$
$y_2 = -x + 1$



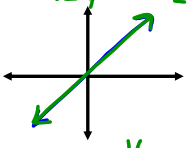
1 solution

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



0 solutions

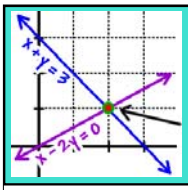
$y = 3x - 2$
$6x - 2y - 4 = 0$
$+2y \quad +2y$

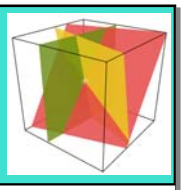


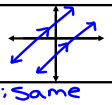
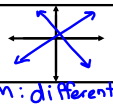
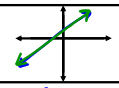
$\frac{6x}{2} - \frac{4}{2} = \frac{2y}{2}$
$y = 3x - 2$

∞ sol'n

The number of solutions can be determined from the graph as above or directly from the equations if they are expressed in slope y-intercept form. But how???





Number of Solutions	0	1	∞
Graphical Example			
Slope and Intercepts	m: same b: different	m: different b: doesn't matter	m: same b: same

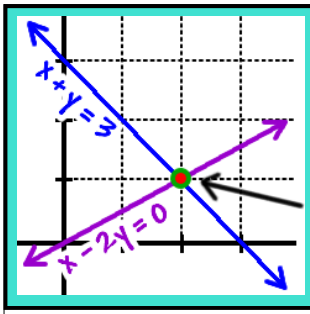
Memorize

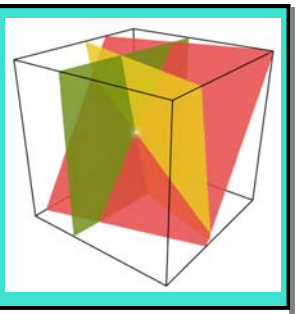
Example Without graphing, determine the number of solutions to each system.

a) $3x + 5y = 15$
$-3x \quad -3x$
$\frac{5y}{5} = \frac{-3x}{5} + \frac{15}{5}$
$y = -\frac{3}{5}x + 3$
$y = \frac{3}{5}x + 0$
m: same
b: diff.
0 sol'n

b) $x - 4y + 8 = 0$
$+4y \quad +4y$
$\frac{1x}{4} + \frac{8}{4} = \frac{4y}{4}$
$\frac{1}{4}x + 2 = y$
$y = \frac{1}{4}x + 2$
m: same
b: same
∞ sol'n

c) $x - 6y = 5$
$-x \quad -x$
$\frac{-6y}{-6} = \frac{-x}{-6} + \frac{5}{-6}$
$y = \frac{1}{6}x - \frac{5}{6}$
$7x + y = 12$
$-7x \quad -7x$
$y = -7x + 12$
m: diff
1 sol'n





Example

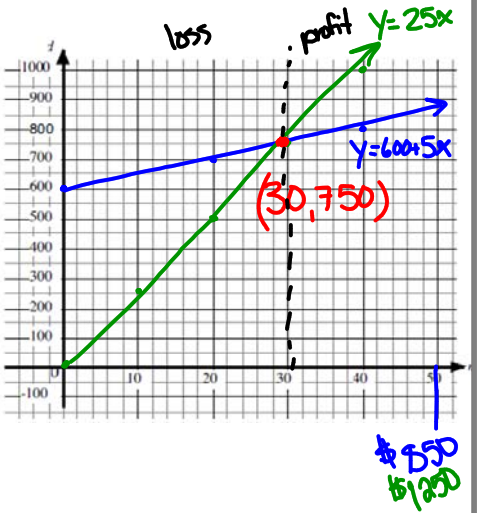
A local High School's Student Council decided to sell hoodies. The cost of designing the hoodies is $600 plus $5 each.

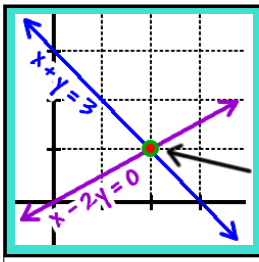
The Students' Council planned to sell them for $25 each. The cost and revenue can be represented by the following system of equations where *d* represented the cost, in dollars, and *n* represents the number of hoodies sold.

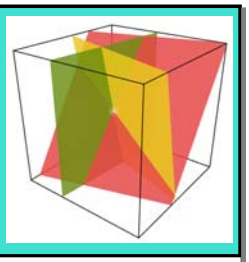
Cost of hoodies in dollars: $600 + 5x = y_1$

Revenue of sweaters in dollars: $25x = y_2$

a) Use a graphing calculator to graph the equations.







b) How much profit or loss is made if..

i) 20 sweaters are sold — loss of $200

ii) 50 sweaters are sold — profit of $400

2nd Trace
1: Value
x=50

c) The break even point is where no profit or loss is made. Circle that point on the graph. (30, 750)

d) Determine the number of sweaters sold to break even.

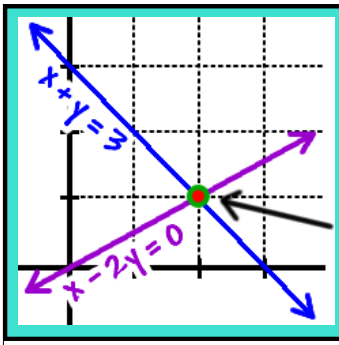
30 sweaters

e) If all 650 students in the school purchase a sweater, how much profit would the student council make?

Cost: $y = 600 + 5x$, $y = 600 + 5(650)$, $y = \$3850$

Revenue: $y = 25x$, $y = 25(650)$, $y = \$16\,250$

Profit of $12 400


x + y = 3
x - 2y = 0