The graph of an equation is with two variables is...

A picture of all the ordered pairs that are solutions to the equation.

The graph of y = 2x - 1 is

a line on the x-y plane that represents
all the points that solutions to the equation.

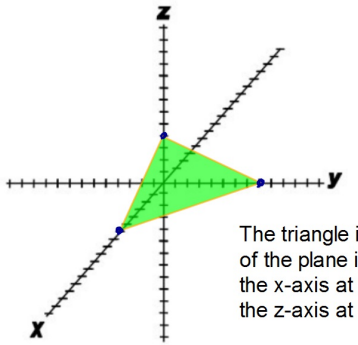
The graph of an equation with three variables is...

A picture of all the ordered triples in space that are solutions to the equation.

This will create a PLANE - flat surface to extends forever

Graph this equation: 4x + 3y + 6z = 24

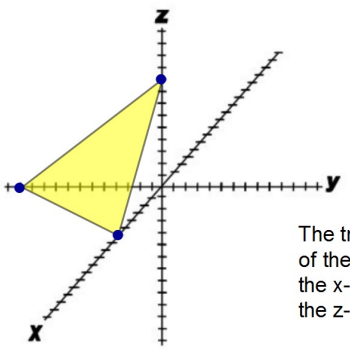
x-int = 6
y-int = 8
z-int = 4



The triangle is a representation of the plane in space that passes through the x-axis at 6, the y-axis at 8 and the z-axis at 4.

Graph this equation: 24x - 12y + 16z = 144

x-int = $\frac{144}{24}$ = 6
y-int = $\frac{144}{-12}$ = -12
z-int = $\frac{144}{16}$ = 9



The triangle is a representation of the plane in space that passes through the x-axis at 6, the y-axis at -12 and the z-axis at 9.

A system of equations in 2 variables is:

2 lines on the x-y plane.

Solutions to systems of equations in 2 variables:

One Solution - Lines intersect once
No Solution - Lines are parallel
ManySolutions - The two equations are the same line

Systems of equations in 3 variables is ...

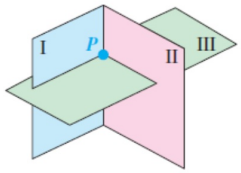
3 planes in Space

Systems of equations in three variables.

How many solutions are possible?

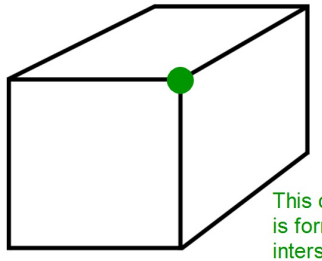
One Solution
No Solution
Many Solutions

One Solution:



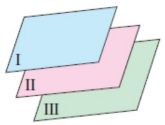
A single solution

(a)



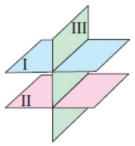
This corner of the box is formed by 3 planes intersecting, the front, top, and right side.

No solution.

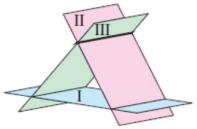


No points in common

(d)



No points in common
to all three planes -
at the same time



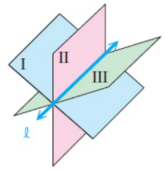
No points in common
to all three planes -
at the same time

Many Solutions:

All points in common

(c)

All three equations
are the SAME plane.



Points of a line in common

(b)

Just like 3 pages
in a book all meet
along a line - and lines
have infinite # of points

Solving a system of equations in three variables.

You can use:

- Substitution
- Elimination
- Combination of Substitution and Elimination.

Essentially you start by turning the 3 equations in 3 variables into two equations with two variables (you eliminate one of them).

Then you can use Elimination or Substitution to solve for those two variables.

Once you know two of the three variables you can subsitute them into an equation and find the 3rd variable.

One of the main rules when
solving a system of three equations
is that you must use
each equation at least once.

Solve this system of equations using Algebra.