

## Lesson One – Developing Properties of Linear Systems

A *system of linear equations* is a set of two or more linear equations ( $y = mx + b$ ) with the same variables ( $x$  and  $y$ ).

The *solution of the system of linear equations* is the set of all ordered pairs that satisfies the equations. In other words, it is the point where the two lines intersect.

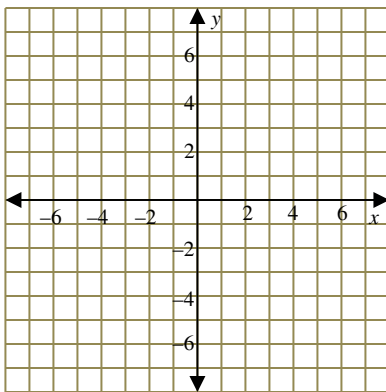
There are 3 types of systems of linear equations:

- Independent
- Inconsistent
- Dependent

**Independent Systems:** systems of equations that intersect at 1 point. They have 1 ordered pair that is the solution.

**Example:** Graph:  $y = 3x + 2$

$$2y = x - 6$$

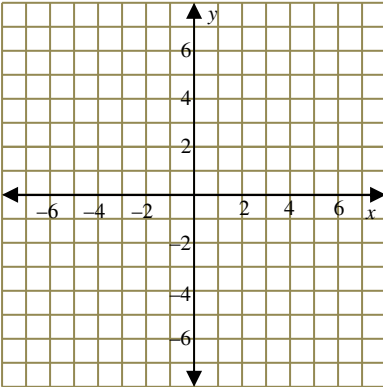


The lines in this type of system have different slopes and intersect at 1 point. This point is the solution to the system.

**Inconsistent Systems:** These are systems of equations that intersect at 0 points. They have no solution.

**Example:** Graph:  $y = 2x + 2$

$$y = 2x - 4$$

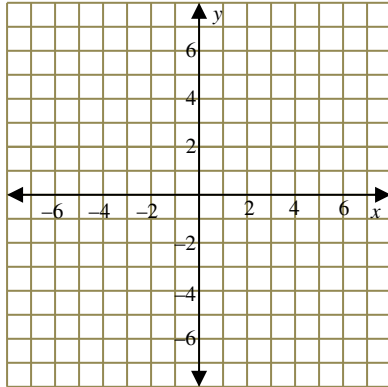


The lines in this type of system are parallel. They have the same slope and different y-intercepts. There is no solution to this system of equations since the lines never intersect.

**Dependent Systems:** These are systems of equations that intersect at all points. They have an infinite number of solutions.

**Example:** Graph:  $3y = -6x + 3$

$$y = -2x + 1$$



Actually, both the lines are the same. Since they have the same slope and the same y-intercept, they are ***coincident lines***, and have an infinite number of solutions.

**Summary: Three types of systems**

1. Independent system/intersecting lines (ONE solution)
2. Dependent system/coincident lines/infinite number of solutions (INFINITE)
3. Inconsistent systems/parallel lines/no solution (NONE)