

**Key Concepts: Systems of two linear equations with two unknowns**  
**Solving systems graphically**  
**Types of solution sets to systems of linear equations**

**Definition**

A solution to a system of two linear equations with two unknowns is an ordered pair that makes each of the equations true.

**Examples**

Decide whether or not the given ordered pairs are solutions to the system of equations:

$$\begin{cases} 2x + 3y = 7 \\ 3x - 2y = -9 \end{cases}$$

Is  $(5, -1)$  a solution to the system?

Is  $(-1, 3)$  a solution to the system?

Solve each system of equations by graphing the two linear equations and finding the point(s) they have in common. Make sure that you check your solution before stating your conclusion.

Solve the system  $\begin{cases} y = 3x - 2 \\ y = -x + 6 \end{cases}$ .

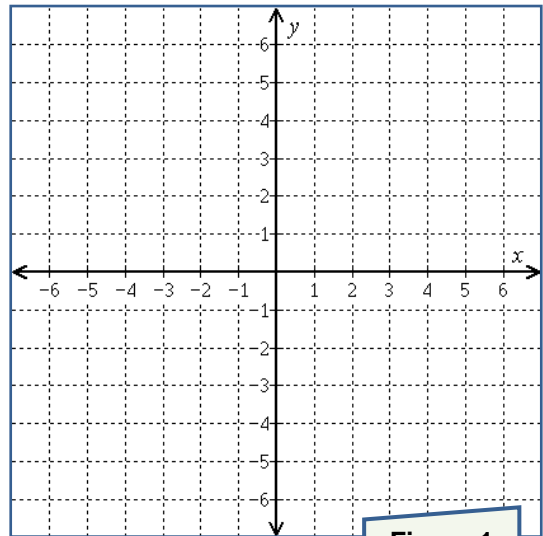


Figure 1

Solve the system  $\begin{cases} y = \frac{x}{4} \\ x + 2y = -3 \end{cases}$ .

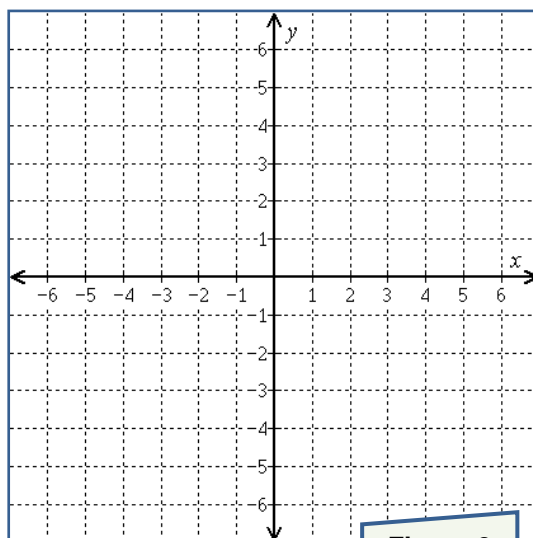


Figure 2

Solve the system  $\begin{cases} 2x - y = 9 \\ x = 3 \end{cases}$ .

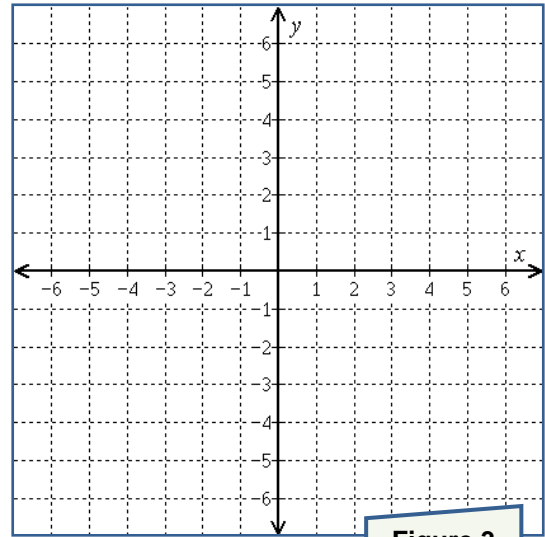
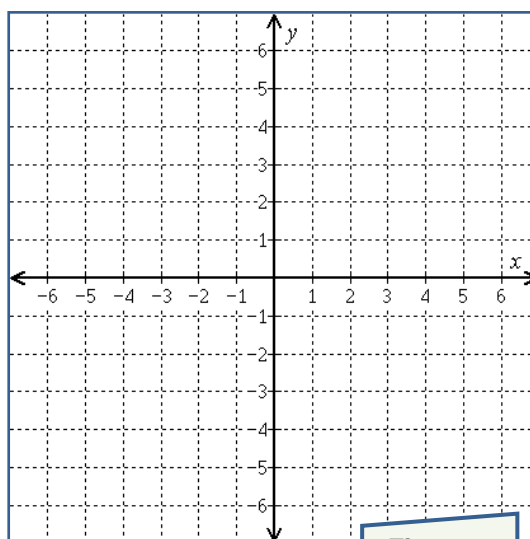


Figure 3

Solve the system  $\begin{cases} 4x + 6y = 24 \\ y = -\frac{2}{3}x - 1 \end{cases}$ .

**Figure 4**

Solve the system  $\begin{cases} y = 3x - 2 \\ 6x - 2y = 4 \end{cases}$ .

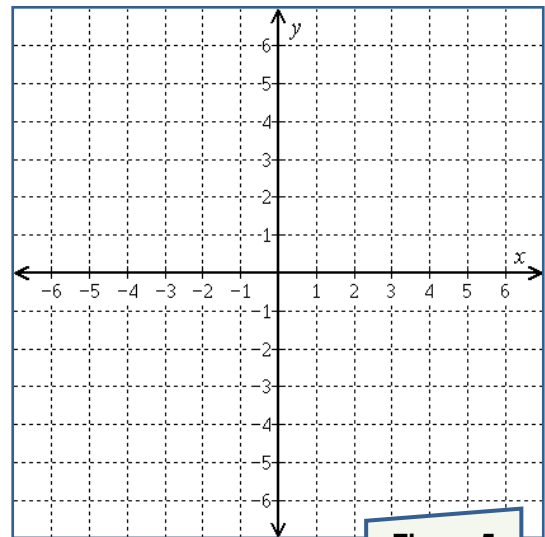


Figure 5

### Types of solutions sets to systems of two linear equations with two unknowns

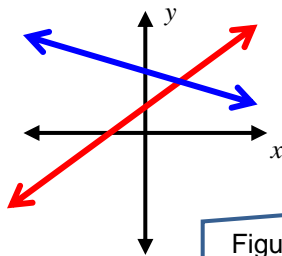


Figure 6

A system can have exactly one solution. In this case, the system is called **consistent** and the equations are called **independent**. This happens when the two equations graph to lines that intersect at a single point.

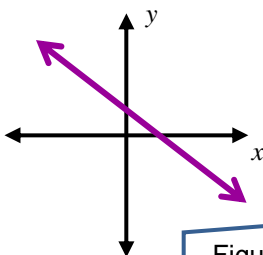


Figure 7

A system can have an “infinite number” of solutions. In this case, the system is called **consistent** and the equations are called **dependent**. This happens when the two equations graph to the same line.

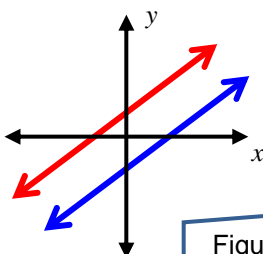


Figure 8

A system can have no solution. In this case, the system is called **inconsistent** and the equations are called **independent**. This happens when the two equations graph to parallel lines.

## Examples

For each system, write both equations in *slope-intercept* form and decide - without graphing - whether the system is consistent or inconsistent and whether the equations are dependent or independent.

$$\begin{cases} y = 2x - 2 \\ 4x = 2y - 4 \end{cases}$$

$$\begin{cases} 2x - 3y = 8 \\ 3x - 2y = 8 \end{cases}$$

Find the solution to the system of equations  $\begin{cases} y = \frac{x}{3} \\ 2x + y = -7 \end{cases}$ .

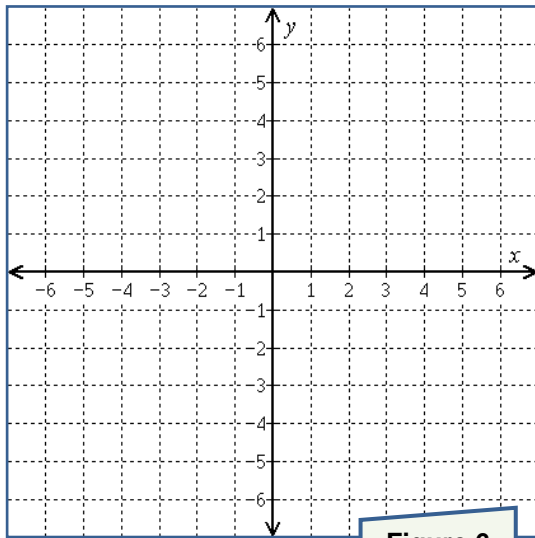


Figure 6