

## 9.2 Systems of Equations

**Minds On:** Solve the following system of equations:  $2x + y = -9$   $x + 2y = -6$

A linear system of equations can have zero (parallel), one (a single POI), or an infinite number of solutions (coincident lines).

**Example 1:** The number of solutions to the following system of equations depends on the value(s) of a and b. Determine values of a and b for which this system has:  $x + 4y = a$   $x + by = 8$

**No Solutions**

**An Infinite # of Solutions**

**One Solution**

**Example 2:** Determine whether  $x = -3$ ,  $y = 5$ , and  $z = 6$  is a solution to the following system:

$$2x + 3y - 5z = -21$$

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

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### ***Consistent and Inconsistent Systems of Equations***

A system of equations is consistent if it has either one solution or an infinite number of solutions. A system is inconsistent if it has no solutions.

**Example 3:** Solve the following system of equations for  $x$ ,  $y$  and  $z$ .

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$$x - y + z = 1$$

$$2x + y - z = 11$$

$$3x + y + 2z = 12$$

**Example 4:** Solve the following system of equations.

$$x - 3y - 2z = -9$$

$$2x - 5y + z = 3$$

$$-3x + 6y + 2z = 8$$

**Example 5:** Solve the following system of equations.

$$x + 4y - 3z + 6 = 0$$

$$2x + 8y - 6z + 11 = 0$$