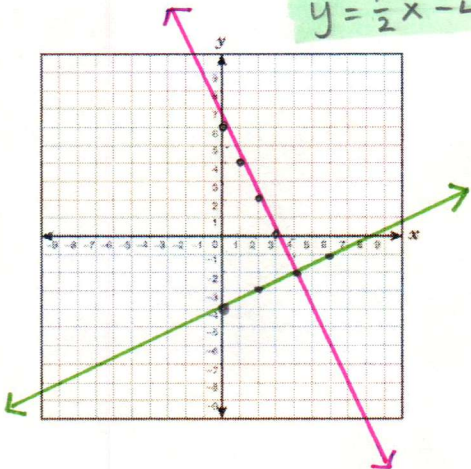


Notes 6.2 – Solving Systems

Warmup

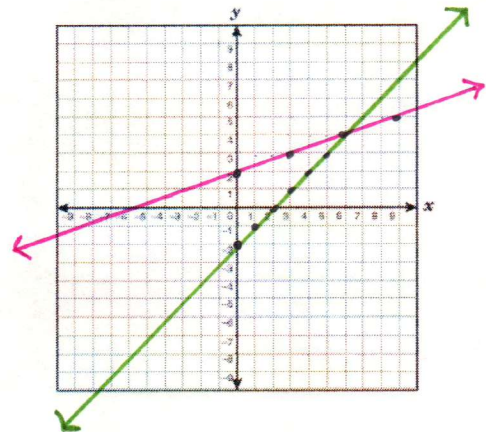
a. $\begin{cases} y = -2x + 6 \\ x - 2y = 8 \end{cases}$ $\frac{-2y}{-2} = \frac{-x + 8}{-2}$

$y = \frac{1}{2}x - 4$



Solution: $(4, -2)$

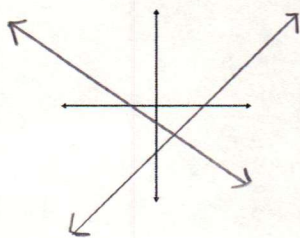
b. $\begin{cases} y = \frac{1}{3}x + 2 \\ y = x - 2 \end{cases}$



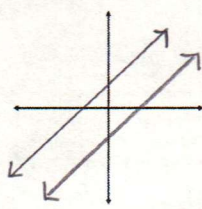
Solution: $(6, 4)$

c. Sketch what each solution type looks like.

One solution

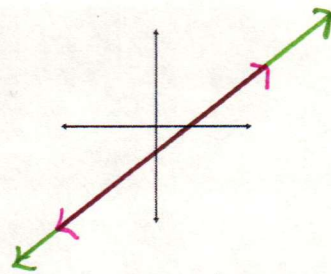


No Solution



parallel

∞ Solutions



same line

Lesson

| Word | Meaning/Notation | Example |
|-------------------------|---|---|
| Solving by Substitution | Solve for one variable in one equation, then replace that variable in the other equation to solve | $y = \boxed{2x + 1}$ $3x + 2y = 5$ $3x + 2(2x + 1) = 5$ |

$$1. \begin{cases} 2y + x = -4 \\ y - x = -5 \end{cases} \rightarrow x = \boxed{-2y - 4}$$

$$y - (-2y - 4) = -5$$

$$y + 2y + 4 = -5$$

$$3y + 4 = -5$$

$$\frac{3y}{3} = \frac{-9}{3} \quad \boxed{y = -3}$$

$$2(-3) + x = -4$$

$$\begin{array}{r} -6 + x = -4 \\ +6 \quad +6 \end{array}$$

$$x = 2$$

$$\boxed{(2, -3)}$$

$$2. \begin{cases} x - 2y = 4 \\ 2x - 4y = 8 \end{cases} \rightarrow x = \boxed{2y + 4}$$

$$2(2y + 4) - 4y = 8$$

$$4y + 8 - 4y = 8$$

$$8 = 8 \leftarrow \text{true}$$

$$\boxed{\infty \text{ solutions}}$$

Steps

1. Solve for one variable in one equation
2. Substitute the value in for the variable in the other equation.
3. Solve
4. Substitute value into either original equation
5. Solve
6. Write solution as an ordered pair

When you are left with only numbers that are equal to each other, then those equations will make the same line. Therefore, there are infinite solutions.

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

$$2x + (-2x - 2) = 7$$

$$2x - 2x - 2 = 7$$

$$-2 = 7 \leftarrow \text{false}$$

No Solution

When you are left with only numbers that are not equal to each other, then the equations will make parallel lines. Therefore, there are no solutions.

$$4. \begin{cases} 2x - y = -1 \\ x + 2y = 6 \end{cases} \rightarrow x = -2y + 6$$

$$2(-2y + 6) - y = -1$$

$$-4y + 12 - y = -1$$

$$\begin{array}{r} -5y + 12 = -1 \\ -12 \quad -12 \end{array}$$

$$\begin{array}{r} -5y = -13 \\ -5 \quad -5 \end{array}$$

$$y = \frac{13}{5}$$

$$2x - \left(\frac{13}{5}\right) = -1$$

$$\begin{array}{r} + \frac{13}{5} \quad + \frac{13}{5} \end{array}$$

$$\left(\frac{1}{2}\right) 2x = \frac{8}{5} \left(\frac{1}{2}\right)$$

$$x = \frac{4}{5}$$

$\left(\frac{4}{5}, \frac{13}{5}\right)$

5. Reese picked two numbers a and b . She told her friend that the sum of the two numbers is 4 and the difference of the two numbers is 8.

Write two linear equations that model the problem.

$$a + b = 4$$

$$a - b = 8 \rightarrow a = b + 8$$

Solve the system using substitution.

$$(b + 8) + b = 4$$

$$b + 8 + b = 4$$

$$\begin{array}{r} 2b + 8 = 4 \\ -8 \quad -8 \end{array}$$

$$\begin{array}{r} 2b = -4 \\ 2 \quad 2 \end{array}$$

$$b = -2$$

$$a + (-2) = 4$$

$$\begin{array}{r} a - 2 = 4 \\ +2 \quad +2 \end{array}$$

$$a = 6$$

$\begin{array}{l} a = 6 \\ b = -2 \end{array}$