

Solving Systems using Elimination Review

Key

Solve the system by elimination.

$$\begin{cases} 3x + 2y = 6 \\ -x + y = -2 \end{cases}$$

Step 1

$$\begin{array}{r} 3x + 2y = 6 \\ 3(-x + y = -2) \\ \hline 3x + 2y = 6 \\ +(-3x + 3y = -6) \\ \hline 0 + 5y = 0 \end{array}$$

Multiply each term in the second equation by 3 to get opposite x-coefficients.

Add the new equation to the first equation.

Step 2

$$\begin{aligned} 5y &= 0 \\ y &= 0 \end{aligned}$$

Simplify and solve for y.

Step 3

$$\begin{aligned} -x + y &= -2 \\ -x + 3(0) &= -2 \\ -x + 0 &= -2 \\ -x &= -2 \\ x &= 2 \end{aligned}$$

Step 4

$$(2, 0)$$

Write one of the original equations. Substitute 0 for y. Simplify and solve for x.

Write the solution as an ordered pair.

Solve by elimination. Don't forget to find both x and y!!!

1)
$$\begin{cases} x + 4y = 9 \\ 3x + 4y = 19 \end{cases} -1$$

$$\begin{aligned} -x + -4y &= -9 \\ 3x + 4y &= 19 \\ \hline 2x &= 10 \\ x &= 5 \end{aligned}$$

$(5, 1)$

2)
$$\begin{cases} x + 4y = 9 \\ x + 4y = 19 \end{cases} -1$$

$$\begin{aligned} x + 4y &= 9 \\ -x - 4y &= -19 \\ \hline 0 &= -10 \end{aligned}$$

No Solution

3)
$$\begin{cases} -3x + 4y = 12 \\ 2x + y = -8 \end{cases} -4$$

$$\begin{aligned} -3x + 4y &= 12 \\ -8x - 4y &= 32 \\ \hline -11x &= 44 \\ x &= -4 \end{aligned}$$

$(-4, 0)$

4)
$$\begin{cases} 2x + 6y = 22 \\ 3x - 4y = 7 \end{cases} -2$$

$$\begin{aligned} 6x + 18y &= 66 \\ -6x + 8y &= -14 \\ \hline 26y &= 52 \\ y &= 2 \end{aligned}$$

$(5, 2)$

5)
$$\begin{cases} 9x - 3y = 3 \\ 3x + 8y = -17 \end{cases} -3$$

$$\begin{aligned} 9x - 3y &= 3 \\ -9x - 24y &= 51 \\ \hline -27y &= 54 \\ y &= -2 \end{aligned}$$

$(-\frac{1}{3}, -2)$

6)
$$\begin{cases} -2x + y = -2 \\ -4x + 2y = 2 \end{cases} -2$$

$$\begin{aligned} 4x - 2y &= 4 \\ 4x + 2y &= 2 \\ \hline 0 &= 6 \end{aligned}$$

No Solution

For the Thinkers: When will a system of two linear equations have no solution? When will it have infinitely many solutions?

↓
When there are parallel lines

↓
When they are the same line

Word Problems:

1. A math test has 25 problems. Some are worth two points, and some are worth 3 points. The test is worth 60 points total. Write and solve a system to determine the number of 2 point problems and the number of 3 point problems on the test.

$$\begin{aligned} 2x + 3y &= 60 \\ x + y &= 25 \end{aligned}$$

$$\begin{aligned} 2x + 3y &= 60 \\ -2x - 2y &= -50 \\ \hline y &= 10 \end{aligned}$$

10	3 point
15	2 point

2. The sum of two numbers is 42. Their difference is 18. What are the two numbers? Write and solve a system of equations.

$$\begin{aligned} x + y &= 42 \\ x - y &= 18 \\ \hline 2x &= 60 \end{aligned}$$

$x = 30$
 $y = 12$

3. The difference between the length and width of a rectangle is 7 cm. The perimeter is 50 cm. Find the length and width.

$$\begin{aligned} L - w &= 7 \\ 2L + 2w &= 50 \\ \hline \end{aligned}$$

$$\begin{aligned} 2L - 2w &= 14 \\ 2L + 2w &= 50 \\ \hline 4L &= 64 \end{aligned}$$

$L = 16$
 $w = 9$

Solve using any method:

Jeff said to his younger brother, Mike, "Give me 8 of your video games, and then I'll have twice as many games as you have." Mike said, "No way! You give me 8 of your games, and then we'll have the same number of games." How many games did each boy have before any video games were swapped?

$M - 8$

$$\begin{aligned} 2(M - 8) &= J + 8 \\ J - 8 &= M + 8 \\ \downarrow \\ J &= M + 16 \end{aligned}$$

~~$2(M - 8) = J + 8$~~
 ~~$2(M - 8) = M + 16 + 8$~~
 ~~$M = 24$~~

$$\begin{aligned} 2(M - 8) &= M + 16 + 8 \\ 2M - 16 &= M + 24 \\ M &= 40 \end{aligned}$$

~~$M = 24$~~
 ~~$J = 16$~~

$M = 40$
$J = 56$