

8.1 Solving Systems of Linear Equations Graphically

Example 2 Solve a Linear System Graphically

a) Consider the system of linear equations $2x + y = 2$ and $x - y = 7$. Identify the point of intersection of the lines by graphing.

b) Verify the solution.

$$\begin{aligned} 2x + y &= 2 & x - y &= 7 \\ y &= -2x + 2 & y &= x - 7 \end{aligned}$$

a) Method 1: Graphing

Finding Intercepts

$$y = -2x + 2$$

$$x\text{-int} \rightarrow y = 0$$

$$0 = -2x + 2$$

$$2x = 2$$

$$x = 1$$

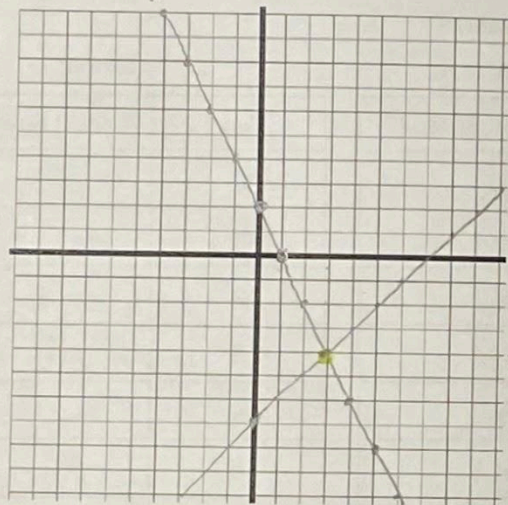
$$(1, 0)$$

$$y\text{-int} \rightarrow x = 0$$

$$y = -2(0) + 2$$

$$y = 2$$

$$(0, 2)$$



$$y = x - 7$$

$$y\text{-int} \rightarrow x = 0$$

$$y = 0 - 7$$

$$y = -7$$

$$(0, -7)$$

$$x\text{-int} \rightarrow y = 0$$

$$0 = x - 7$$

$$7 = x$$

$$(7, 0)$$

pt. $(3, -4)$

b) (Use a different method to solve)

Method 2: Table of Values

x	$y = -2x + 2$
0	2
1	0
2	-2
3	-4
4	-6
5	-8
6	-10

x	$y = x - 7$
0	-7
1	-6
2	-5
3	-4
4	-3
5	-2
6	-1

Example 3 Connect a Solution and a Graph

Guy solved the linear system $x - 2y = 12$ and $3x - 2y = 4$. His solution is $(2, -5)$. Verify whether Guy's solution is correct. Explain how Guy's results can be illustrated on a graph.

$$x - 2y = 12$$

$$2 - 2(-5) = 12$$

$$2 + 10 = 12$$

$$12 = 12$$

✓

∴ $(2, -5)$ is not the correct solution.

$$3x - 2y = 4$$

$$3(2) - 2(-5) = 4$$

$$6 + 10 = 4$$

$$16 \neq 4$$

x

1. Turn slope-intercept form
2. Graph the equations
3. Find the point where they cross.
Calc. 2nd - Calc → intersection

Example 4 Solve a Problem Involving a Linear System

The Skyride is a red aerial tram that carries passengers up Grouse Mountain in Vancouver, BC. The Skyride travels from an altitude of about 300 m to an altitude of 1100 m. The tram can make the trip up or down in 5 min and can carry 100 passengers.

There is also a blue tram that can carry 45 passengers. This tram takes approximately 8 min to travel up or down the mountain. Each tram travels at a constant speed.

- Create a graph to represent the altitudes of the trams if the red tram starts at the top and the blue tram starts at the base.
- Explain the meaning of the point of intersection.

a) X + Y intercepts

$$\begin{aligned} \downarrow & \quad \downarrow \\ y=0 & \quad x=0 \end{aligned}$$

Red: $(0, 1100)$

$(5, 300)$

Blue: $(0, 300)$

$(8, 1100)$

Approx. $(3, 600)$

b) After how many minutes are they at the same height?
3 min, both at 600m

