Mathematics 10C

Unit RF: Relations and functions

Systems of linear equations

Two lines that meet

- The lines are $y = x + 1$ and $y = -x + 5$.
- At $x = 2$ both give $y = 3$.
- The shared point $(2, 3)$ is the solution of the system.

A pair that works twice

- A system here is two linear equations.
- The solution of a system is the pair that makes both equations true.

Key terms

system of linear equations

Two linear equations considered together, each drawing a line. (two equations)

solution of a system

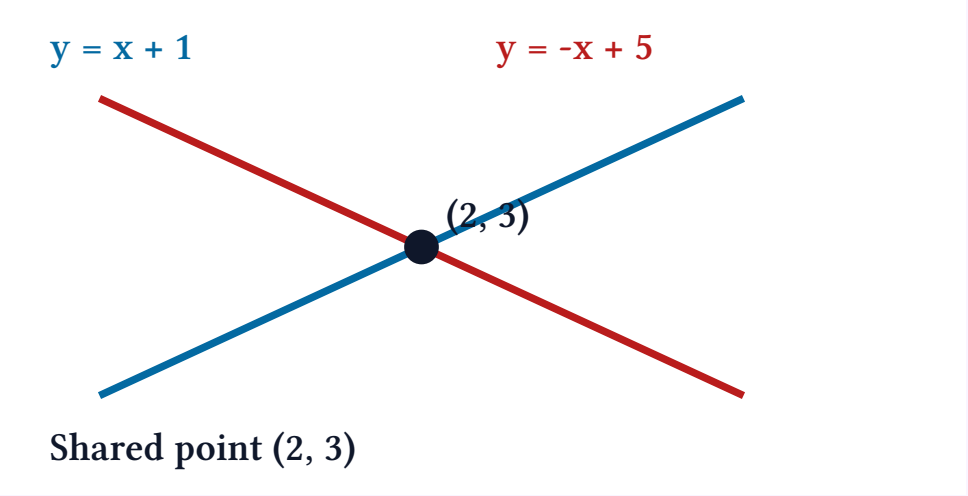
The ordered pair that makes both equations true at the same time. ((x, y))

point of intersection

The point where the two lines meet, which is the solution you can see on the graph. (the shared point)

The intersection point

- Set x + 1 equal to −x + 5.
- Then $2x = 4$, so x = 2 and y = 3.
- Check: 2 + 1 = 3 and −2 + 5 = 3.

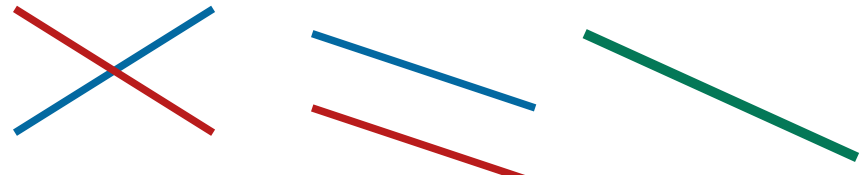


Add to remove y

- The equations are x + y = 5 and x − y = 1.
- Adding them gives $2x = 6$, so x = 3.
- Then y = 2, and the checks are 3 + 2 = 5 and 3 − 2 = 1.

How many solutions

- The lines $y = 2x + 1$ and $y = -x + 4$ meet once.
- The lines $y = 2x + 1$ and $y = 2x + 4$ stay apart.
- The equation $2y = 4x + 2$ is the line $y = 2x + 1$ again.



one point lines apart one shared line

Different slopes meet once.

Same slope, new intercept: apart.

One intersection by algebra

- Set $2x + 1$ equal to −x + 4.
- Then $3x = 3$, so x = 1 and y = 3.
- Check: 2(1) + 1 = 3 and −1 + 4 = 3.

2x + 1 = −x + 4

3x = 3 ⟶ x = 1

y = 3

Two phone plans

- Plan A is $y = 0.10x + 20$.
- Plan B is $y = 0.20x + 10$.
- Set them equal: $0.10x + 20 = 0.20x + 10$, so $x = 100$ and $y = 30$.

Quick check

- Solving y = x + 4 and y = $-2x + 10$ gives (2, 6).
- The lines y = 3x + 1 and y = 3x − 5 stay apart.

A pair that works twice

- The lines $y = x + 1$ and $y = -x + 5$ meet at $(2, 3)$.
- A solution makes both equations true.