

Systems of Equations

two lines, one question: where do they meet, and do they meet at all

A system, and what solving it means *

the pair, in standard form $a_1x + b_1y = c_1$

and $a_2x + b_2y = c_2$

a solution is an ordered pair (x, y) satisfying BOTH

graphically, the point where the lines cross
the solution is

one equation alone has endlessly many pairs on its line. The second equation is what narrows those down, usually to a single point

Q. Solve $y = 4x - 7$ and $3x + 2y = 8$.

① one equation is already solved for y , so substitute it into the other

$$\textcircled{2} \quad 3x + 2(4x - 7) = 8$$

$$\textcircled{3} \quad 3x + 8x - 14 = 8, \text{ so } 11x = 22$$

$$\textcircled{4} \quad x = 2, \text{ then } y = 4(2) - 7$$

Answer $(x, y) = (2, 1)$

when a variable already sits alone on one side, substitution beats elimination every time. Reach for elimination only when neither variable is isolated

Q. Solve $2x + 3y = 16$ and $5x - 3y = 19$, then give the value of $x + y$.

① the y terms are already opposites, so add the two equations: $7x = 35$

$$\textcircled{2} \quad x = 5$$

$$\textcircled{3} \quad \text{put } x = 5 \text{ back into the first: } 10 + 3y = 16, \text{ so } 3y = 6$$

$$\textcircled{4} \quad y = 2, \text{ and the question wants } x + y$$

Answer $(x, y) = (5, 2)$, so $x + y = 7$

check in the equation you did not substitute into:
 $5(5) - 3(2) = 25 - 6 = 19$, which is right, so the pair holds in both