Two Lines, One Answer?

Solving systems of equations



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How would you start?

Two equations share x and y. How would you find what fits both?

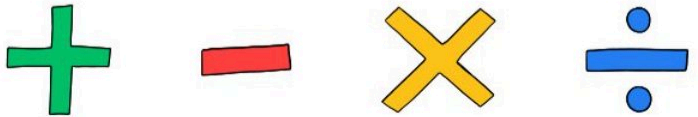
A Graph both lines and look for crossing

B Solve one equation for x or y, then plug in

C Add or subtract equations to cancel a variable

D Make a table and guess and check

Vote with your hands, then explain why.



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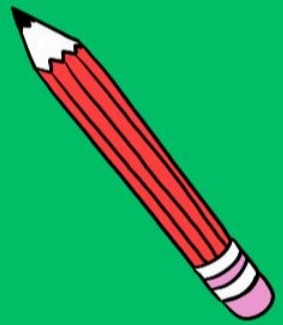
$a^2+b^2=c^2$

Systems map

- 2 equations together
- cross once = 1 solution
- same line = many solutions

Systems

- same x, same y
- parallel = no solution



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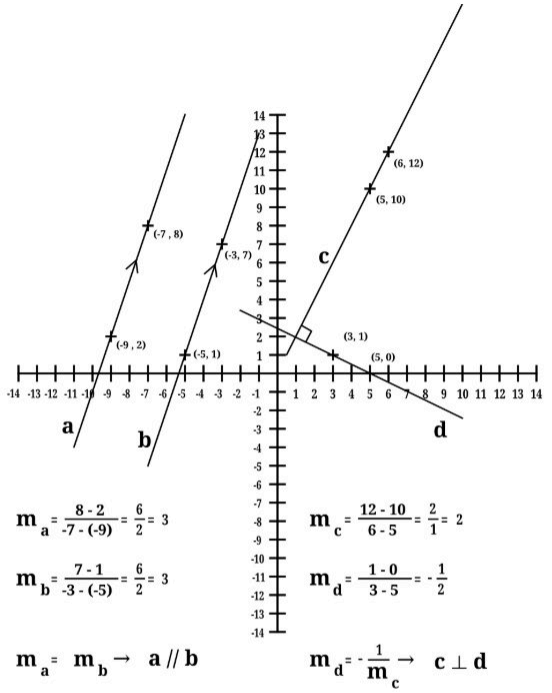
DID YOU KNOW?

3x + 2y cannot be 5 and 6 at the same time.

Those two graphs are parallel, so that system has no solution.



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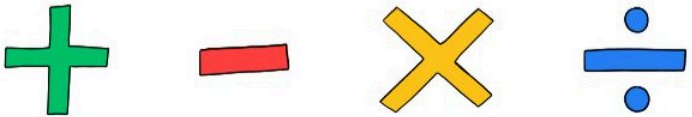

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$a^2+b^2=c^2$

Think, pair, share

If (4, 7) fits 2x + y = 15, is it the solution to the system with 3x - y = 5? What must you check next?





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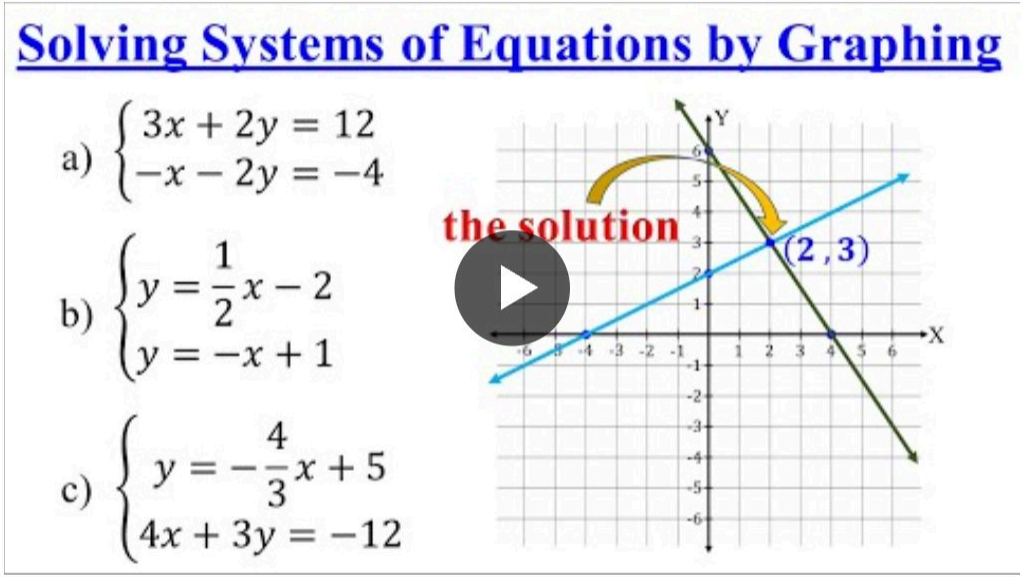
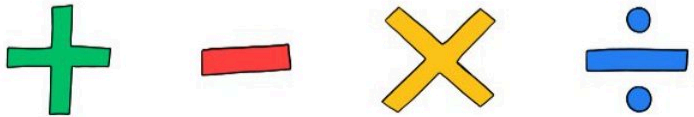
See the crossing



▶ 0:00 – 4:30

- Watch how intersection gives the x and y
- Notice when graph is only an estimate



$a^2+b^2=c^2$

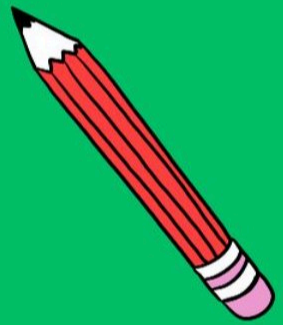
Graph vs. algebra

Graphing

- See lines cross
- Fast estimate of solution

Algebra

- Substitution or elimination
- Exact pair that fits both



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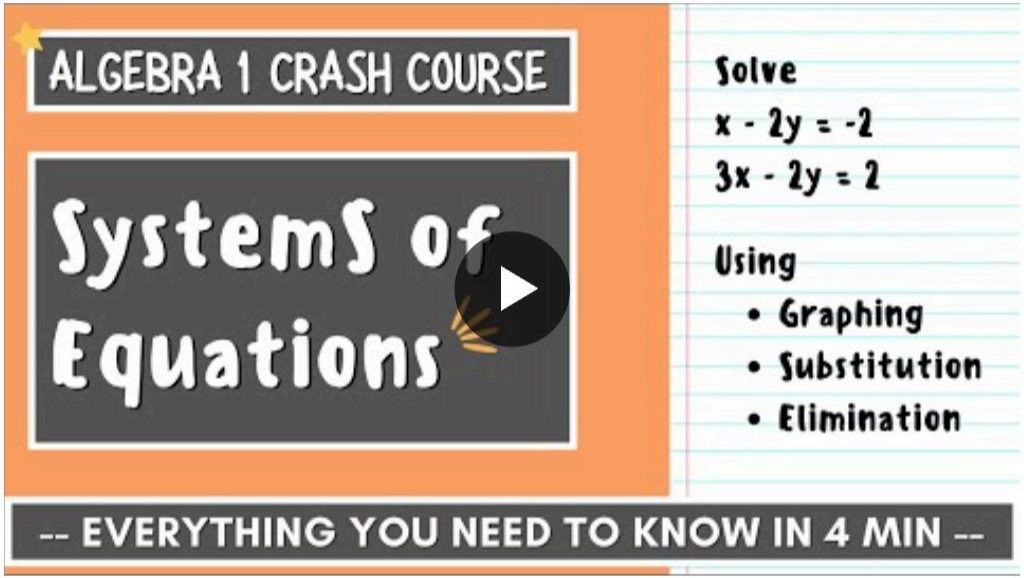
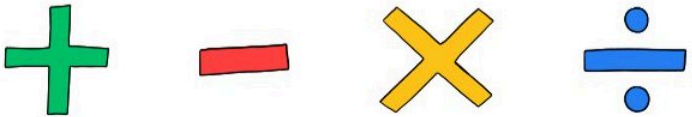
All methods in action



▶ 0:00 – 4:29

- Spot substitution vs. elimination moves
- Listen for one, none, infinite solutions



$a^2+b^2=c^2$

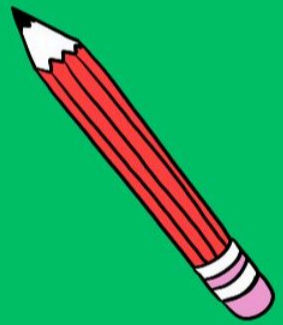
Your task

Solve systems A, B, and C. Graph system B to check your exact answer.

1. Solve A by substitution: y = x + 2, x + y = 6
2. Solve B by elimination: 2x + y = 15, 3x - y = 5
3. Decide C by inspection: 3x + 2y = 5, 3x + 2y = 6

10 min

In pairs



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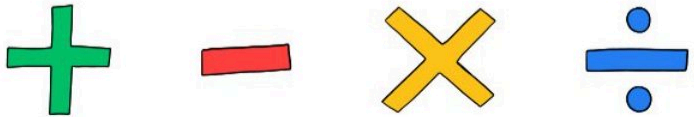
BIG IDEA

A system solution must make every equation true at the same time.



Illustration: Peggy_Marco · Pixabay



$a^2+b^2=c^2$

What could this be?

Two straight paths run side by side forever and never meet. What about their system?





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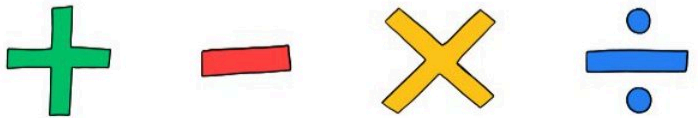
True or false?

The pair (4, 7) solves $2x + y = 15$ and $3x - y = 5$.

The system $3x + 2y = 5$ and $3x + 2y = 6$ has no solution.

Two identical lines give exactly one solution.

Graphing always gives the exact solution.



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