MATHEMATICS · GRADES 10-12

Word problems involving systems

Difficulty level: Advanced

Mathematics: Grades 10-12

This document was made by AI and there may be mistakes. If a question or answer looks wrong, use the Flag a mistake button to let Brett know so he can fix it.

Overview of the concept

This is how you solve a story with two unknowns linked by two facts, like the number of adult and child tickets sold from two totals, by turning each fact into an equation and solving them together. Each fact on its own is not enough, because it involves both unknowns at once. Together, the two facts pin both unknowns down, because only one pair of numbers satisfies both. That is how you work out ticket sales, mixtures, or any story where two things have to be found from two totals.



Rule

Word problems involving systems: turn each fact in the story into an equation, then solve the equations together.

You need two equations for two unknowns, because one fact on its own is not enough.

© 2026 Brett Robbins. All Rights Reserved.

Worked examples

EXAMPLE 1

Q Two numbers add to 20 and differ by 4. Find them.

SOLUTION

Let the numbers be x and y: $x + y = 20$ and $x - y = 4$.

Add: $2x = 24$, so $x = 12$

Then $y = 20 - 12 = 8$.

The numbers are 12 and 8.

EXAMPLE 2

Q A rectangle has perimeter 30 and length 3 more than width. Find its sides.

SOLUTION

Let length be L and width W: $2L + 2W = 30$ and $L = W + 3$.

Substitute: $2(W + 3) + 2W = 30$, so $4W + 6 = 30$, giving $W = 6$

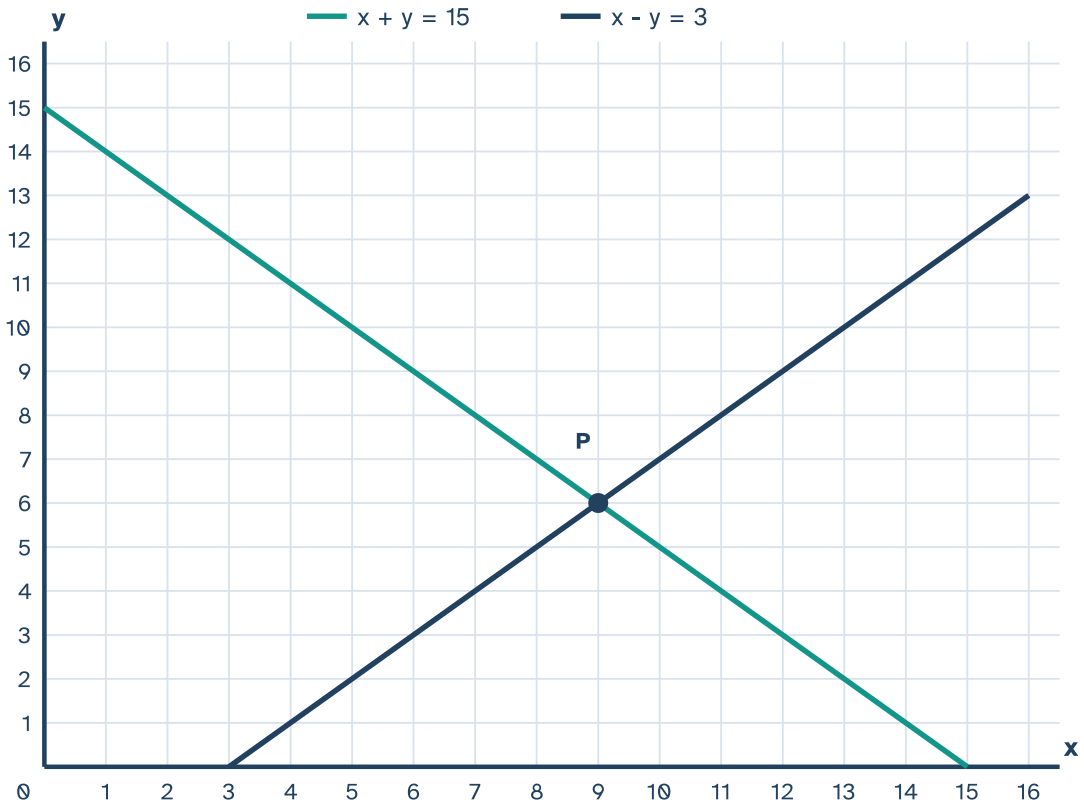
Then $L = W + 3 = 6 + 3 = 9$.

The sides are 9 and 6.

© 2026 Brett Robbins. All Rights Reserved.

Practice questions

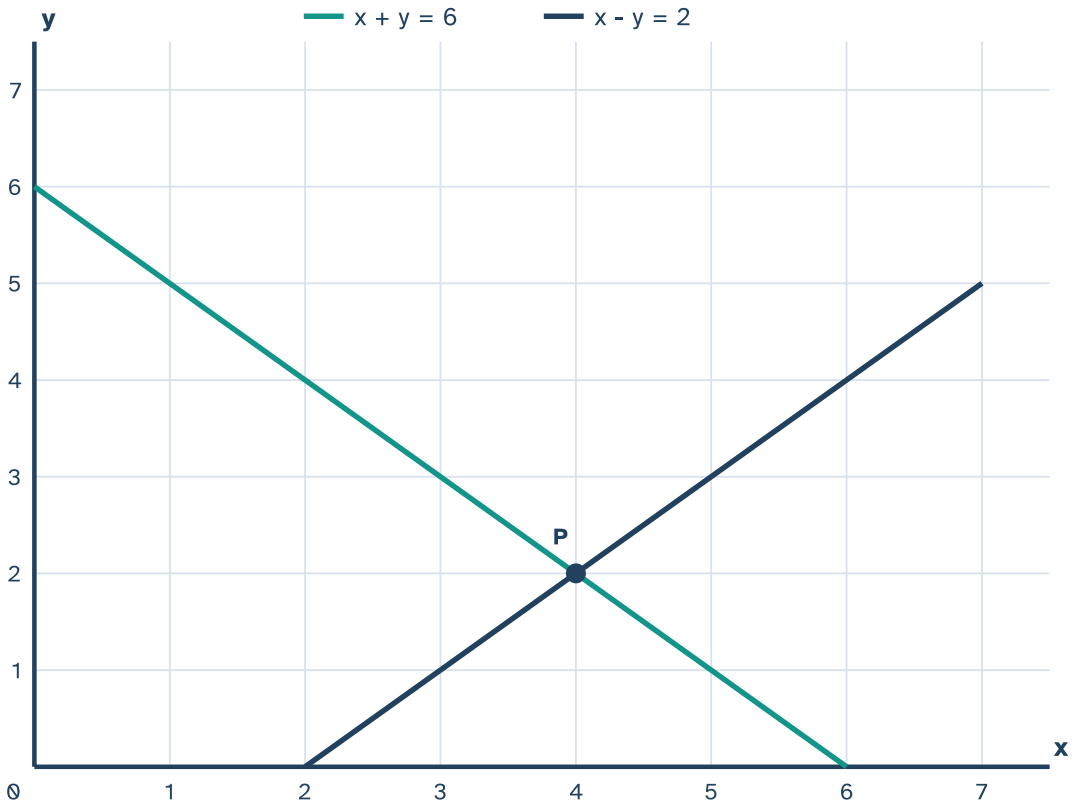
1 Two numbers add to 15 and differ by 3. Let x be the larger number and y be the smaller number. The graph shows the two lines x + y = 15 and x - y = 3 crossing at point P. Read the coordinates of P to find the two numbers.



Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

2 A pen costs 2 dollars more than a pencil. Together they cost 6 dollars. Let x be the price of the pen and y be the price of the pencil. The graph shows the two lines crossing at point P. Read the coordinates of P to find each price.



A Pen $2, pencil $4

B Pen $4, pencil $2

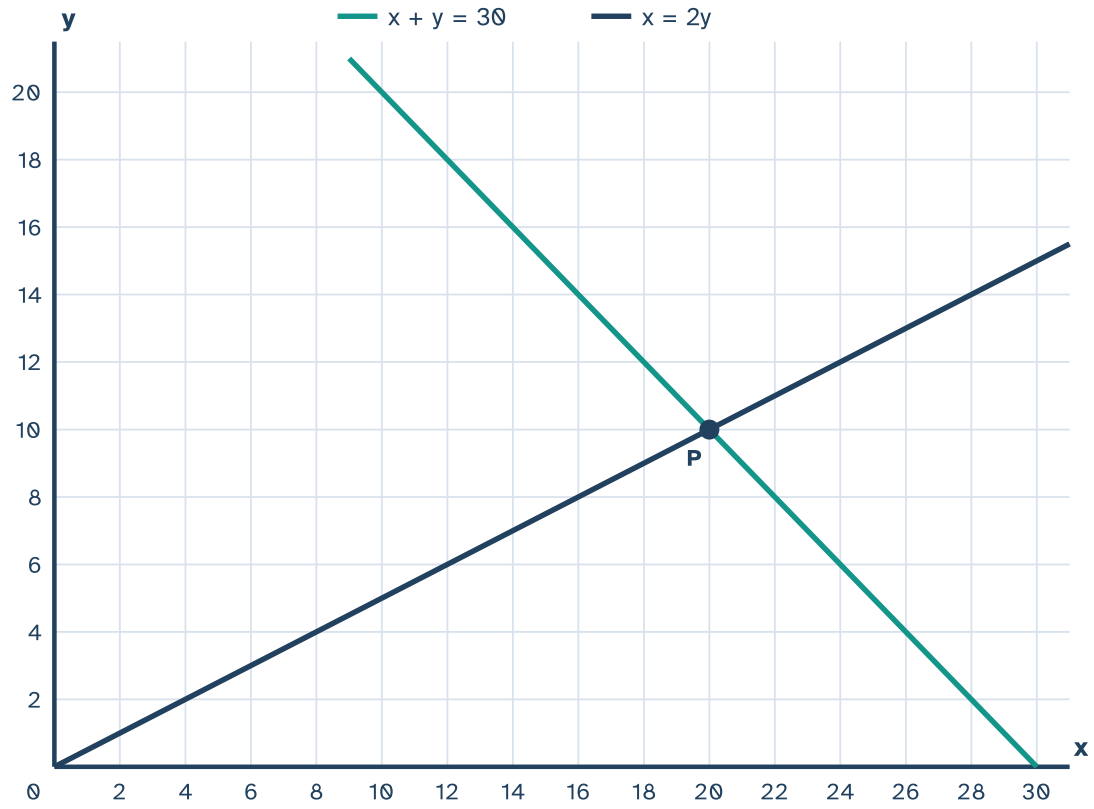
C Pen $3, pencil $3

D Pen $5, pencil $1

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

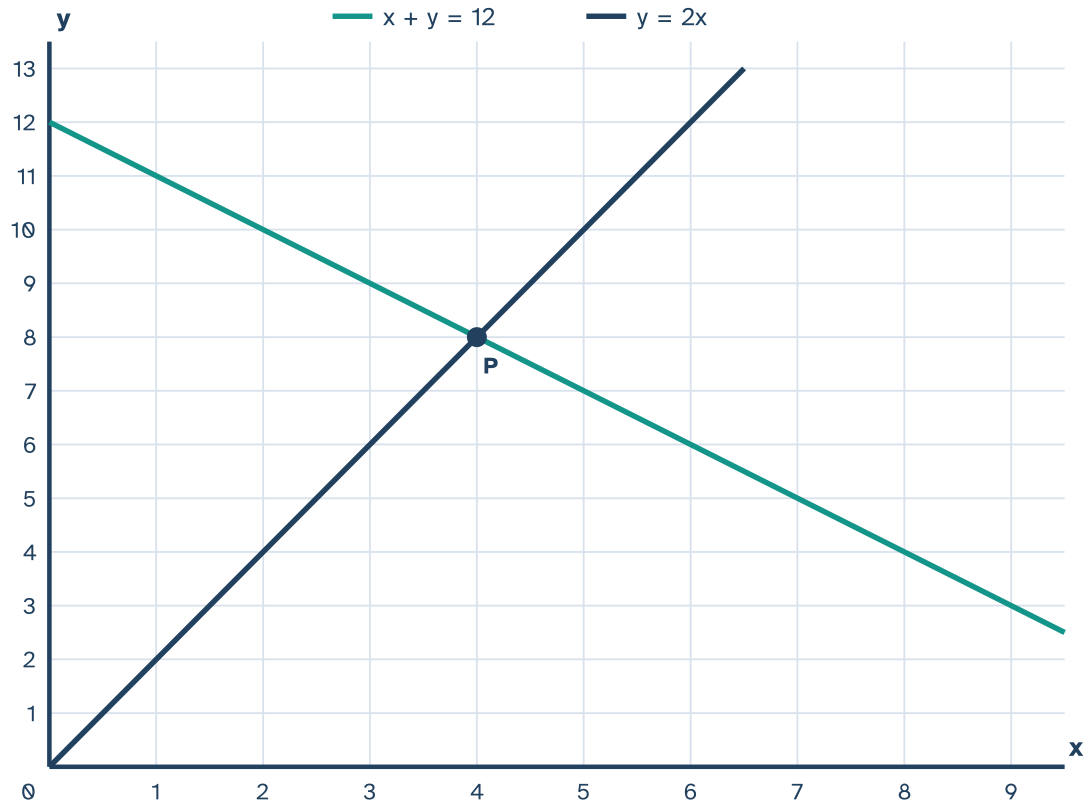
3 Two numbers add to 30 and one is twice the other. Let x be the larger number and y be the smaller number. The graph shows the two lines crossing at point P. Read the coordinates of P to find the two numbers.



Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

4 A rectangle has perimeter 24 and length twice the width. Let x be the width and y be the length. The graph shows the two lines crossing at point P. Read the coordinates of P to find its sides.



- **A** Length 4, width 8
- **B** Length 6, width 6
- **C** Length 8, width 4
- **D** Length 12, width 2

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

5

What is the first step in a system word problem?

A Define the unknowns with letters

B Solve one equation on its own

C Guess both numbers

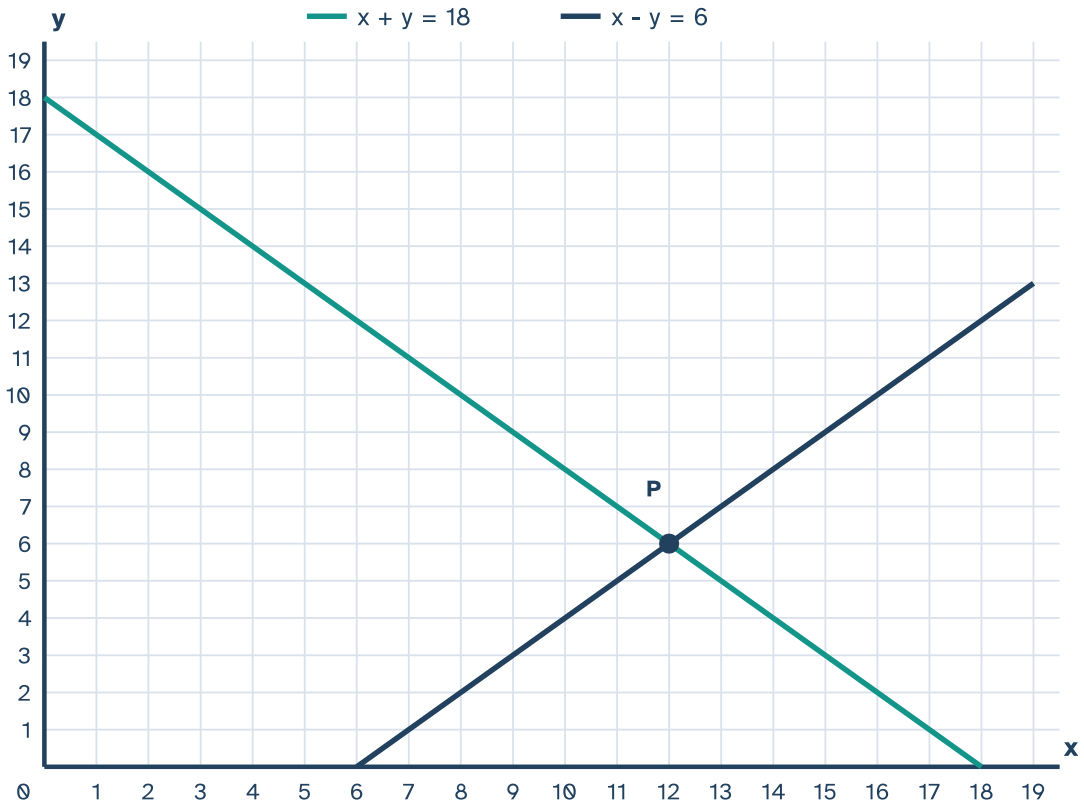
D Draw the graph first

Understand It with Pulse

Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

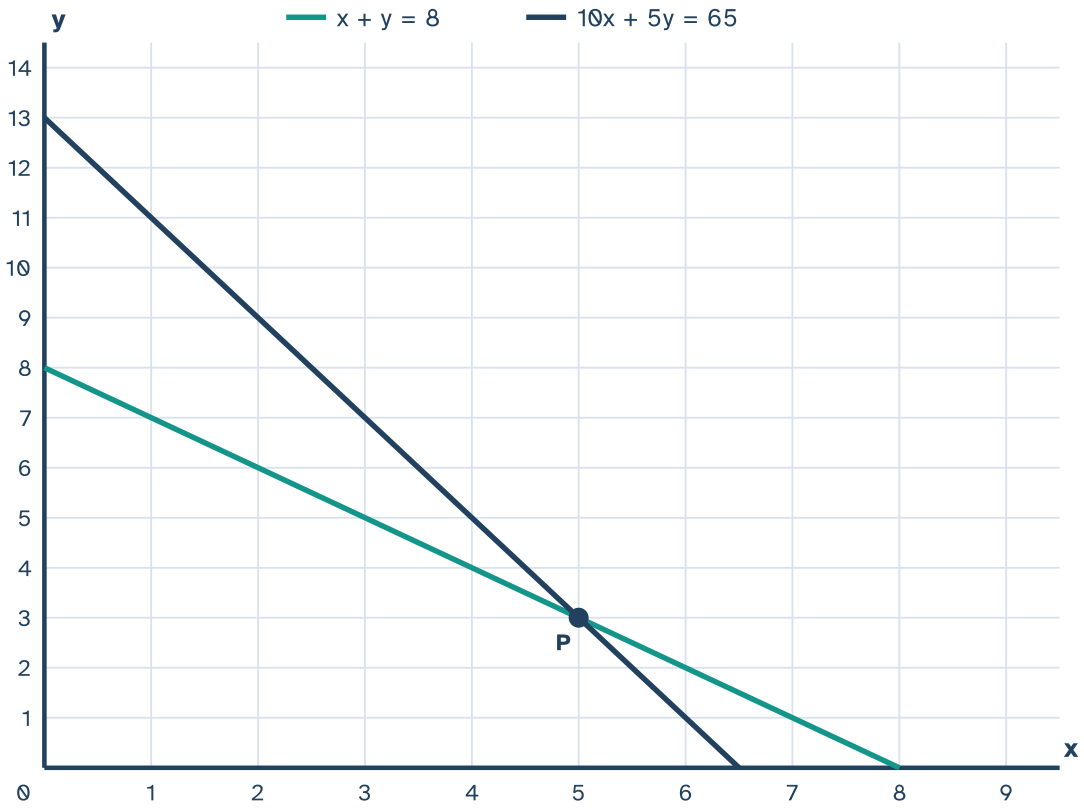
6 Two numbers add to 18 and differ by 6. Let x be the larger number and y be the smaller number. The graph shows the two lines x + y = 18 and x - y = 6 crossing at point P. Read the coordinates of P to find the two numbers.



Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

7 Tickets cost 10 dollars for an adult and 5 dollars for a child. 8 tickets cost 65 dollars. Let x be the number of adult tickets and y be the number of child tickets. The graph shows the two lines crossing at point P. Read the coordinates of P to find how many adult tickets were bought.

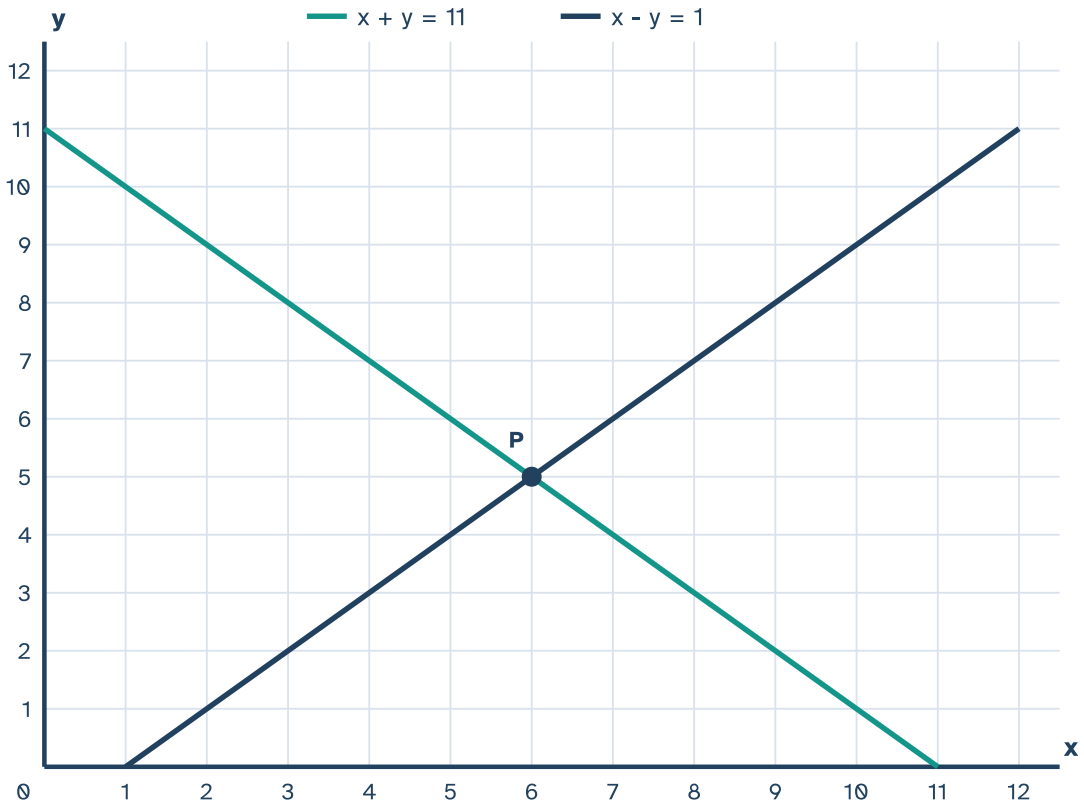


Understand It with Pulse

Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

8 A number + another number is 11, and their difference is 1. Let x be the larger number and y be the smaller number. The graph shows the two lines crossing at point P. Read the coordinates of P to find the two numbers.

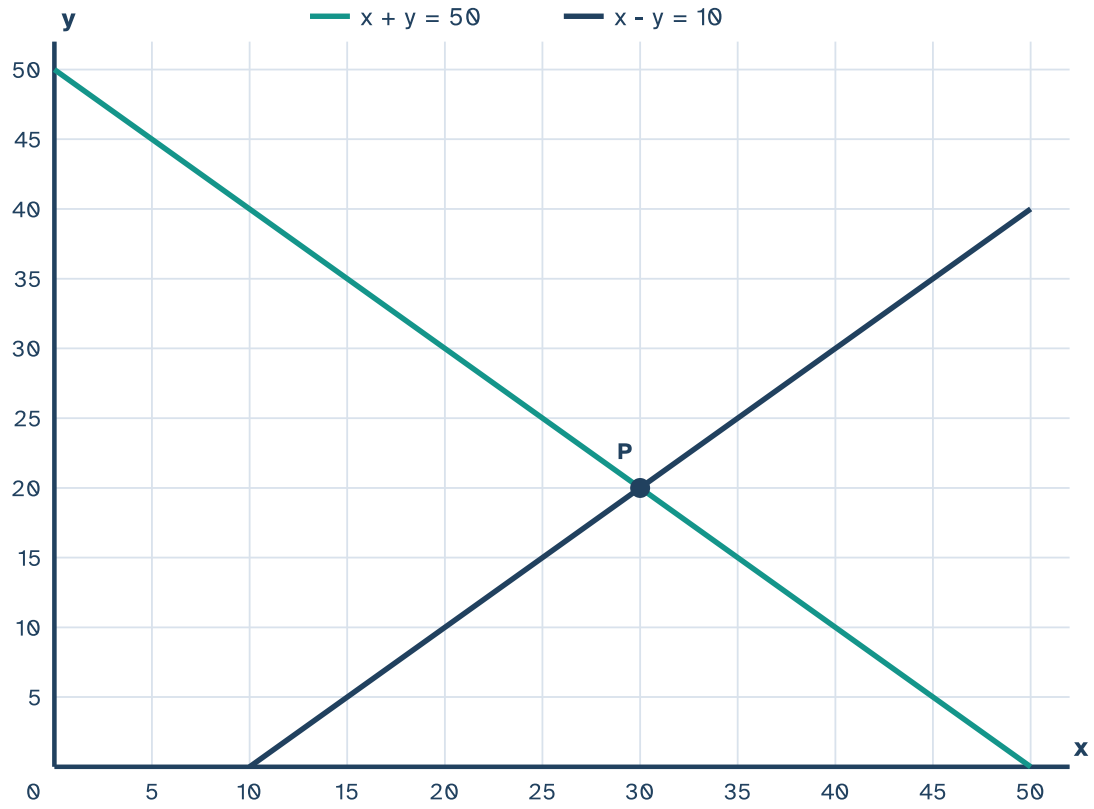


Understand It with Pulse

Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

9 Two numbers add to 50 and one is 10 more than the other. Let x be the larger number and y be the smaller number. The graph shows the two lines crossing at point P. Read the coordinates of P to find the two numbers.



Understand It with Pulse

Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

10

Why do you need two equations for two unknowns?

A One equation is enough for two unknowns

B Two equations are needed for one unknown

C Equations cannot share unknowns

D One equation alone leaves infinitely many pairs; two pin down one pair

Understand It with Pulse

Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

ANSWER KEY

1. 9, 6

2. Pen $4, pencil $2

3. 20, 10

4. Length 8, width 4

5. Define the unknowns with letters

6. 12, 6

7. 5

8. 6, 5

9. 30, 20

10. One equation alone leaves infinitely many pairs; two pin down one pair

© 2026 Brett Robbins. All Rights Reserved.