MATHEMATICS · GRADES 10-12

Intersections of linear and quadratic functions

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 find where a straight line and a curve meet, like the moment a steadily rising cost line crosses the curve of a growing profit. The meeting point is where two things are equal, and that is often the moment that matters most, the break even point, the catch up point, or the moment one overtakes the other. You use it to find when a business starts making a profit, when a rising cost catches up with a budget, or when a steady runner is overtaken by one who is speeding up.



Rule

To find where two graphs meet, set them equal and solve.

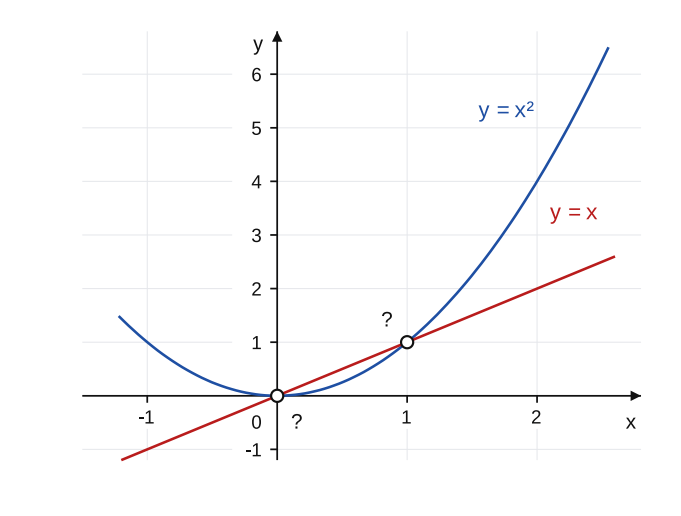
Put the two right hand sides equal to each other, solve for x, then use either equation to find y.

© 2026 Brett Robbins. All Rights Reserved.

Worked examples

EXAMPLE 1

Q **Find where $y = x$ and $y = x^2$ meet.**



SOLUTION

Set the two right sides equal: $x = x^2$.

Bring all terms to one side: $x^2 - x = 0$, so $x(x - 1) = 0$.

So $x = 0$ or $x = 1$, giving points $(0, 0)$ and $(1, 1)$.

EXAMPLE 2

Q **Find where $y = 2$ and $y = x^2$ meet.**

SOLUTION

Set equal: $x^2 = 2$.

So $x = \sqrt{2}$ or $x = -\sqrt{2}$.

Points: $(\sqrt{2}, 2)$ and $(-\sqrt{2}, 2)$.

© 2026 Brett Robbins. All Rights Reserved.

Practice questions

1 Where do $y = x^2$ and $y = x + 2$ meet?

- **A** (2, 4) and (1, 1)
- **B** (2, 4) and (-1, 1)
- **C** (-2, 4) and (1, 1)
- **D** (2, -4) and (-1, -1)

Understand It with Pulse | Flag a mistake

2 The line $y = 0$ is the x-axis. Where does it meet $y = x^2$?

- **A** (0, 1)
- **B** (0, 0)
- **C** (1, 0)
- **D** (1, 1)

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

3 Where do $y = 3$ and $y = x^2$ meet?

A $(3, \sqrt{3})$ and $(3, -\sqrt{3})$

B $(1, 3)$ and $(-1, 3)$

C $(\sqrt{3}, 3)$ only

D $(\sqrt{3}, 3)$ and $(-\sqrt{3}, 3)$

Understand It with Pulse | Flag a mistake

4 How many times can a straight line cross a parabola?

A 2 times only

B 1 time only

C 0, 1, or 2 times

D 3 times

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

5 Where does the vertical line $x = 2$ meet $y = x^2$?

- **A** (2, 4)
- **B** (4, 2)
- **C** (2, 2)
- **D** (4, 4)

Understand It with Pulse | Flag a mistake

6 How many points do $y = x^2$ and $y = x^2 - 1$ share?

- **A** 0
- **B** 1
- **C** 2
- **D** Infinitely many

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

7 If a line just touches a parabola without crossing it, how many intersection points are there?

Understand It with Pulse | Flag a mistake

8 A line meets $y = x^2$ at (1, 1) and (3, 9). What is the equation of the line?

A. $y = 4x - 3$

B. $y = 2x - 1$

C. $y = 3x - 2$

D. $y = 4x + 3$

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

9 **Can the line $y = -1$ meet the parabola $y = x^2$? Explain.**

- **A** Yes, at (-1, 1)
- **B** Yes, at (0, -1)
- **C** None, since x^2 is never negative
- **D** Yes, at (1, -1)

Understand It with Pulse | Flag a mistake

10 **What method finds where a line and a curve meet?**

- **A** Add the two equations together
- **B** Set the two expressions for y equal and solve
- **C** Draw the line only and read off its slope
- **D** Multiply the two expressions for y

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

ANSWER KEY

1. (2, 4) and (-1, 1)

2. (0, 0)

3. ($\sqrt{3}$, 3) and (-$\sqrt{3}$, 3)

4. 0, 1, or 2 times

5. (2, 4)

6. 0

7. 1

8. $y = 4x - 3$

9. None, since x^2 is never negative

10. Set the two expressions for y equal and solve

© 2026 Brett Robbins. All Rights Reserved.