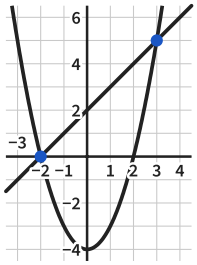
Simultaneous equations: linear and quadratic

ANSWERS

1

The graphs of $y = x^2 - 4$ and $y = x + 2$ are drawn. Write down the coordinates of the points where they meet.

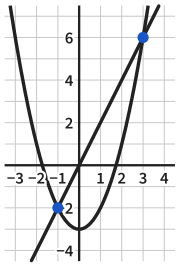


(−2, 0)

(3, 5)

2

The graphs of $y = x^2 - 3$ and $y = 2x$ are drawn. Write down the coordinates of the points where they meet.



(−1, −2)

(3, 6)

3

Find the x values where the graphs of $y = x^2$ and $y = x + 20$ meet.

$x^2 = x + 20$

$x^2 - x - 20 = 0$

$(x - 5)(x + 4) = 0$

Answer $x = 5$ or $x = -4$

4

Find the x values where the graphs of $y = x^2$ and $y = 2x + 8$ meet.

$x^2 = 2x + 8$

$x^2 - 2x - 8 = 0$

$(x - 4)(x + 2) = 0$

Answer $x = 4$ or $x = -2$

5 *Notice the change!*

Find the x values where the graphs of $y = x^2$ and $y = 3 - 2x$ meet.

$x^2 = 3 - 2x$

$x^2 + 2x - 3 = 0$

$(x - 1)(x + 3) = 0$

Answer $x = 1$ or $x = -3$

6

Solve the simultaneous equations $y = x^2$ and $y = 2x + 15$.

$x^2 = 2x + 15$

$x^2 - 2x - 15 = 0$

$(x - 5)(x + 3) = 0$

$x = 5$ or $x = -3$

$y = 25$ or $y = 9$

Answer (5, 25) and (−3, 9)

7 *Notice the change!*

Solve the simultaneous equations $y = x^2 + 3$ and $y = 2x + 6$.

$x^2 + 3 = 2x + 6$

$x^2 - 2x - 3 = 0$

$(x - 3)(x + 1) = 0$

$x = 3$ or $x = -1$

$y = 12$ or $y = 4$

Answer (3, 12) and (−1, 4)

8

Ben solves $y = x^2$ and $y = 3x + 4$.
He writes $(x - 4)(x + 1) = 0$, so $x = -4$ or $x = 1$. His answer is (−4, 16) and (1, 1). Explain his mistake and find the right answer.

$x - 4 = 0$ gives $x = 4$, not -4

$x = 4$ or $x = -1$: $y = 16$ or $y = 1$

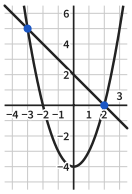
Answer (4, 16) and (−1, 1)

Simultaneous equations: linear and quadratic *further practice*

ANSWERS

9

Write down where the graphs of $y = x^2 - 4$ and $y = 2 - x$ meet.
Check each point in both equations.



$(-3)^2 - 4 = 5$ and $2 - (-3) = 5$

$2^2 - 4 = 0$ and $2 - 2 = 0$

Answer (2, 0) and (−3, 5)

10

Find the x values where the graphs of $y = x^2 + 1$ and $y = 4x - 2$ meet.

$x^2 - 4x + 3 = 0$

$(x - 3)(x - 1) = 0$

Answer $x = 3$ or $x = 1$

11

Solve the simultaneous equations $y = x^2$ and $y = 4x + 5$.

$x^2 - 4x - 5 = 0$, $(x - 5)(x + 1) = 0$

$x = 5$ or $x = -1$

Answer (5, 25) and (−1, 1)

12

Solve the simultaneous equations $y = x^2 - 5$ and $y = 2x + 3$.

$x^2 - 2x - 8 = 0$, $(x - 4)(x + 2) = 0$

$y = 2 \times 4 + 3 = 11$, $y = 2 \times (-2) + 3 = -1$

Answer (4, 11) and (−2, −1)

13

Show that the line $y = 7x - 12$ meets the curve $y = x^2$ at (3, 9).
Find the other point where they meet.

$3^2 = 9$ and $7 \times 3 - 12 = 9$

$x^2 - 7x + 12 = 0$, $(x - 4)(x - 3) = 0$

Answer (4, 16)

14

How many times does the line $y = 4x - 4$ meet the curve $y = x^2$?
Find where.

$x^2 - 4x + 4 = 0$

$(x - 2)(x - 2) = 0$: only $x = 2$

Answer once, at (2, 4)

15

Solve the simultaneous equations $y = x^2 + x$ and $y = 5x - 3$.

$x^2 - 4x + 3 = 0$, $(x - 3)(x - 1) = 0$

$x = 3$ or $x = 1$

Answer (3, 12) and (1, 2)

16

The line $y = 3x + c$ meets the curve $y = x^2$ at (5, 25). Find c. Then find the other point where they meet.

$25 = 3 \times 5 + c$, so $c = 10$

$x^2 - 3x - 10 = 0$, $(x - 5)(x + 2) = 0$

Answer $c = 10$; (−2, 4)