

GCSE Maths: Linear and quadratic simultaneous equations (Higher): answers

GCSE Maths - Quadratic and Simultaneous Equations - Higher - Lesson 14.11

Answers. Final answers to the worksheet questions. Full step-by-step solutions for every question are free at websink.site/gcse/maths/ch14-quadratics-simultaneous/higher/linear-and-quadratic-simultaneous-equations/

Exercise 14K Linear and quadratic simultaneous equations Non-calculator

1 Solve each pair of simultaneous equations.

(a) $y = x^2$ and $y = x + 6$

Answer: $x = -2, y = 4$ and $x = 3, y = 9$

(b) $y = x^2 + 2x$ and $y = 3x + 2$

Answer: $x = -1, y = -1$ and $x = 2, y = 8$

(c) $y = x^2 - 5x + 4$ and $y = x - 1$

Answer: $x = 1, y = 0$ and $x = 5, y = 4$

(d) $y = x^2 + x - 2$ and $y = 2x + 4$

Answer: $x = -2, y = 0$ and $x = 3, y = 10$

(e) $y = x^2 - 4x + 3$ and $x + y = 3$

Answer: $x = 0, y = 3$ and $x = 3, y = 0$

(f) $y = 2x^2 - 3$ and $y = x$

Answer: $x = -1, y = -1$ and $x = \frac{3}{2}, y = \frac{3}{2}$

2 Solve the simultaneous equations

$$y = x^2 - 2x - 8$$

$$y = x + 2$$

Answer: $x = -2, y = 0$ and $x = 5, y = 7$

3 Solve the simultaneous equations

$$y = x^2 - 3x - 4$$

$$3x - y = 4$$

Answer: $x = 0, y = -4$ and $x = 6, y = 14$

4 Solve the simultaneous equations

$$y = x^2 - 6$$

$$x + y = 0$$

Answer: $x = -3, y = 3$ and $x = 2, y = -2$

5 Solve each pair of simultaneous equations. Each is a circle and a straight line.

(a) $x^2 + y^2 = 25$ and $y = x + 1$

Answer: $x = -4, y = -3$ and $x = 3, y = 4$

(b) $x^2 + y^2 = 25$ and $x + y = 7$

Answer: $x = 3, y = 4$ and $x = 4, y = 3$

(c) $x^2 + y^2 = 10$ and $y = 3x$

Answer: $x = -1, y = -3$ and $x = 1, y = 3$

(d) $x^2 + y^2 = 13$ and $y = x + 1$

Answer: $x = -3, y = -2$ and $x = 2, y = 3$

(e) $x^2 + y^2 = 20$ and $y = 2x$

Answer: $x = -2, y = -4$ and $x = 2, y = 4$

(f) $x^2 + y^2 = 5$ and $x + y = 3$

Answer: $x = 1, y = 2$ and $x = 2, y = 1$

6 Solve the simultaneous equations

$$x^2 + y^2 = 25$$

$$x = 2y - 5$$

Answer: $x = -5, y = 0$ and $x = 3, y = 4$

7 Solve the simultaneous equations

$$x^2 + y^2 = 74$$

$$x - y = 2$$

Answer: $x = -5, y = -7$ and $x = 7, y = 5$

8 Show that the line $y = 2x + 1$ meets the curve $y = x^2 + 2$ at exactly one point, and find the coordinates of that point.

Answer: One solution only: $x = 1, y = 3$. The line touches the curve at $(1, 3)$

9 Show that the line $y = 2x - 3$ does not meet the curve $y = x^2 + 1$.

Answer: $x^2 - 2x + 4 = 0$ has discriminant -12 , which is negative: no solutions

10 Find the coordinates of the points where the line and the curve meet.

$$y = x^2 - x - 5$$

$$y = x + 3$$

Answer: $x = -2, y = 1$ and $x = 4, y = 7$

11 A rectangle has a perimeter of 26 cm and an area of 40 cm^2 . Its length is l cm and its width is w cm. Form a pair of simultaneous equations and solve them to find the dimensions of the rectangle.

Answer: 8 cm by 5 cm

12 The line $y = 2x + k$ is a tangent to the curve $y = x^2$. Find the value of k .

Answer: $k = -1$

