

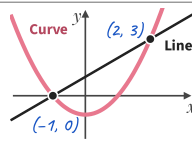
Simultaneous Equations: Linear and Quadratic

ANSWERS

1

Solve

$$y = x^2 - 1$$

$$y = x + 1$$


put them equal, then = 0

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

factorise

$$(x - 2)(x + 1) = 0$$

solve

$$x = 2 \text{ or } -1$$

Answer $(2, 3)$ and $(-1, 0)$

2

Solve

$$y = x^2$$

$$y = 2x + 3$$

put them equal, then = 0

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

factorise

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

solve

$$x = 3 \text{ or } -1$$

Answer $(3, 9)$ and $(-1, 1)$

3

Solve

$$y = x^2 + 4x - 1$$

$$y = x + 3$$

put them equal, then = 0

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

factorise

$$(x - 1)(x + 4) = 0$$

solve

$$x = 1 \text{ or } -4$$

Answer $(1, 4)$ and $(-4, -1)$

4

Solve

$$y = x^2 - 3x + 5$$

$$y = 2x - 1$$

put them equal, then = 0

$$x^2 - 5x + 6 = 0$$

factorise

$$(x - 3)(x - 2) = 0$$

solve

$$x = 3 \text{ or } 2$$

Answer $(3, 5)$ and $(2, 3)$

5

Solve

$$y = x^2 - 2x - 6$$

$$y = x - 2$$

put them equal, then = 0

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

factorise

$$(x - 4)(x + 1) = 0$$

solve

$$x = 4 \text{ or } -1$$

Answer $(4, 2)$ and $(-1, -3)$

6

Solve

$$y = x^2 - 2x + 1$$

$$y = 3x + 1$$

put them equal, then = 0

$$x^2 - 5x = 0$$

factorise

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

solve

$$x = 5 \text{ or } 0$$

Answer $(5, 16)$ and $(0, 1)$

7

Solve

$$y = x^2 + 2x - 1$$

$$y = x + 5$$

put them equal, then = 0

$$x^2 + x - 6 = 0$$

factorise

$$(x + 3)(x - 2) = 0$$

solve

$$x = 2 \text{ or } -3$$

Answer $(2, 7)$ and $(-3, 2)$

8

Solve

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

$$y = x + 1$$

put them equal, then = 0

$$x^2 + (x + 1)^2 = 25$$

factorise

$$(x + 4)(x - 3) = 0$$

solve

$$x = 3 \text{ or } -4$$

Answer $(3, 4)$ and $(-4, -3)$

Simultaneous Equations: Linear and Quadratic *further practice*

ANSWERS

9

Solve

$$x^2 + y^2 = 20$$

$$y = x - 2$$

put them equal, then = 0

$$x^2 + (x - 2)^2 = 20, \text{ so } x^2 - 2x - 8 = 0$$

factorise

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

solve

$$x = 4 \text{ or } -2$$

Answer $(4, 2)$ and $(-2, -4)$

10

Solve

$$x + y = 7$$

$$y = x^2 + 1$$

put them equal, then = 0

$$y = 7 - x, \text{ so } x^2 + 1 = 7 - x$$

factorise

$$x^2 + x - 6 = 0$$

solve

$$x = 2 \text{ or } -3$$

Answer $(2, 5)$ and $(-3, 10)$

11

Solve

$$xy = 6$$

$$y = x + 1$$

put them equal, then = 0

$$x(x + 1) = 6, \text{ so } x^2 + x - 6 = 0$$

factorise

$$(x + 3)(x - 2) = 0$$

solve

$$x = 2 \text{ or } -3$$

Answer $(2, 3)$ and $(-3, -2)$

12

The line $y = x + k$ meets the curve $y = x^2$ at the point where $x = 3$. Find k and the coordinates of the other point where they meet.

put them equal, then = 0

$$x^2 = x + k, \text{ so } x^2 - x - k = 0$$

factorise

$$(x - 3)(x + 4) = 0$$

solve

$$x = 3 \text{ or } -4$$

Answer $k = 6, (-2, 4)$

13

A toy rocket's height after t seconds is $h = 6t - t^2$ metres. A drone's height is $h = t + 4$ metres. At what times are they at the same height?

put them equal, then = 0

$$6t - t^2 = t + 4, \text{ so } t^2 - 5t + 4 = 0$$

factorise

$$(t - 4)(t - 1) = 0$$

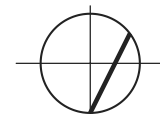
solve

$$t = 4 \text{ or } 1$$

Answer $1 \text{ s and } 4 \text{ s}$

14

A circular pond has edge $x^2 + y^2 = 25$, in metres. A straight bridge across it follows the line $y = 2x - 5$. Find the length of the bridge in surd form.



put them equal, then = 0

$$x^2 - 2x - 5 = 0, \text{ so } (x - 5)(x + 1) = 0$$

solve

$$x = 5 \text{ or } -1$$

Answer $4\sqrt{5} \text{ m}$

15

A rectangular tile has a diagonal of 10 cm and a perimeter of 28 cm. Find its length and width.

put them equal, then = 0

$$x + y = 14 \text{ and } x^2 + y^2 = 100$$

factorise

$$x^2 - 14x + 48 = 0, \text{ so } x = 8 \text{ or } 6$$

solve

$$x = 8 \text{ or } 6$$

Answer $8 \text{ cm by } 6 \text{ cm}$

16

Explain why the line $y = 2x$ and the curve $y = x^2 + 4$ never meet.

put them equal, then = 0

$$x^2 + 4 = 2x, \text{ so } x^2 - 2x + 4 = 0$$

factorise

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

solve

$$\text{no solutions, so they never meet}$$

Answer $\text{no solutions, so they never meet}$