

Simultaneous Equations: Linear and Quadratic *extend*

ANSWERS

1



Solve the simultaneous equations

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

$$x + 2y = 5$$

$$x = 5 - 2y: (5 - 2y)^2 + y^2 = 25$$

$$5y^2 - 20y = 0, 5y(y - 4) = 0$$

Answer (5, 0) and (-3, 4)

2



Solve the simultaneous equations

$$y = 2x^2 + 3x - 1$$

$$y = 4x + 2$$

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

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

Answer $(\frac{3}{2}, 8)$ and $(-1, -2)$

3



Solve the simultaneous equations

$$2x^2 - xy = 6$$

$$x - y = 1$$

$$y = x - 1: 2x^2 - x(x - 1) = 6$$

$$x^2 + x - 6 = 0, (x + 3)(x - 2) = 0$$

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

4



The line $y = x + 1$ meets the circle $x^2 + y^2 = 13$ at A and B . O is the centre of the circle. Find the area of triangle OAB .

$$A(2, 3), B(-3, -2), C(0, 1) \text{ on } AB$$

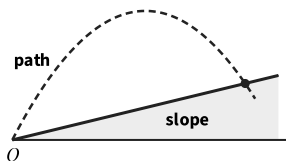
$$OC = 1: \frac{1}{2} \times 1 \times 2 + \frac{1}{2} \times 1 \times 3$$

Answer $\frac{5}{2}$ square units

5



A ball is kicked from O at the bottom of a slope. Its path is $y = 4x - 0.5x^2$ and the slope is $y = 0.5x$, in metres. How high above O does it land?



$$4x - 0.5x^2 = 0.5x, x^2 = 7x$$

$$x = 7 \text{ (not 0)}, y = 3.5$$

Answer 3.5 m

6



The line $x + y = k$ is a tangent to the circle $x^2 + y^2 = 8$. Find the two possible values of k .

$$2x^2 - 2kx + k^2 - 8 = 0$$

$$4k^2 - 8(k^2 - 8) = 0, k^2 = 16$$

Answer $k = 4$ or $k = -4$

7



Find the points where the circle $x^2 + y^2 = 20$ meets the curve $y = x^2$

$$y + y^2 = 20, (y + 5)(y - 4) = 0$$

$$x^2 \geq 0, \text{ so } y = 4, \text{ not } -5$$

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

8



Show that the line $x + y = 8$ does not meet the circle $x^2 + y^2 = 16$

$$x^2 + (8 - x)^2 = 16$$

$$x^2 - 8x + 24 = (x - 4)^2 + 8 > 0$$

Reason no solutions: they never meet