

Simultaneous Equations

Exercise 4S Skills Practice

- Find the coordinates of the point of intersection for each pair of lines.
 - $y = 2x - 3$
 $y = x + 4$
 - $y = \frac{1}{2}x$
 $y = 3x - 2$
 - $y = 2 - x$
 $y = 4x + 1$
- Find the pair of values (x, y) which satisfy each pair of equations.
 - $2x + y = 9$
 $x - y = 3$
 - $4x + y = 10$
 $3x + y = 7$
 - $x - 4y = -6$
 $2x + y = 33$
 - $2x - 3y = 29$
 $5x + 2y = 25$
 - $4x - 5y = 3$
 $3x - 8y = 15$
 - $4x + y = 8$
 $6x - 3y = -15$
 - $2x + y - 14 = 0$
 $x - 3y - 21 = 0$
 - $3x + 2y - 10 = 0$
 $9x - 5y + 14 = 0$
 - $3x - 2y - 9 = 0$
 $8x + 4y - 31 = 0$
- Find the coordinates of the points of intersection for the given curve and line.
 - $y = x^2 + 4$
 $y = 4x + 1$
 - $y = 2x - x^2$
 $y = x - 2$
 - $y = 5 - 2x - 4x^2$
 $y = 9 - 12x$
- Solve each pair of simultaneous equations.
 - $x^2 + y - 10 = 0$
 $x - y - 2 = 0$
 - $y^2 + 3y - x = 4$
 $2y + x = 2$
 - $x^2 + y^2 = 25$
 $x - 2y = -5$
 - $x^2 - y + 3 = 0$
 $3x + 2y - 8 = 0$
 - $x^2 + 2xy = 15$
 $x + y = 4$
 - $5x^2 - y^2 = 20$
 $5x - y = 10$
 - $y^2 - 2xy + 5 = 0$
 $y - x + 2 = 0$
 - $x^2 + 4x + y^2 = 21$
 $x + 3y = 13$
 - $2x^2 - 5xy + 18 = 0$
 $2x + 5y - 18 = 0$
- Find in each case if the line and curve intersect. If they do so, find the coordinates of any points of intersection.
 - $x + 2y = 10$
 $x^2 + y^2 = 100$
 - $y = 2x - 5$
 $y = x^2 - 2$
 - $y = x + 1$
 $x^2 - 5y + 2y^2 = 7$
 - $x + 4y = 8$
 $x^2 - xy + 2y = 14$
 - $4x + 3y = 1$
 $2x^2 + y - y^2 = 2$
 - $x - 3y = 4$
 $2x^2 + x + y^2 = 4$
- Solve each pair of simultaneous equations.
 - $y = \frac{2}{x} - 3$
 $y = x - 2$
 - $2x + \frac{1}{y} = 11$
 $x - \frac{1}{y} = 1$
 - $2x^2 + y^2 = 33$
 $x^2 - y^2 = 15$

Exercise 4S Skills Practice

- $(7, 11)$
 - $(\frac{4}{5}, \frac{2}{5})$
 - $(\frac{1}{5}, \frac{9}{5})$
- $(4, 1)$
 - $(3, -2)$
 - $(14, 5)$
 - $(7, -5)$
 - $(-3, -3)$
 - $(\frac{1}{2}, 6)$
 - $(9, -4)$
 - $(\frac{2}{3}, 4)$
 - $(\frac{1}{2}, \frac{3}{4})$
- $(1, 5), (3, 13)$
 - $(-1, -3), (2, 0)$
 - $(\frac{1}{2}, 3), (2, -15)$
- $x = -4, y = -6; x = 3, y = 1$
 - $x = 14, y = -6; x = 0, y = 1$
 - $x = -5, y = 0; x = 3, y = 4$
 - $x = \frac{1}{2}, y = \frac{13}{4}; x = -2, y = 7$
 - $x = 3, y = 1; x = 5, y = -1$
 - $x = 2, y = 0; x = 3, y = 5$
 - $x = 3, y = 1; x = -3, y = -5$
 - $x = 1, y = 4; x = -2, y = 5$
 - $x = 3, y = \frac{12}{5}; x = \frac{3}{2}, y = 3$
- $(-6, 8), (10, 0)$
 - do not intersect
 - $(-\frac{5}{3}, -\frac{2}{3}), (2, 3)$
 - $(4, 1), (-2, \frac{5}{2})$
 - $(-2, 3), (4, -5)$
 - $(-\frac{20}{19}, -\frac{32}{19}), (1, -1)$
- $x = -2, y = -4; x = 1, y = -1$
 - $x = 4, y = \frac{1}{3}$
 - $x = -4, y = \pm 1; x = -4, y = \pm 1$

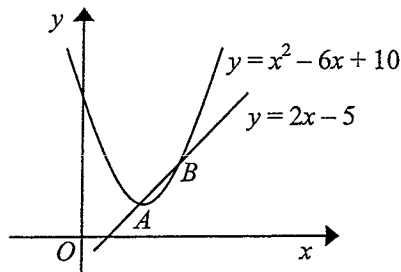
Exercise 4E Exam Practice

- 1 Solve the simultaneous equations

$$\begin{aligned} 6x - 2xy + y^2 &= 15 \\ 8x - y &= 0 \end{aligned}$$

(5 marks)

2



The diagram shows the curve $y = x^2 - 6x + 10$ and the line $y = 2x - 5$ which intersect at the points A and B .

- a Find the coordinates of the points A and B . (4 marks)
 b Find the exact length AB in its simplest form. (3 marks)

- 3 a Given that

$$9^{2p+1} = 27^{q-2}$$

find a linear relationship between p and q . (2 marks)

- b Solve the simultaneous equations

$$9^{2p+1} = 27^{q-2}$$

$$\left(\frac{1}{2}\right)^{q-3} = 16^{p+1}$$

(5 marks)

- 4 The points $(2 - a, b - 1)$ and $(3 - 2b, 5a - 9)$ lie on the line $2y - 5x + 6 = 0$.

Find the values of the constants a and b . (5 marks)

- 5 a Show that the line $y = 2x + 10$ is a tangent to the curve $y = 1 - 4x - x^2$. (4 marks)

- b The line $x - y + k = 0$ is also a tangent to the curve $y = 1 - 4x - x^2$. Find the value of k . (4 marks)

- 6 By first letting $X = \frac{1}{x}$ and $Y = \frac{1}{y}$, or otherwise, solve the simultaneous equations

$$\frac{3}{x} + \frac{2}{y} = 9$$

$$\frac{12}{x} - \frac{1}{y} = 0$$

(5 marks)

Exercise 4E Exam Practice

- 1 $x = \frac{1}{2}, y = 4; x = -\frac{5}{8}, y = -5$
 2 a $(3, 1), (5, 5)$ b $2\sqrt{5}$
 3 a $4p = 3q - 8$ b $p = -\frac{11}{16}, q = \frac{7}{4}$
 4 $a = \frac{1}{5}, b = \frac{5}{2}$
 5 b $\frac{29}{4}$
 6 $x = 3, y = \frac{1}{4}$