

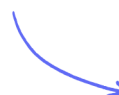
Exam Questions

Simultaneous Equations

Linear Simultaneous Equations / Quadratic Simultaneous Equations

Easy (14 questions)	/39
Medium (12 questions)	/45
Hard (15 questions)	/69
Very Hard (18 questions)	/100
Total Marks	/253

Scan here to return to the course
or visit [savemyexams.com](https://www.savemyexams.com)



Easy Questions

1 Solve the simultaneous equations

$$\begin{aligned}4x + y &= 25 \\ x - 3y &= 16\end{aligned}$$

(3 marks)

2 Solve the simultaneous equations

$$\begin{aligned}2x - y &= 13 \\ x - 2y &= 11\end{aligned}$$

(3 marks)

3 Solve the simultaneous equations

$$\begin{aligned}3x + y &= -4 \\ 3x - 4y &= 6\end{aligned}$$

(3 marks)

4 Solve the simultaneous equations

$$2x - 4y = 19$$

$$3x + 5y = 1$$

(4 marks)

5 Solve the simultaneous equations

$$4x + 5y = 4$$

$$2x - y = 9$$

Show clear algebraic working.

(3 marks)

6 Solve the simultaneous equations

$$4x + 2y = 9$$

$$x - 4y = 9$$

Show clear algebraic working.

$$x =$$

$$y =$$

(3 marks)

7 Solve the simultaneous equations

$$x + y = 15$$

$$7x - 5y = 3$$

Show clear algebraic working.

$$x = \dots\dots\dots$$

$$y = \dots\dots\dots$$

(3 marks)

8 Solve the simultaneous equations

$$x + 2y = -0.5$$

$$3x - y = 16$$

Show clear algebraic working.

$$x = \dots\dots\dots$$

$$y = \dots\dots\dots$$

(3 marks)

9 Solve the simultaneous equations

$$3x + 5y = 6$$

$$7x - 5y = -11$$

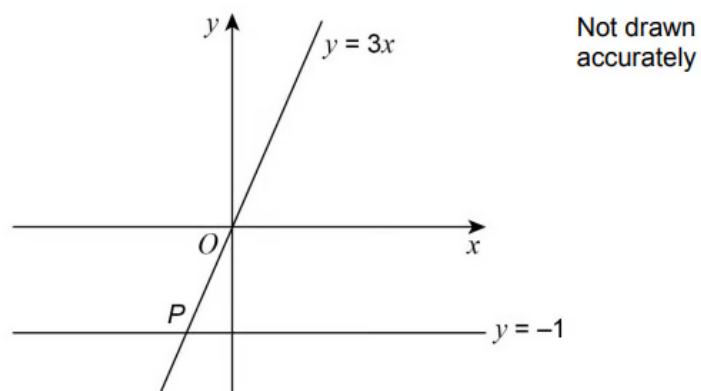
Show clear algebraic working.

$$x = \dots\dots\dots$$

$$y = \dots\dots\dots$$

(3 marks)

10 Two straight lines intersect at point P .

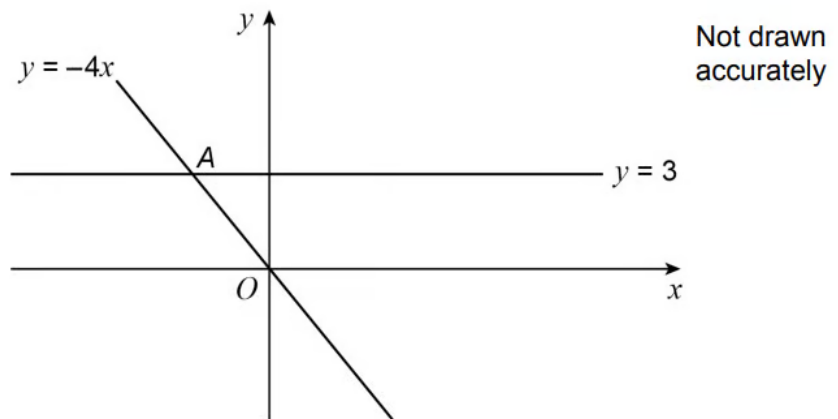


Choose the coordinates of P

- A. $(-3, -1)$
- B. $\left(-1, -\frac{1}{3}\right)$
- C. $(-1, -3)$
- D. $\left(-\frac{1}{3}, -1\right)$

(1 mark)

- 11 Two straight lines intersect at point A .



Choose the coordinates of A .

--	--	--	--

A. $(-\frac{3}{4}, 3)$

B. $(-4, 3)$

C. $(-12, 3)$

D. $(-\frac{4}{3}, 3)$

(1 mark)

- 12 Solve the simultaneous equations.

$$2x + y = 18$$

$$x - y = 6$$

(3 marks)

13 Solve the simultaneous equations

$$7x + 2y = 36$$

$$3x + 2y = 16$$

$$x = \dots\dots\dots$$

$$y = \dots\dots\dots$$

(3 marks)

14 Solve.

$$4x + 3y = 5$$

$$2x + 3y = 1$$

$$x = \dots\dots\dots$$

$$y = \dots\dots\dots$$

(3 marks)

Medium Questions

1 Solve the simultaneous equations

$$5x + 2y = 11$$

$$4x - 3y = 18$$

(4 marks)

2 Solve the simultaneous equations

$$3x + 2y = 4$$

$$4x + 5y = 17$$

(4 marks)

3 Solve the simultaneous equations

$$4x + 7y = 1$$

$$3x + 10y = 15$$

(4 marks)

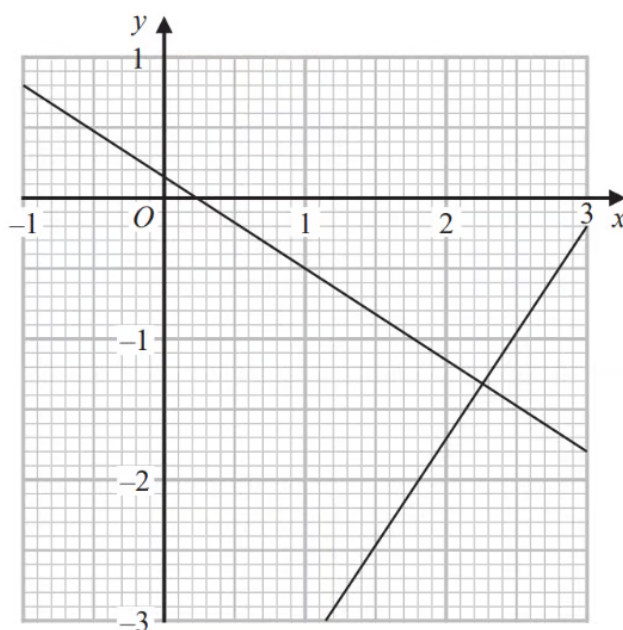
4 Solve the simultaneous equations

$$3x + 4y = 5$$

$$2x - 3y = 9$$

(4 marks)

5 The graphs with equations $3y + 2x = \frac{1}{2}$ and $2y - 3x = -\frac{113}{12}$ have been drawn on the grid below.



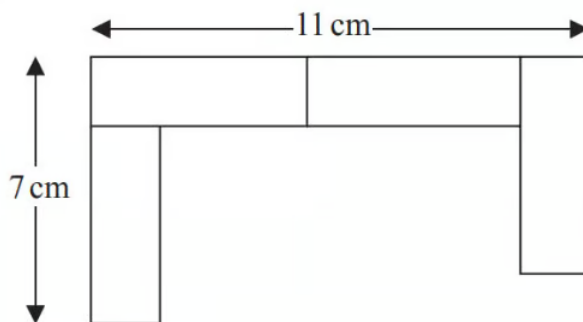
Using the graphs, find estimates of the solutions of the simultaneous equations

$$3y + 2x = \frac{1}{2}$$

$$2y - 3x = -\frac{113}{12}$$

(2 marks)

- 6 A pattern is made using identical rectangular tiles.



Find the total area of the pattern.

(4 marks)

- 7 Solve the simultaneous equations

$$2x + 7y = 17$$

$$5x + 3y = -1$$

Show clear algebraic working.

$x =$

$y =$

(4 marks)

8 Solve the simultaneous equations

$$5a + 2c = 10$$

$$2a - 4c = 7$$

Show clear algebraic working.

$$a = \dots\dots\dots$$

$$c = \dots\dots\dots$$

(3 marks)

9 Solve the simultaneous equations

$$7x - 2y = 34$$

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

Show clear algebraic working.

$$x = \dots\dots\dots$$

$$y = \dots\dots\dots$$

(4 marks)

10 Solve the simultaneous equations

$$2x + 4y = -9$$

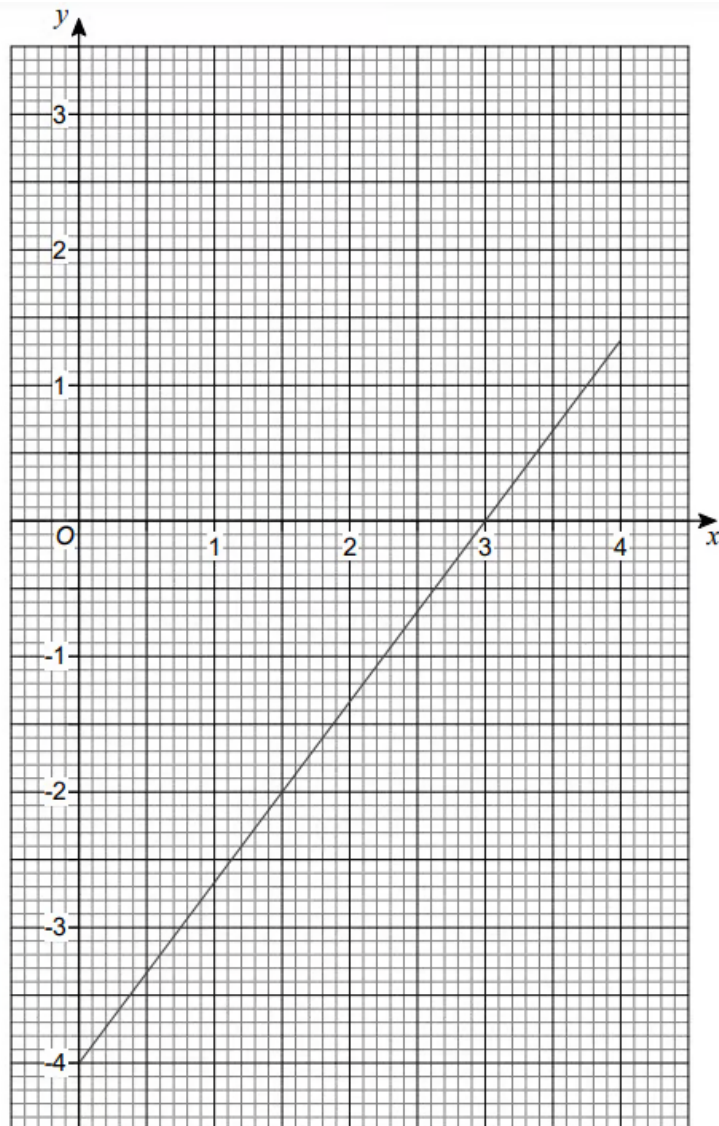
$$2y = 4x - 7$$

$$x = \dots\dots\dots$$

$$y = \dots\dots\dots$$

(4 marks)

11 Here is the graph of $4x - 3y = 12$ for values of x from 0 to 4



By drawing a second graph on the grid,

work out an approximate solution to the simultaneous equations

$$4x - 3y = 12 \text{ and } 3x + 2y = 6$$

(3 marks)

12 Solve simultaneously

$$4y - x = 1$$

$$x^2 - 4xy + y^2 = 13$$

(5 marks)

Hard Questions

1 Solve

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

$$3x - 4y = 18$$

(4 marks)

2 Solve the equations

$$x^2 + y^2 = 36$$

$$x = 2y + 6$$

(5 marks)

3 Solve the simultaneous equations

$$x^2 + y^2 = 9$$

$$x + y = 2$$

Give your answers correct to 2 decimal places.

(6 marks)

4 Solve algebraically the simultaneous equations

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

$$y - 3x = 13$$

(5 marks)

5 Solve algebraically the simultaneous equations

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

$$y - 2x = 5$$

(5 marks)

- 6** 3 kg of potatoes and 4 kg of carrots have a total cost of 440p.
4 kg of potatoes and 3 kg of carrots have a total cost of 470p.

Work out the total cost of 1 kg of potatoes and 1 kg of carrots.

(4 marks)

- 7** A cinema sells adult tickets and child tickets.

The total cost of 3 adult tickets and 1 child ticket is £30

The total cost of 1 adult ticket and 3 child tickets is £22

Work out the cost of an adult ticket and the cost of a child ticket.

(4 marks)

- 8** 3 teas and 2 coffees have a total cost of £7.80
5 teas and 4 coffees have a total cost of £14.20

Work out the cost of one tea and the cost of one coffee.

(4 marks)

9 Solve the simultaneous equations

$$3x + 5y = 3.1$$

$$6x + 3y = 3.75$$

Show clear algebraic working.

$$x = \dots\dots\dots$$

$$y = \dots\dots\dots$$

(3 marks)

- 10 The line with equation $2y = x + 1$ intersects the curve with equation $3y^2 + 7y + 16 = x^2 - x$ at the points A and B

Find the coordinates of A and the coordinates of B Show clear algebraic working.

(5 marks)

11 Solve the simultaneous equations

$$2x + 3y = 5p$$

$$y = 2x + p$$

where p is a constant.

Give your answers in terms of p in their simplest form.

(4 marks)

12 A linear sequence starts

$$a + 2b \quad a + 6b \quad a + 10b \quad \dots\dots \quad \dots\dots$$

The 2nd term has value 8

The 5th term has value 44

Work out the values of a and b .

$$a = \dots\dots\dots$$

$$b = \dots\dots\dots$$

(4 marks)

13 Solve.

$$x^2 + y^2 = 34$$

$$y = x + 2$$

Show your working.

$$x = \dots\dots\dots y = \dots\dots\dots$$

$$x = \dots\dots\dots y = \dots\dots\dots$$

(6 marks)

14 The diagrams show the price paid by two groups of people visiting a funfair.

5 adults	£	
4 children	£	
Total £		78

3 adults	£	
6 children	£	
Total £		63

Assume each adult pays the same price and each child pays the same price.

Find the price for an adult and the price for a child.

Adult price = £

Child price = £

(5 marks)

15 Given that

$$m \begin{pmatrix} 4 \\ 1 \end{pmatrix} + n \begin{pmatrix} 5 \\ 2 \end{pmatrix} = \begin{pmatrix} 12 \\ 6 \end{pmatrix}$$

find the value of m and the value of n .

$m =$

$n = \dots\dots\dots$

(5 marks)

Very Hard Questions

- 1 Solve algebraically the simultaneous equations

$$\begin{aligned}x^2 - 4y^2 &= 9 \\ 3x + 4y &= 7\end{aligned}$$

(5 marks)

- 2 Prove algebraically that the straight line with equation $x - 2y = 10$ is a tangent to the circle with equation $x^2 + y^2 = 20$

(5 marks)

- 3 (a) In all the following sequences, after the first two terms, the rule is to add the previous two terms to find the next term.

Write down the next two terms in this sequence.

1 1 2 3 5 8 13

(1 mark)

(b) Write down the first two terms of this sequence.

..... 3 11 14

(2 marks)

(c) i) Find the value of d and the value of e .

2 d e 10

[3]

ii) Find the value of x , the value of y and the value of z .

-33 x y z 18

[5]

(8 marks)

4 There are only r red counters and g green counters in a bag.

A counter is taken at random from the bag.

The probability that the counter is green is $\frac{3}{7}$

The counter is put back in the bag.

2 more red counters and 3 more green counters are put in the bag. A counter is taken at random from the bag.

The probability that the counter is green is $\frac{6}{13}$

Find the number of red counters and the number of green counters that were in the bag originally.

(5 marks)

5 Solve the simultaneous equations

$$\begin{aligned}3x^2 + y^2 - xy &= 5 \\ y &= 2x - 3\end{aligned}$$

Show clear algebraic working.

(5 marks)

6 Solve the simultaneous equations

$$x^2 - 9y - x = 2y^2 - 12$$

$$x + 2y - 1 = 0$$

Show clear algebraic working.

(5 marks)

7 The straight line **L** has equation $x - y = 3$

The curve **C** has equation $3x^2 - y^2 + xy = 9$

L and **C** intersect at the points **P** and **Q**.

Find the coordinates of the midpoint of **PQ**. Show clear algebraic working.

(6 marks)

8 Solve the simultaneous equations

$$x - 6y = 5$$

$$xy - 2y^2 = 6$$

Show clear algebraic working.

(5 marks)

- 9 Solve the simultaneous equations

$$\begin{aligned}y &= 3 - 2x \\x^2 + y^2 &= 18\end{aligned}$$

Show clear algebraic working.

(5 marks)

- 10 The curve with equation $x^2 - x + y^2 = 10$ and the straight line with equation $x - y = -4$ intersect at the points A and B .

Work out the exact length of AB .

Show your working clearly and give your answer in the form $\frac{\sqrt{a}}{2}$ where a is an integer.

(6 marks)

11 (a) The line $y = 3x + p$ and the circle $x^2 + y^2 = 53$ intersect at points A and B .

p is a positive integer.

Show that the x -coordinates of points A and B satisfy the equation

$$10x^2 + 6px + p^2 - 53 = 0$$

(3 marks)

(b) The coordinates of A are $(2, 7)$

Work out the coordinates of B .

You **must** show your working.

(5 marks)

12 $x : y = 7 : 4$

$$x + y = 88$$

Work out the value of $x - y$

(3 marks)

13 A curve has equation $y = 4x^2 + 5x + 3$

A line has equation $y = x + 2$

Show that the curve and the line have **exactly** one point of intersection.

Do **not** use a graphical method.

(4 marks)

14 The prices of two phones are in the ratio $x : y$.

When the prices are both increased by £20, the ratio becomes 5 : 2.

When the prices are both reduced by £5, the ratio becomes 5 : 1.

Express the ratio $x : y$ in its lowest terms.

(6 marks)

- 15** Li has t toy bricks.
She only has red bricks and blue bricks.

Li picks two bricks, one after the other.

If the first brick she picks is red, the probability that the second brick is red is $\frac{2}{3}$.

If the first brick she picks is blue, the probability that the second brick is red is $\frac{7}{10}$.

Calculate the value of t .

$t = \dots\dots\dots$

(4 marks)

- 16** Solve these simultaneous equations algebraically.

$$y = 2x^2 - 7x + 4$$

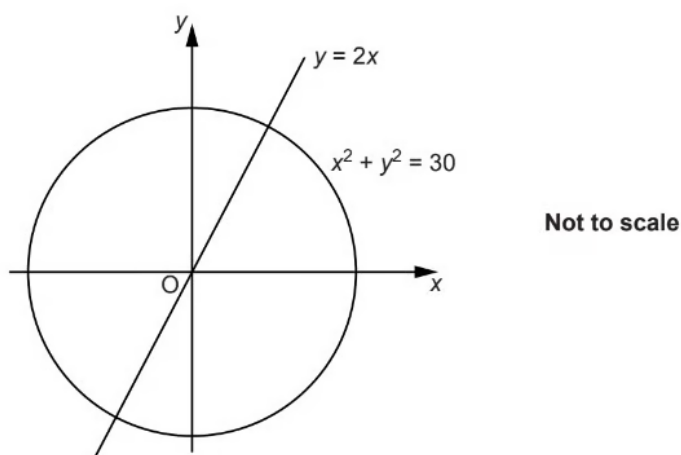
$$y = 4x - 1$$

$x = \dots\dots\dots y = \dots\dots\dots$

$x = \dots\dots\dots y = \dots\dots\dots$

(6 marks)

- 17 Find the exact coordinates of the two intersections of the line $y = 2x$ and the circle $x^2 + y^2 = 30$



(5 marks)

- 18 (a) Each week Dan drives two routes, route X and route Y.

One week he drives route X three times and route Y twice.
He drives a total of 134 miles that week.

Another week he drives route X twice and route Y five times.
He drives a total of 203 miles that week.

Find the length of each route.

route X = miles

route Y = miles

(5 marks)

(b) State an assumption that has been made in answering part **(a)**.

(1 mark)