Simultaneous Equations

Question Paper

Course	Edexcel IGCSE Maths
Section	2. Equations, Formulae & Identities
Topic	Simultaneous Equations
Difficulty	Very Hard

Time allowed: 120

Score: /100

Percentage: /100

Question 1

Solve algebraically the simultaneous equations

$$x^2 - 4y^2 = 9$$
$$3x + 4y = 7$$

[5 marks]

Question 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]

Question 3a

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.

<div align="center">1   1   2   3   5   8   13   ....</div>

[1 mark]

Question 3b

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

<div align="center">.........   3   11   14</div>

[2 marks]

Question 3c

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

<div align="center">2 d e 10</div>

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

<div align="center">−33 x y z 18</div>

[8 marks]

Question 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 $\dfrac{3}{7}$

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 $\dfrac{6}{13}$

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

[5 marks]

Question 5

Solve the simultaneous equations

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

Show clear algebraic working.

[5 marks]

Question 6

Solve the simultaneous equations

$$x^2 - 9y - x = 2y^2 - 12$$
$$x + 2y - 1 = 0$$

Show clear algebraic working.

[5 marks]

Question 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]

Question 8

Solve the simultaneous equations

$$x - 6y = 5$$
$$xy - 2y^2 = 6$$

Show clear algebraic working.

[5 marks]

Question 9

Solve the simultaneous equations

$$y = 3 - 2x$$
$$x^2 + y^2 = 18$$

Show clear algebraic working.

[5 marks]

Question 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 $\dfrac{\sqrt{a}}{2}$ where a is an integer.

[6 marks]

Question 11a

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]

Question 11b

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

Work out the coordinates of B.
You **must** show your working.

[5 marks]

Question 12

$x : y = 7 : 4$

$x + y = 88$

Work out the value of $x - y$

[3 marks]

Question 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]

Question 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]

Question 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 $\dfrac{2}{3}$.

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

Calculate the value of t.

$t =$ ....

[4 marks]

Question 16

Solve these simultaneous equations algebraically.

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

$$y = 4x - 1$$

$x =$ .... $y =$ ....

$x =$ .... $y =$ ....

[6 marks]

Question 17

Find the exact coordinates of the two intersections of the line $y = 2x$ and the circle $x^2 + y^2 = 30$
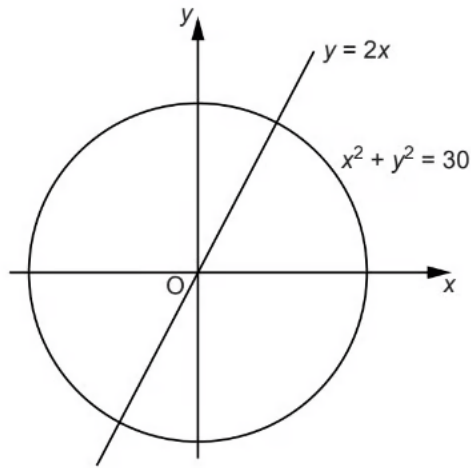
Not to scale

[5 marks]

Question 18a

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]

Question 18b

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

[1]

[1 mark]