Simultaneous Equations - Past Edexcel Exam Questions

In addition to the questions presented here, it is possible that the use of simultaneous equations is required throughout the other exam questions, particularly questions that are based on coordinate geometry.

1. **(Question 10 - C1 May 2018)**

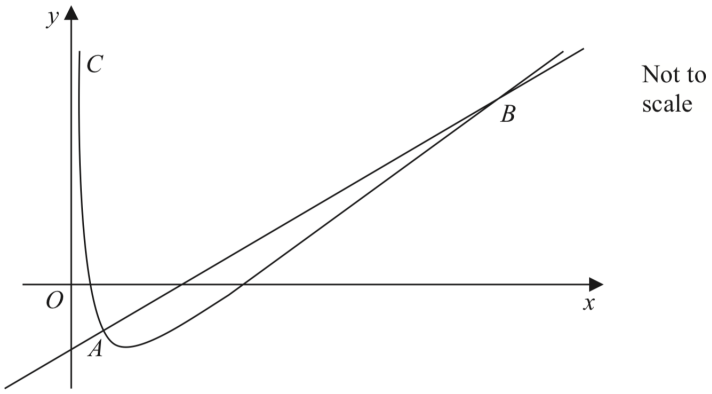

Figure 3

Figure 3 shows a sketch of part of the curve C with equation

$$y = \frac{1}{2}x + \frac{27}{x} - 12, \qquad x > 0$$

The point A lies on C and has coordinates $\left(3, -\frac{3}{2}\right)$.

(a) Show that the equation of the normal to C at the point A can be written as $10y = 4x - 27$. [5]

The normal to C at A meets C again at the point B, as shown in Figure 3.

(b) Use algebra to find the coordinates of B. [5]

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2. **(Question 5 - C1 May 2016)**

Solve the simultaneous equations

$$y + 4x + 1 = 0$$
$$y^2 + 5x^2 + 2x = 0$$

[6]

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3. **(Question 2 - C1 May 2015)**

Solve the simultaneous equations

$$y - 2x - 4 = 0$$
$$4x^2 + y^2 + 20x = 0$$

[7]

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4. **(Question 10 - C1 May 2013)**

Given the simultaneous equations

$$2x + y = 1,$$
$$x^2 - 4ky + 5k = 0$$

where k is a non zero constant,

(a) show that

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

[2]

Given that $x^2 + 8kx + k = 0$ has equal roots,

(b) find the value of k. [3]

(c) For this value of k, find the solution of the simultaneous equations. [3]

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5. **(Question 5 - C1 May 2012)**

The curve C has equation $y = x(5 - x)$ and the line L has equation $2y = 5x + 4$.

(a) Use algebra to show that C and L do not intersect. [4]

(b) Sketch C and L on the same diagram, showing the coordinates of the points at which C and L meet the axes. [5]

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6. **(Question 4 - C1 May 2011)**

Solve the simultaneous equations

$$x + y = 2$$
$$4y^2 - x^2 = 11$$

[7]

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7. **(Question 5 - C1 Jan 2010)**

Solve the simultaneous equations

$$y - 3x + 2 = 0$$
$$y^2 - x - 6x^2 = 0$$

[7]

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8. **(Question 6 - C1 June 2008)**

The curve C has equation $y = \frac{3}{x}$ and the line l has equation $y = 2x + 5$.

(a) Sketch the graphs of C and l, indicating clearly the coordinates of any intersections with the axes. [3]

(b) Find the coordinates of the points of intersection of C and l. [6]

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9. **(Question 6 - C1 May 2007)**

(a) By eliminating y from the equations

$$y = x - 4$$
$$2x^2 - xy = 8$$

show that

$$x^2 + 4x - 8 = 0$$

[2]

(b) Hence, or otherwise, solve the simultaneous equations

$$y = x - 4$$
$$2x^2 - xy = 8$$

giving your answers in the form $a \pm b\sqrt{3}$, where a and b are integers. [5]

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10. **(Question 4 - C1 Jan 2007)**

Solve the simultaneous equations

$$y = x - 2$$
$$y^2 + x^2 = 10$$

[6]

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11. **(Question 10 - C1 Jan 2007)**

10. (a) On the same axes sketch the graphs of the curves with equations

(i) $y = x^2(x-2)$,

(3)

(ii) $y = x(6-x)$,

(3)

and indicate on your sketches the coordinates of all the points where the curves cross the x-axis.

(b) Use algebra to find the coordinates of the points where the graphs intersect.

(7)

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12. **(Question 5 - C1 May 2005)**

Solve the simultaneous equations

$$\begin{aligned} x - 2y &= 1 \\ x^2 + y^2 &= 29 \end{aligned}$$

[6]

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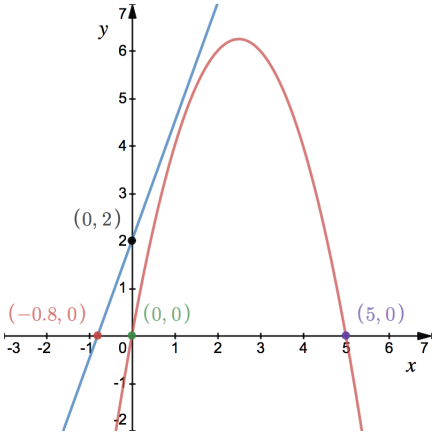
Solutions

1. (a) *(Differentiation Question)*
   (b) $\left(90, \frac{333}{10}\right)$
2. $\left(-\frac{1}{7}, -\frac{3}{7}\right)$, $\left(-\frac{1}{3}, \frac{1}{3}\right)$
3. $(-4, -4)$, $\left(-\frac{1}{2}, 3\right)$
4. (a) -
   (b) $k = \frac{1}{16}$
   (c) $\left(-\frac{1}{4}, \frac{3}{2}\right)$
5. (a) In an attempt to solve the simultaneous equations $y = x(5-x)$ and $2y = 5x+4$, ie. when solving the equation $2x(5-x) = 5x+4$, it will be seen that this quadratic has no solutions. This can also be seen from the absence of intersections in part b).
   (b) See figure below.



6. $(5, -3)$, $\left(\frac{1}{3}, \frac{5}{3}\right)$
7. $\left(\frac{1}{3}, -1\right)$, $(4, 10)$

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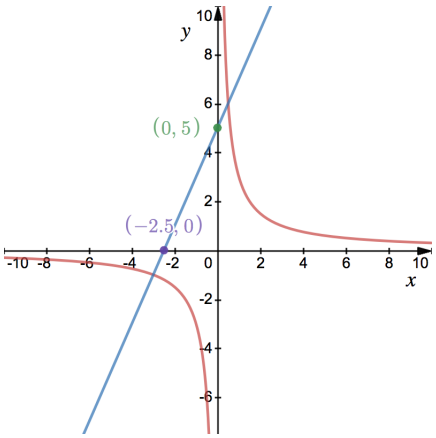
8. (a) See figure below.



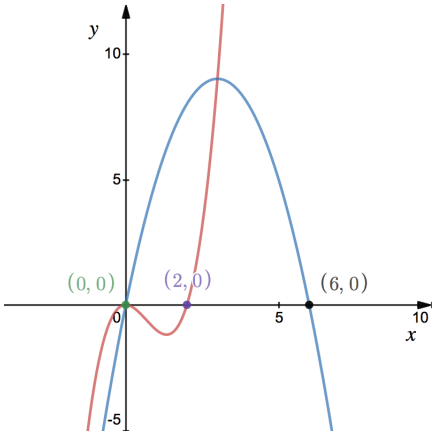
(b) $(-3,-1)$, $\left(\frac{1}{2},6\right)$

9. (a) -

(b) $\left(-2+2\sqrt{3},-6+2\sqrt{3}\right)$, $\left(-2-2\sqrt{3},-6-2\sqrt{3}\right)$

10. $(-1,-3)$, $(3,1)$

11. (a) See figure below.



(b) $(-2,-16)$, $(3,9)$

12. $(5,2)$,$\left(\frac{-23}{5},\frac{-14}{5}\right)$

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