Edexcel Maths C1

Topic Questions from Papers

Coordinates

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8. The line l_1 passes through the point $(9, -4)$ and has gradient $\frac{1}{3}$.

(a) Find an equation for l_1 in the form $ax + by + c = 0$, where a, b and c are integers.

(3)

The line l_2 passes through the origin O and has gradient -2. The lines l_1 and l_2 intersect at the point P.

(b) Calculate the coordinates of P.

(4)

Given that l_1 crosses the y-axis at the point C,

(c) calculate the exact area of $\triangle OCP$.

(3)

Leave blank

Question 8 continued

Q8

(Total 10 marks)

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10. The curve C has equation $y = \frac{1}{3}x^3 - 4x^2 + 8x + 3$.

The point P has coordinates (3, 0).

(a) Show that P lies on C.

(1)

(b) Find the equation of the tangent to C at P, giving your answer in the form $y = mx + c$, where m and c are constants.

(5)

Another point Q also lies on C. The tangent to C at Q is parallel to the tangent to C at P.

(c) Find the coordinates of Q.

(5)

Leave blank

Question 10 continued

Q10

(Total 11 marks)

TOTAL FOR PAPER: 75 MARKS

END

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3. The line L has equation $y = 5 - 2x$.

(a) Show that the point P (3, –1) lies on L.

(1)

(b) Find an equation of the line perpendicular to L, which passes through P. Give your answer in the form $ax + by + c = 0$, where a, b and c are integers.

(4)

Q3

(Total 5 marks)

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9. **Figure 2**

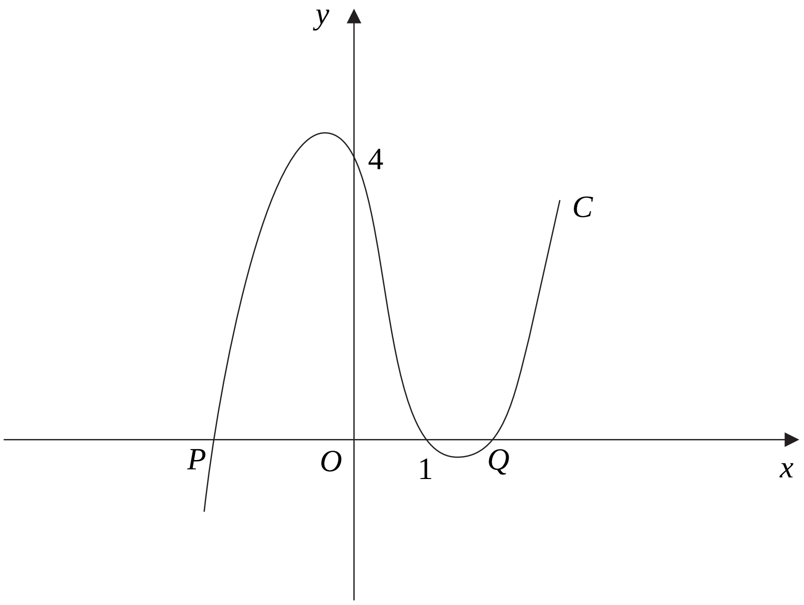

Figure 2 shows part of the curve C with equation

$$y = (x - 1)(x^2 - 4).$$

The curve cuts the x-axis at the points P, (1, 0) and Q, as shown in Figure 2.

(a) Write down the x-coordinate of P, and the x-coordinate of Q.

(2)

(b) Show that $\dfrac{dy}{dx} = 3x^2 - 2x - 4$.

(3)

(c) Show that $y = x + 7$ is an equation of the tangent to C at the point $(-1, 6)$.

(2)

The tangent to C at the point R is parallel to the tangent at the point $(-1, 6)$.

(d) Find the exact coordinates of R.

(5)

Leave blank

Question 9 continued

(Total 12 marks)

Q9

Turn over

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11. The line l_1 passes through the points $P(-1, 2)$ and $Q(11, 8)$.

(a) Find an equation for l_1 in the form $y = mx + c$, where m and c are constants.

(4)

The line l_2 passes through the point $R(10, 0)$ and is perpendicular to l_1. The lines l_1 and l_2 intersect at the point S.

(b) Calculate the coordinates of S.

(5)

(c) Show that the length of RS is $3\sqrt{5}$.

(2)

(d) Hence, or otherwise, find the exact area of triangle PQR.

(4)

Leave blank

Question 11 continued

(Total 15 marks)

Q11

TOTAL FOR PAPER: 75 MARKS

END

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7. The curve C has equation $y = \mathrm{f}(x)$, $x \neq 0$, and the point $P\,(2, 1)$ lies on C. Given that

$$\mathrm{f}'(x) = 3x^2 - 6 - \frac{8}{x^2},$$

(a) find $\mathrm{f}(x)$.

(5)

(b) Find an equation for the tangent to C at the point P, giving your answer in the form $y = mx + c$, where m and c are integers.

(4)

Leave blank

8. The curve C has equation $y = 4x + 3x^{\frac{3}{2}} - 2x^2, \quad x > 0$.

(a) Find an expression for $\frac{\mathrm{d}y}{\mathrm{d}x}$.

(3)

(b) Show that the point P (4, 8) lies on C.

(1)

(c) Show that an equation of the normal to C at the point P is

$$3y = x + 20.$$

(4)

The normal to C at P cuts the x-axis at the point Q.

(d) Find the length PQ, giving your answer in a simplified surd form.

(3)

N 2 3 5 6 1 A 0 1 2 2 0

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Question 8 continued

(Total 11 marks)

Q8

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10. The curve C has equation $y = x^2(x-6) + \frac{4}{x}$, $x > 0$.

The points P and Q lie on C and have x-coordinates 1 and 2 respectively.

(a) Show that the length of PQ is $\sqrt{170}$.

(4)

(b) Show that the tangents to C at P and Q are parallel.

(5)

(c) Find an equation for the normal to C at P, giving your answer in the form $ax + by + c = 0$, where a, b and c are integers.

(4)

Leave blank

Question 10 continued

Leave blank

11. The line l_1 has equation $y = 3x + 2$ and the line l_2 has equation $3x + 2y - 8 = 0$.

(a) Find the gradient of the line l_2.

(2)

The point of intersection of l_1 and l_2 is P.

(b) Find the coordinates of P.

(3)

The lines l_1 and l_2 cross the line $y = 1$ at the points A and B respectively.

(c) Find the area of triangle ABP.

(4)

Leave blank

Question 11 continued

Q11

(Total 9 marks)

TOTAL FOR PAPER: 75 MARKS

END

H 2 6 1 0 7 A 0 2 4 2 4

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4. The point A (–6, 4) and the point B (8, –3) lie on the line L.

(a) Find an equation for L in the form $ax + by + c = 0$, where a, b and c are integers.
(4)

(b) Find the distance AB, giving your answer in the form $k\sqrt{5}$, where k is an integer.
(3)

Q4

(Total 7 marks)

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10.

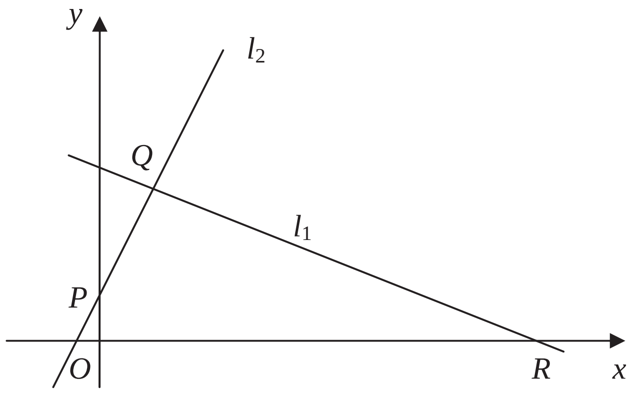

Figure 2

The points Q (1, 3) and R (7, 0) lie on the line l_1, as shown in Figure 2.

The length of QR is $a\sqrt{5}$.

(a) Find the value of a.
(3)

The line l_2 is perpendicular to l_1, passes through Q and crosses the y-axis at the point P, as shown in Figure 2.

Find

(b) an equation for l_2,
(5)

(c) the coordinates of P,
(1)

(d) the area of ΔPQR.
(4)

Leave blank

Question 10 continued

H 2 9 9 9 2 A 0 2 3 2 8

Turn over

Leave blank

10. The line l_1 passes through the point A (2, 5) and has gradient $-\frac{1}{2}$.

(a) Find an equation of l_1, giving your answer in the form $y = mx + c$.
(3)

The point B has coordinates (–2, 7).

(b) Show that B lies on l_1.
(1)

(c) Find the length of AB, giving your answer in the form $k\sqrt{5}$, where k is an integer.
(3)

The point C lies on l_1 and has x-coordinate equal to p.

The length of AC is 5 units.

(d) Show that p satisfies

$$p^2 - 4p - 16 = 0.$$

(4)

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Question 10 continued

Q10

(Total 11 marks)

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8.

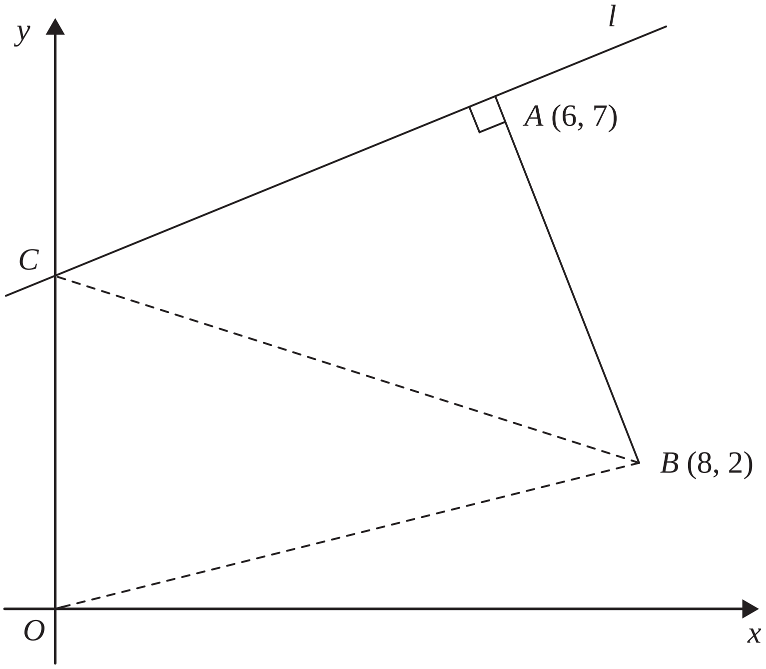

Figure 1

The points A and B have coordinates (6, 7) and (8, 2) respectively.

The line l passes through the point A and is perpendicular to the line AB, as shown in Figure 1.

(a) Find an equation for l in the form $ax + by + c = 0$, where a, b and c are integers.
(4)

Given that l intersects the y-axis at the point C, find

(b) the coordinates of C,
(2)

(c) the area of ΔOCB, where O is the origin.
(2)

Leave blank

Question 8 continued

H 3 4 2 6 2 A 0 1 5 2 8

Turn over

Leave blank

3. The line l_1 has equation $3x + 5y - 2 = 0$

(a) Find the gradient of l_1.

(2)

The line l_2 is perpendicular to l_1 and passes through the point (3, 1).

(b) Find the equation of l_2 in the form $y = mx + c$, where m and c are constants.

(3)

Leave blank

9. (a) Factorise completely $x^3 - 4x$

(3)

(b) Sketch the curve C with equation

$$y = x^3 - 4x,$$

showing the coordinates of the points at which the curve meets the x-axis.

(3)

The point A with x-coordinate -1 and the point B with x-coordinate 3 lie on the curve C.

(c) Find an equation of the line which passes through A and B, giving your answer in the form $y = mx + c$, where m and c are constants.

(5)

(d) Show that the length of AB is $k\sqrt{10}$, where k is a constant to be found.

(2)

Leave blank

Question 9 continued

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8. (a) Find an equation of the line joining $A(7, 4)$ and $B(2, 0)$, giving your answer in the form $ax + by + c = 0$, where a, b and c are integers.

(3)

(b) Find the length of AB, leaving your answer in surd form.

(2)

The point C has coordinates $(2, t)$, where $t > 0$, and $AC = AB$.

(c) Find the value of t.

(1)

(d) Find the area of triangle ABC.

(2)

Leave blank

Question 8 continued

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9. The line L_1 has equation $2y - 3x - k = 0$, where k is a constant.

Given that the point $A\ (1, 4)$ lies on L_1, find

(a) the value of k,

(1)

(b) the gradient of L_1.

(2)

The line L_2 passes through A and is perpendicular to L_1.

(c) Find an equation of L_2 giving your answer in the form $ax + by + c = 0$, where a, b and c are integers.

(4)

The line L_2 crosses the x-axis at the point B.

(d) Find the coordinates of B.

(2)

(e) Find the exact length of AB.

(2)

Leave blank

Question 9 continued

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3. The points P and Q have coordinates $(-1, 6)$ and $(9, 0)$ respectively.

The line l is perpendicular to PQ and passes through the mid-point of PQ.

Find an equation for l, giving your answer in the form $ax + by + c = 0$, where a, b and c are integers.

(5)

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6.

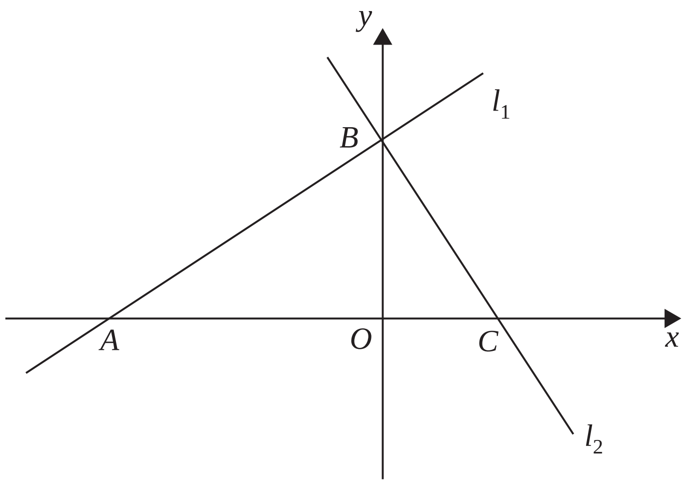

Figure 1

The line l_1 has equation $2x - 3y + 12 = 0$

(a) Find the gradient of l_1.

(1)

The line l_1 crosses the x-axis at the point A and the y-axis at the point B, as shown in Figure 1.

The line l_2 is perpendicular to l_1 and passes through B.

(b) Find an equation of l_2.

(3)

The line l_2 crosses the x-axis at the point C.

(c) Find the area of triangle ABC.

(4)

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Question 6 continued

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10.

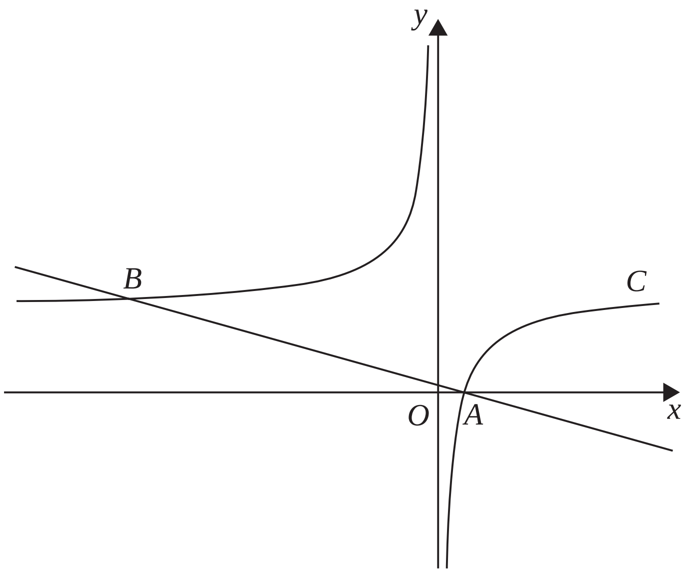

Figure 2

Figure 2 shows a sketch of the curve C with equation

$$y = 2 - \frac{1}{x}, \quad x \neq 0$$

The curve crosses the x-axis at the point A.

(a) Find the coordinates of A.

(1)

(b) Show that the equation of the normal to C at A can be written as

$$2x + 8y - 1 = 0$$

(6)

The normal to C at A meets C again at the point B, as shown in Figure 2.

(c) Find the coordinates of B.

(4)

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Question 10 continued

Q10

(Total 11 marks)

TOTAL FOR PAPER: 75 MARKS

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9. The line L_1 has equation $4y + 3 = 2x$

The point A $(p, 4)$ lies on L_1

(a) Find the value of the constant p.

(1)

The line L_2 passes through the point C $(2, 4)$ and is perpendicular to L_1

(b) Find an equation for L_2 giving your answer in the form $ax + by + c = 0$, where a, b and c are integers.

(5)

The line L_1 and the line L_2 intersect at the point D.

(c) Find the coordinates of the point D.

(3)

(d) Show that the length of CD is $\frac{3}{2}\sqrt{5}$

(3)

A point B lies on L_1 and the length of $AB = \sqrt{(80)}$

The point E lies on L_2 such that the length of the line CDE = 3 times the length of CD.

(e) Find the area of the quadrilateral $ACBE$.

(3)

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Question 9 continued

P 4 0 6 8 4 A 0 1 9 2 4

Turn over

Leave blank

5. The line l_1 has equation $y = -2x + 3$

The line l_2 is perpendicular to l_1 and passes through the point (5, 6).

(a) Find an equation for l_2 in the form $ax + by + c = 0$, where a, b and c are integers.
(3)

The line l_2 crosses the x-axis at the point A and the y-axis at the point B.

(b) Find the x-coordinate of A and the y-coordinate of B.
(2)

Given that O is the origin,

(c) find the area of the triangle OAB.
(2)

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Question 5 continued

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4. The line L_1 has equation $4x + 2y - 3 = 0$

(a) Find the gradient of L_1.

(2)

The line L_2 is perpendicular to L_1 and passes through the point (2, 5).

(b) Find the equation of L_2 in the form $y = mx + c$, where m and c are constants.

(3)

Leave blank

6. The straight line L_1 passes through the points $(-1, 3)$ and $(11, 12)$.

(a) Find an equation for L_1 in the form $ax + by + c = 0$,

where a, b and c are integers.

(4)

The line L_2 has equation $3y + 4x - 30 = 0$.

(b) Find the coordinates of the point of intersection of L_1 and L_2.

(3)

Core Mathematics C1

Mensuration

Surface area of sphere = $4\pi r^2$

Area of curved surface of cone = $\pi r \times$ slant height

Arithmetic series

$u_n = a + (n - 1)d$

$S_n = \frac{1}{2}n(a + l) = \frac{1}{2}n[2a + (n - 1)d]$