

Q1

(3)

N 2 0 2 3 3 A 0 2 2 0

Q2

$$u_{n+1} = (u_n - 3)^2, \quad u_1 = 1.$$

(3)

(1)

(Total 4 marks)



Q3

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

(1)

(4)

(Total 5 marks)



Q4

(a) find $\frac{dy}{dx}$,

(2)

(b) find $\int y \, dx$.

(3)

N 2 0 2 3 3 A 0 5 2 0

5. (a) Write $\sqrt[4]{45}$ in the form $a\sqrt[4]{5}$, where a is an integer.

(b) Express $\frac{2(3+\sqrt{5})}{(3-\sqrt{5})}$ in the form $b + c\sqrt{5}$, where b and c are integers.

Question 5 continued

Handwriting practice area with 30 horizontal lines.

(Total 6 marks)

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Q5

Marking box for Q5.



6.

Figure 1

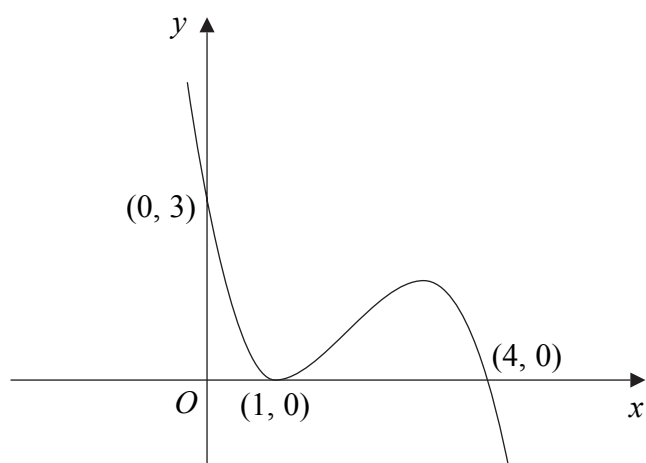


Figure 1 shows a sketch of the curve with equation $y = f(x)$. The curve passes through the points $(0, 3)$ and $(4, 0)$ and touches the x -axis at the point $(1, 0)$.

On separate diagrams sketch the curve with equation

(a) $y = f(x + 1)$, (3)

(b) $y = 2f(x)$, (3)

(c) $y = f\left(\frac{1}{2}x\right)$. (3)

On each diagram show clearly the coordinates of all the points where the curve meets the axes.



Question 6 continued

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Q6

(Total 9 marks)



- (a) Show that, immediately after her 12th birthday, the total of the allowances that Alice had received was £1200.

(b) Find the amount of Alice's annual allowance on her 18th birthday.

(c) Find the total of the allowances that Alice had received up to and including her 18th birthday.

When the total of the allowances that Alice had received reached £32 000 the allowance stopped.

- (d) Find how old Alice was when she received her last allowance.

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Question 7 continued

(Total 13 marks)

Q7



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8. The curve with equation $y = f(x)$ passes through the point $(1, 6)$. Given that

$$f'(x) = 3 + \frac{5x^2 + 2}{x^{\frac{1}{2}}}, \quad x > 0,$$

find $f(x)$ and simplify your answer.

(7)



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Question 8 continued

(Total 7 marks)

Q8



9.

Figure 2

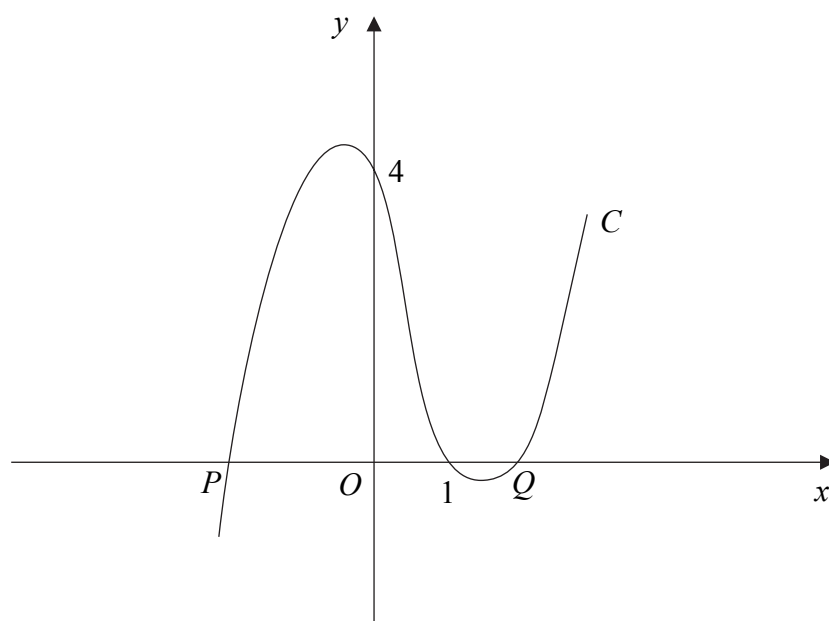


Figure 2 shows part of the curve C with equation

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

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 $\frac{dy}{dx} = 3x^2 - 2x - 4$.

(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)



Question 9 continued

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Lined area for writing the answer to Question 9.



Question 9 continued

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Lined area for writing the answer to Question 9.



Question 9 continued

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Handwriting practice area with 30 horizontal lines.

(Total 12 marks)

Q9



10. $x^2 + 2x + 3 \equiv (x + a)^2 + b.$

- (a) Find the values of the constants a and b . (2)
- (b) In the space provided below, sketch the graph of $y = x^2 + 2x + 3$, indicating clearly the coordinates of any intersections with the coordinate axes. (3)
- (c) Find the value of the discriminant of $x^2 + 2x + 3$. Explain how the sign of the discriminant relates to your sketch in part (b). (2)

The equation $x^2 + kx + 3 = 0$, where k is a constant, has no real roots.

- (d) Find the set of possible values of k , giving your answer in surd form. (4)



Question 10 continued

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Question 10 continued

(Total 11 marks)

Q10

TOTAL FOR PAPER: 75 MARKS

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