Please check the examination details below before entering your candidate information

Candidate surname	Other names

Pearson Edexcel GCE

Centre Number	Candidate Number

Wednesday 15 May 2019

Morning (Time: 1 hour 30 minutes)	Paper Reference **6663/01**

Core Mathematics C1

Advanced Subsidiary

You must have:
Mathematical Formulae and Statistical Tables (Pink)

Total Marks

Calculators may NOT be used in this examination.

Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B). Coloured pencils and highlighter pens must not be used.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions and ensure that your answers to parts of questions are clearly labelled.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- You should show sufficient working to make your methods clear. Answers without working may not gain full credit.

Information

- The total mark for this paper is 75.
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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Pearson

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1. (a) Simplify $\left(3\sqrt{7}\right)^2$

(1)

(b) Simplify

$$\frac{\sqrt{3}}{5\sqrt{3}+6\sqrt{2}}$$

giving your answer in the form $a + b\sqrt{c}$, where a, b and c are integers and $b \neq -1$

(4)

Leave blank

Question 1 continued

Q1

(Total 5 marks)

Leave blank

2. It is given that

$$y = 15x + 108x^{\frac{1}{2}} + 4x^{\frac{5}{2}} \qquad x > 0$$

Find, in simplest form,

(a) $\dfrac{dy}{dx}$

(3)

(b) $\dfrac{d^2y}{dx^2}$

(2)

(c) Find the value of $\dfrac{d^2y}{dx^2}$ when $x = 9$

(1)

Leave blank

Question 2 continued

Q2

(Total 6 marks)

Leave blank

3. The curve C has equation

$$y = 9 - x^2$$

and the line l has equation

$$2y - 3x - 20 = 0$$

Use algebra to show that C and l do not intersect.

(4)

Leave blank

Question 3 continued

Q3

(Total 4 marks)

Leave blank

4. A sequence $a_1, a_2, a_3, \ldots$ is defined by

$$a_1 = 8$$
$$a_{n+1} = 4(a_n - c) \qquad n \geqslant 1$$

where c is a constant.

(a) Find an expression for a_2 in terms of c.

(1)

Given that $a_3 = 28$

(b) find the numerical value of $\sum_{i=1}^{4} a_i$

(6)

Leave blank

Question 4 continued

Q4

(Total 7 marks)

Leave blank

5. Find the set of values of x for which

(a) $3 - 2x < 6 + 4x$

(2)

(b) $3x^2 + 20x - 7 < 0$

(4)

(c) **both** $3 - 2x < 6 + 4x$ **and** $3x^2 + 20x - 7 < 0$

(1)

Leave blank

Question 5 continued

Q5

(Total 7 marks)

Leave blank

6. Given that $y = 4$ when $x = 1$ and that

$$\frac{dy}{dx} = 12x^2 + \frac{4x + 2}{3x^4} \qquad x \neq 0$$

find y in terms of x, giving each term in a simplified form.

(8)

Leave blank

Question 6 continued

Q6

(Total 8 marks)

Leave blank

7. The line l passes through the points $A(5, 8)$ and $B(3, 11)$.

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

(4)

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

(2)

The point C has coordinates $(t, 8)$ and $AC = CB$.

(c) Find the value of t.

(3)

(d) Find the area of triangle ABC.

(2)

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Question 7 continued

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Question 7 continued

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Question 7 continued

(Total 11 marks)

Q7

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8. For 25 years, Chloe gave money to a charity.

She gave £80 in the first year, £100 in the second year, £120 in the third year and so on, so that the amounts she gave each year form an arithmetic sequence.

(a) Find the amount of money that she gave to the charity in the 17th year.

(2)

(b) Calculate the total amount that she gave over the 25 years.

(2)

Jack also gave money to the same charity over the same 25 years.

He gave £16 in the first year and increased the amount he gave each year so that he gave £$(16 + d)$ in the second year, £$(16 + 2d)$ in the third year and so on. The amounts he gave each year form an arithmetic sequence with common difference £d.

The total amount that he gave over the 25 years was £4000

(c) Calculate how much he gave to the charity in the 17th year.

(5)

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Question 8 continued

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Question 8 continued

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Question 8 continued

Q8

(Total 9 marks)

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9.

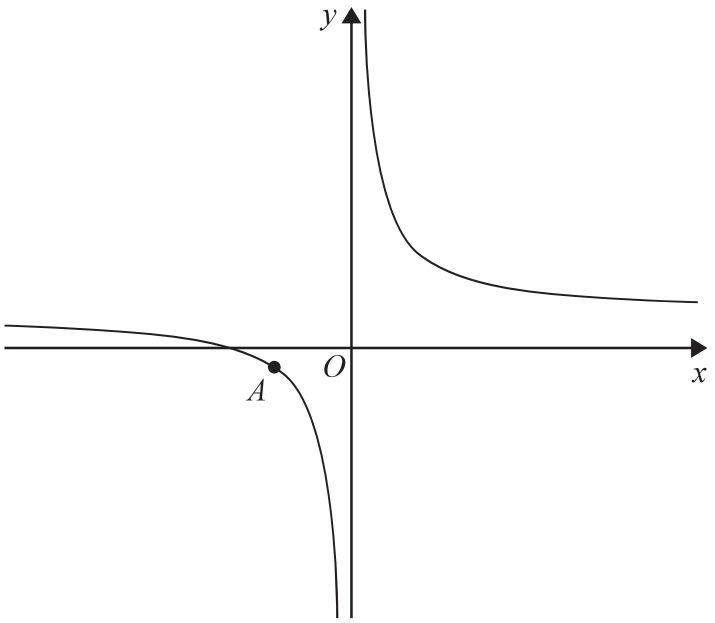

Figure 1

Figure 1 shows a sketch of part of the curve H with equation

$$y = \frac{12}{x} + 5 \quad x \neq 0$$

(a) Find an equation for the normal to H at the point A $(-2, -1)$, giving your answer in the form $ax + by + c = 0$, where a, b and c are integers.

(5)

The points B and C also lie on the curve H.
The normal to H at the point B and the normal to H at the point C are each parallel to the straight line with equation $4y = 3x + 5$

(b) Find the coordinates of the points B and C, given that the x coordinate of B is positive.

(5)

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Question 9 continued

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Question 9 continued

Leave blank

Question 9 continued

Q9

(Total 10 marks)

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10.

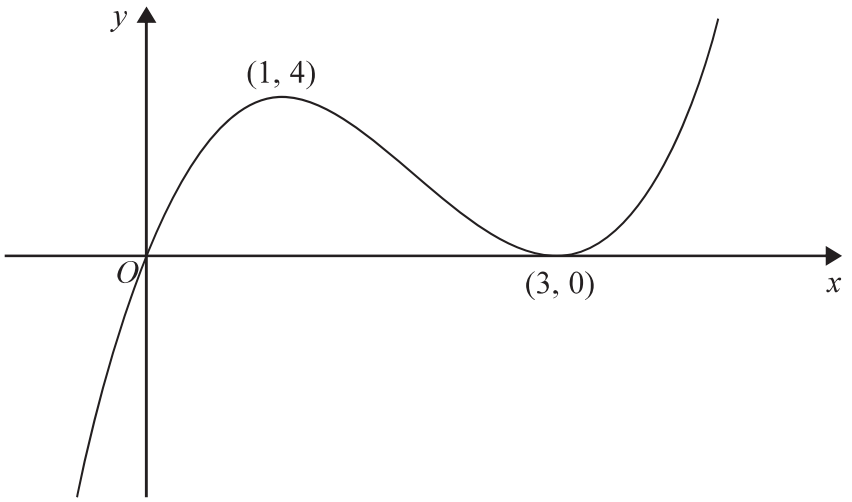

Figure 2

Figure 2 shows a sketch of the curve with equation $y = f(x)$ where

$$f(x) = x(3 - x)^2 \qquad x \in \mathbb{R}$$

The curve passes through the origin and touches the x-axis at the point (3, 0).
There is a maximum point at (1, 4) and a minimum point at (3, 0).

(a) On separate diagrams, sketch the curve with equation

(i) $y = f(\frac{1}{2}x)$,

(ii) $y = f(x + 2)$.

On each sketch indicate clearly the coordinates of

- any points where the curve crosses or touches the x-axis,
- the point where the curve crosses the y-axis,
- any maximum or minimum points.

(6)

The curve with equation $y = f(x) + k$, where k is a non-zero constant, has a maximum point at $(a, 0)$.

(b) Write down the values of a and k.

(2)

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Question 10 continued

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Question 10 continued

Q10

(Total 8 marks)

TOTAL FOR PAPER: 75 MARKS

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