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**Pearson
Edexcel GCE**

Centre Number

Candidate Number

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Core Mathematics C1

Advanced Subsidiary



Wednesday 17 May 2017 – Morning
Time: 1 hour 30 minutes

Paper Reference
6663/01

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. Find

$$\int \left(2x^5 - \frac{1}{4x^3} - 5\right) dx$$

giving each term in its simplest form.

(4)

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Question 1 continued

Q1

(Total 4 marks)



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2. Given

$$y = \sqrt{x} + \frac{4}{\sqrt{x}} + 4, \quad x > 0$$

find the value of $\frac{dy}{dx}$ when $x = 8$, writing your answer in the form $a\sqrt{2}$, where a is a rational number.

(5)

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Question 2 continued

Q2

(Total 5 marks)



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- 3.** A sequence a_1, a_2, a_3, \dots is defined by

$$a_{n+1} = \frac{k(a_n + 1)}{a_n}, \quad n \geq 1$$

where k is a positive constant.

- (a) Write down expressions for a_2 and a_3 in terms of k , giving your answers in their simplest form.

(3)

Given that $\sum_{r=1}^3 a_r = 10$

- (b) find an exact value for k .

(3)

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Question 3 continued

Q3

(Total 6 marks)



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4. A company, which is making 140 bicycles each week, plans to increase its production. The number of bicycles produced is to be increased by d each week, starting from 140 in week 1, to $140 + d$ in week 2, to $140 + 2d$ in week 3 and so on, until the company is producing 206 in week 12.

- (a) Find the value of d .

(2)

After week 12 the company plans to continue making 206 bicycles each week.

- (b) Find the total number of bicycles that would be made in the first 52 weeks starting from and including week 1.

(5)

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Question 4 continued

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Q4

(Total 7 marks)



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5. $f(x) = x^2 - 8x + 19$

- (a) Express $f(x)$ in the form $(x + a)^2 + b$, where a and b are constants. (2)

The curve C with equation $y = f(x)$ crosses the y -axis at the point P and has a minimum point at the point Q .

- (b) Sketch the graph of C showing the coordinates of point P and the coordinates of point Q .

- (c) Find the distance PQ , writing your answer as a simplified surd. (3)

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Question 5 continued

Q5

(Total 8 marks)



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6. (a) Given $y = 2^x$, show that

$$2^{2x+1} - 17(2^x) + 8 = 0$$

can be written in the form

$$2y^2 - 17y + 8 = 0$$

(2)

- (b) Hence solve

$$2^{2x+1} - 17(2^x) + 8 = 0$$

(4)

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Question 6 continued

Q6

(Total 6 marks)



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7. The curve C has equation $y = f(x)$, $x > 0$, where

$$f'(x) = 30 + \frac{6 - 5x^2}{\sqrt{x}}$$

Given that the point $P(4, -8)$ lies on C ,

- (a) 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. (4)

(b) Find $f(x)$, giving each term in its simplest form. (5)

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Question 7 continued

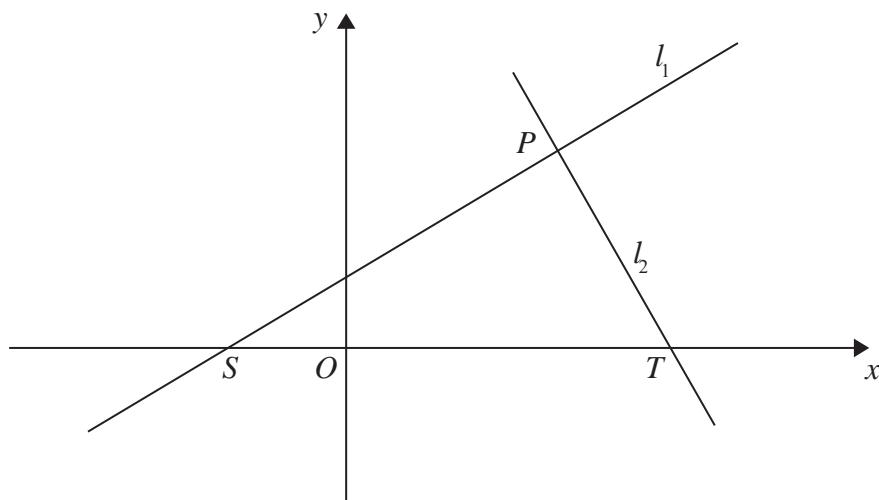
Q7

(Total 9 marks)



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8.

**Figure 1**

The straight line l_1 , shown in Figure 1, has equation $5y = 4x + 10$

The point P with x coordinate 5 lies on l_1

The straight line l_2 is perpendicular to l_1 and passes through P .

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

(4)

The lines l_1 and l_2 cut the x -axis at the points S and T respectively, as shown in Figure 1.

- (b) Calculate the area of triangle SPT .

(4)

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Question 8 continued

Q8

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9. (a) On separate axes sketch the graphs of

(i) $y = -3x + c$, where c is a positive constant,

(ii) $y = \frac{1}{x} + 5$

On each sketch show the coordinates of any point at which the graph crosses the y -axis and the equation of any horizontal asymptote.

(4)

Given that $y = -3x + c$, where c is a positive constant, meets the curve $y = \frac{1}{x} + 5$ at two distinct points,

(b) show that $(5 - c)^2 > 12$

(3)

(c) Hence find the range of possible values for c .

(4)

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Question 9 continued

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Question 9 continued

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Question 9 continued

Q9

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10.

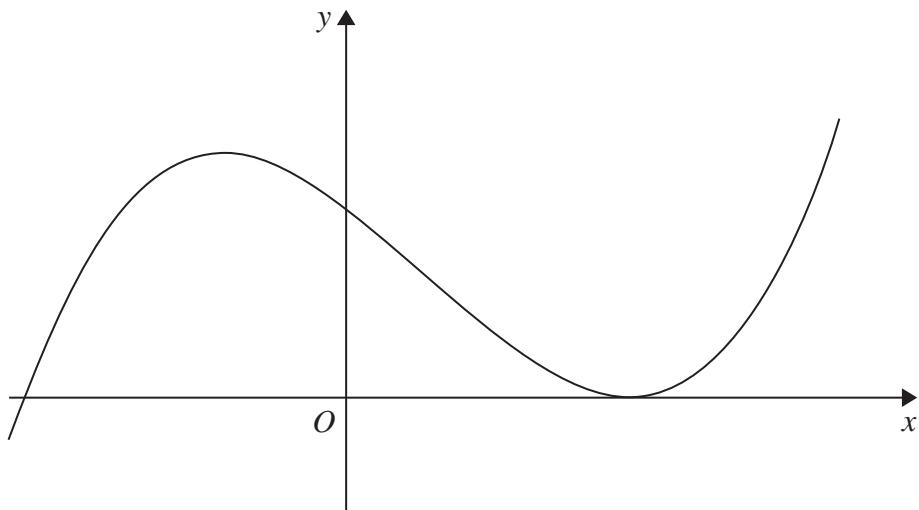
**Figure 2**

Figure 2 shows a sketch of part of the curve $y = f(x)$, $x \in \mathbb{R}$, where

$$f(x) = (2x - 5)^2(x + 3)$$

(a) Given that

- (i) the curve with equation $y = f(x) - k$, $x \in \mathbb{R}$, passes through the origin, find the value of the constant k ,
- (ii) the curve with equation $y = f(x + c)$, $x \in \mathbb{R}$, has a minimum point at the origin, find the value of the constant c .

(3)

(b) Show that $f'(x) = 12x^2 - 16x - 35$

(3)

Points A and B are distinct points that lie on the curve $y = f(x)$.

The gradient of the curve at A is equal to the gradient of the curve at B .

Given that point A has x coordinate 3

(c) find the x coordinate of point B .

(5)

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Question 10 continued

Q10

(Total 11 marks)

TOTAL FOR PAPER: 75 MARKS

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