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**Pearson Edexcel** Centre Number 

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**International GCSE**

**Further Pure Mathematics**

**Paper 2**

|  |                                   |
|--|-----------------------------------|
| Friday 23 May 2014 – Afternoon<br><b>Time: 2 hours</b> | Paper Reference<br><b>4PM0/02</b> |
|--|-----------------------------------|

**Calculators may be used.**

|             |
|-------------|
| Total Marks |
|-------------|

### Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided  
– *there may be more space than you need.*

### Information

- The total mark for this paper is 100.
- 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.
- Check your answers if you have time at the end.

P43025A

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Turn over ►

**PEARSON**

Answer all ELEVEN questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1

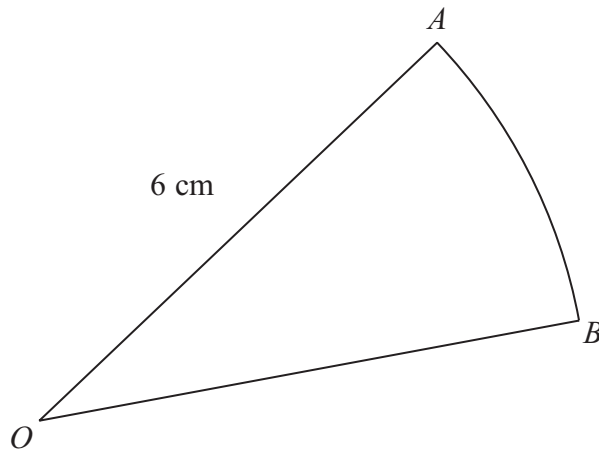


Diagram NOT  
accurately drawn

Figure 1

Figure 1 shows the sector  $OAB$  of a circle. The circle has centre  $O$  and radius 6 cm. The area of the sector is  $12 \text{ cm}^2$ .

(a) Find, in radians, the size of angle  $AOB$ .

(2)

(b) Find, in cm, the length of the arc  $AB$ .

(2)

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2



P 4 3 0 2 5 A 0 2 3 2



2 Evaluate  $\sum_{r=5}^{60} (2r + 7)$

(4)

Ruled lines for writing the solution to the summation problem.

(Total for Question 2 is 4 marks)







**Question 4 continued**

A series of horizontal dotted lines for writing the answer to Question 4.

**(Total for Question 4 is 7 marks)**











**Question 6 continued**

Handwriting practice area consisting of 25 horizontal dotted lines.



**Question 6 continued**

A series of horizontal dotted lines for writing.





7

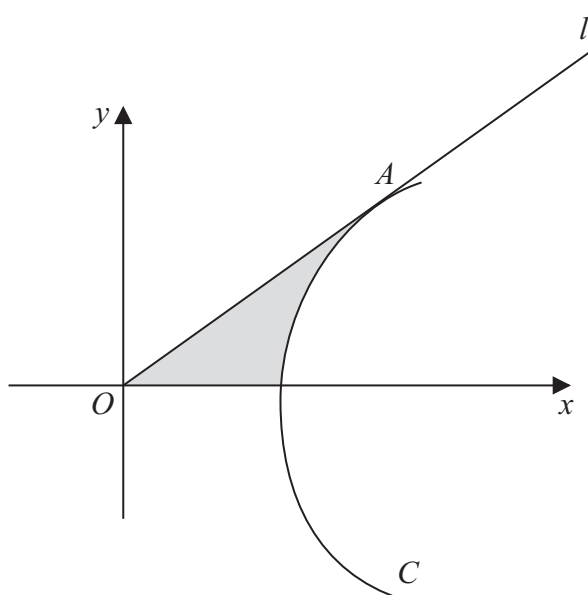


Diagram NOT accurately drawn

Figure 2

Figure 2 shows the curve  $C$  with equation  $y^2 = 8(x - 2)$  and the line  $l$  with equation  $y = x$

The line  $l$  is the tangent to  $C$  at the point  $A$ .

- (a) Find the coordinates of  $A$ . (4)

The region shown shaded in Figure 2 is rotated through  $360^\circ$  about the  $x$ -axis.

- (b) Use algebraic integration to find the volume of the solid formed. (5)  
Give your answer in terms of  $\pi$ .

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**Question 7 continued**

A series of horizontal dotted lines for writing.







8 A curve has equation  $y = \frac{3x - 2}{4x + 5}, \quad x \neq -\frac{5}{4}$

(a) Write down an equation of the asymptote to the curve which is parallel to

- (i) the  $x$ -axis,              (ii) the  $y$ -axis.

(2)

(b) Find the coordinates of the point where the curve crosses

- (i) the  $x$ -axis,              (ii) the  $y$ -axis.

(2)

(c) Sketch the curve, showing clearly the asymptotes and the coordinates of the points where the curve crosses the coordinate axes.

(3)

(d) Find an equation of the normal to the curve at the point where  $x = -1$

Give your answer in the form  $ax + by + c = 0$  where  $a, b$  and  $c$  are integers.

(7)

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**Question 8 continued**

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**Question 8 continued**

A series of horizontal dotted lines for writing the answer to Question 8.

**(Total for Question 8 is 14 marks)**



9

$$f(x) = x^3 + 5x^2 + px - q \quad p, q \in \mathbb{Z}$$

Given that  $(x + 2)$  and  $(x - 1)$  are factors of  $f(x)$ ,

(a) form a pair of simultaneous equations in  $p$  and  $q$ , (2)

(b) show that  $p = 2$  and find the value of  $q$ , (3)

(c) factorise  $f(x)$  completely. (1)

(d) Sketch the curve with equation  $y = f(x)$  showing the coordinates of the points where the curve crosses the  $x$ -axis. (2)

The curve with equation  $y = x^3 + 2x^2 + 4x$  meets the curve with equation  $y = f(x)$  at two points  $A$  and  $B$ . The  $x$ -coordinate of  $A$  is  $-\frac{4}{3}$  and the  $x$ -coordinate of  $B$  is 2

(e) Use algebraic integration to find, to 3 significant figures, the area of the finite region bounded by the two curves. (5)



**Question 9 continued**

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Question 9 continued

Handwriting practice area consisting of multiple horizontal dotted lines for text entry.





**Question 9 continued**

Area containing horizontal dotted lines for writing the answer to Question 9.

**(Total for Question 9 is 13 marks)**



P 4 3 0 2 5 A 0 2 5 3 2

10 Using the identities

$$\cos(A + B) = \cos A \cos B - \sin A \sin B$$

$$\sin(A + B) = \sin A \cos B + \cos A \sin B$$

(a) (i) show that  $\cos 2A = 1 - 2 \sin^2 A$

(ii) write down an expression for  $\sin 2A$  in terms of  $\sin A$  and  $\cos A$  (4)

(b) Hence show that  $\sin 3A = 3 \sin A - 4 \sin^3 A$  (4)

(c) Solve, for  $0 \leq x \leq \pi$ , the equation  $16 \sin^3 x - 12 \sin x + 1 = 0$   
Give your answers correct to 3 significant figures. (4)

(d) Find  $\int (24 \sin^3 \theta + 6 \cos \theta) d\theta$  (2)

(e) Hence evaluate  $\int_0^{\frac{\pi}{3}} (24 \sin^3 \theta + 6 \cos \theta) d\theta$ , giving your answer in the form  $a + b\sqrt{c}$ ,  
where  $a, b$  and  $c$  are integers. (2)

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**Question 10 continued**

Dotted lines for writing.



Question 10 continued

A large rectangular area containing 30 horizontal dotted lines, intended for writing the answer to Question 10.



**Question 10 continued**

A series of horizontal dotted lines for writing.

**(Total for Question 10 is 16 marks)**





**Question 11 continued**

Lined writing area for the answer to Question 11.



**Question 11 continued**

Dotted lines for writing.

**(Total for Question 11 is 10 marks)**

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**TOTAL FOR PAPER IS 100 MARKS**

