

Write your name here	
Surname	Other names
<b>Pearson Edexcel</b>	Centre Number
<b>International GCSE</b>	Candidate Number
<h1 style="margin: 0;">Further Pure Mathematics</h1> <h2 style="margin: 0;">Paper 2</h2>	
Friday 23 May 2014 – Afternoon <b>Time: 2 hours</b>	Paper Reference <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.

Turn over ►

P43025A

©2014 Pearson Education Ltd.

6/6/6/



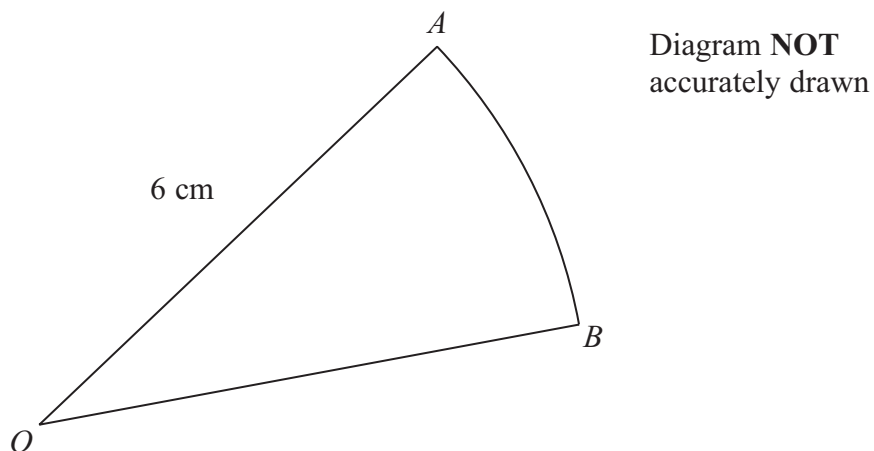
**PEARSON**

**Answer all ELEVEN questions.**

**Write your answers in the spaces provided.**

**You must write down all stages in your working.**

1



### 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)

- (b) Find, in cm, the length of the arc  $AB$ . (2)



---



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

(4)

(Total for Question 2 is 4 marks)





- (5)

- (2)

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



**5** Solve the equation

(a)  $\log_x 243 = 5$

(2)

(b)  $\log_6 (2y + 4) = 2$

(2)

(c)  $\log_4 p + \log_p 64 = 4$

(5)

This image shows a full page of white paper with horizontal dashed lines. The lines are evenly spaced and run across the width of the page, providing a guide for handwriting practice. There are no margins, text, or other markings on the page.



(continued from page 10)



- Given that  $S = 200$  and that the sum of the first 3 terms is 175

- (4)

- (1)

The sum of the first  $n$  terms of the series is  $S_n$

(c) find the value of  $n$ .

- (4)

[illegible]



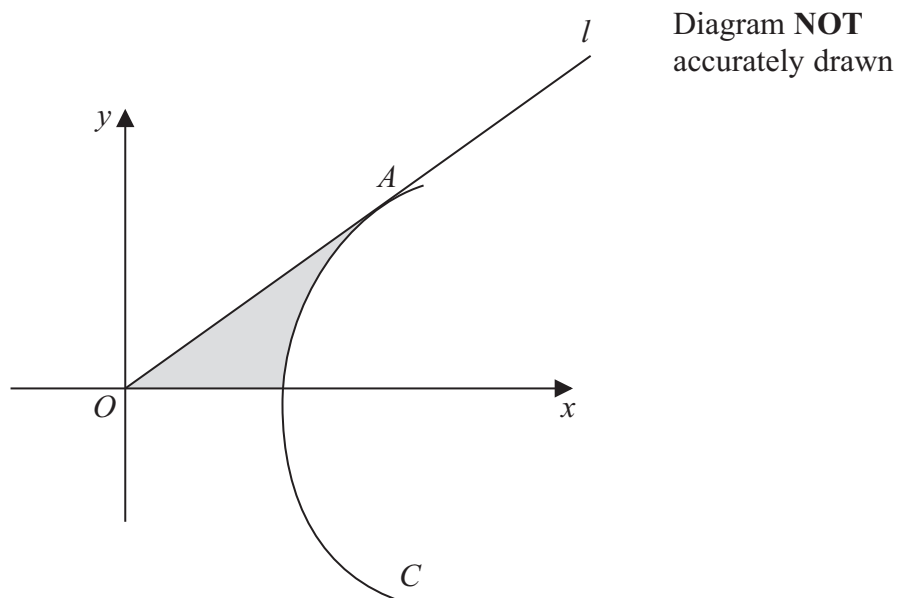


[illegible]

(Total for Question 6 is 9 marks)



7



### 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.

Give your answer in terms of  $\pi$ .

(5)



**Question 7 continued**







**Question 7 continued**

**(Total for Question 7 is 9 marks)**



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

- (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)

[illegible]

**Question 8 continued**

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....



P 4 3 0 2 5 A 0 1 9 3 2



(Total for Question 6 is 14 marks)





**Question 9 continued**

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....



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





**Question 9 continued**

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



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

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

(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)

[illegible]





**Question 10 continued**

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







**TOTAL FOR PAPER IS 100 MARKS**