

Write your name here

Surname

Other names

**Pearson Edexcel**  
**International GCSE**

Centre Number

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Candidate Number

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# Further Pure Mathematics

## Paper 2

Wednesday 20 June 2018 – Afternoon  
**Time: 2 hours**

Paper Reference

**4PM0/02**

**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 ►

P53392RA

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



Pearson



**Question 1 continued**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Area with horizontal dotted lines for writing.

**(Total for Question 1 is 3 marks)**



P 5 3 3 9 2 R A 0 3 3 2



**Question 2 continued**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Area with horizontal dotted lines for writing.

**(Total for Question 2 is 6 marks)**



P 5 3 3 9 2 R A 0 5 3 2



**Question 3 continued**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Area with horizontal dotted lines for writing.

**(Total for Question 3 is 7 marks)**



P 5 3 3 9 2 R A 0 7 3 2





Question 4 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Area with horizontal dotted lines for writing.



P 5 3 3 9 2 R A 0 9 3 2

Question 4 continued

Handwriting practice area consisting of 25 horizontal dotted lines.

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



**Question 4 continued**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Area with horizontal dotted lines for writing.

**(Total for Question 4 is 9 marks)**



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



**Question 5 continued**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Area with horizontal dotted lines for writing.

**(Total for Question 5 is 8 marks)**





Question 6 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Area with horizontal dotted lines for writing.



Question 6 continued

Handwriting practice area consisting of 25 horizontal dotted lines.

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA





**Question 6 continued**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Area with horizontal dotted lines for writing.

**(Total for Question 6 is 11 marks)**



P 5 3 3 9 2 R A 0 1 7 3 2



**Question 7 continued**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Area with horizontal dotted lines for writing.



**Question 7 continued**

Area for writing the answer to Question 7, consisting of 25 horizontal dotted lines.

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



**Question 7 continued**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Area with horizontal dotted lines for writing.

**(Total for Question 7 is 14 marks)**



8

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

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

Using the above identities

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

(ii)  $\sin 2\theta = 2\sin\theta\cos\theta$

(3)

$$f(\theta) = \cos 4\theta + 2\cos 2\theta$$

(b) Show that  $f(\theta) = 8\sin^4\theta - 12\sin^2\theta + 3$

(4)

(c) Solve, giving your solutions to 3 significant figures, the equation

$$4\sin^4x^\circ - 6\sin^2x^\circ - \cos 2x^\circ + 1.2 = 0 \quad 0 \leq x < 90$$

(4)

(d) (i) Find  $\int (2\sin^4\theta - 3\sin^2\theta) d\theta$

(ii) Hence find the exact value of  $\int_0^{\frac{\pi}{3}} (2\sin^4\theta - 3\sin^2\theta) d\theta$

Give your answer in the form  $a\sqrt{b} - c\pi$  where  $a$  and  $c$  are rational numbers and  $b$  is a prime number.

(5)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



**Question 8 continued**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Area with horizontal dotted lines for writing.



Question 8 continued

Handwriting practice area with 25 horizontal dotted lines.

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA





**Question 8 continued**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Area with horizontal dotted lines for writing.

**(Total for Question 8 is 16 marks)**



9 The points  $A, B$  and  $C$  have coordinates  $(-4, 4), (1, 6)$  and  $(-2, -1)$  respectively.

(a) Show, by calculation, that  $AB$  is perpendicular to  $AC$ . (4)

(b) Find an equation for  $BC$  in the form  $px + qy + r = 0$ , where  $p, q$  and  $r$  are integers. (3)

The line  $l$  is the perpendicular bisector of  $AB$ .

(c) Find an equation for  $l$ . (4)

The line  $l$  and the line  $BC$  intersect at the point  $E$ .

(d) Find the coordinates of  $E$ . (2)

(e) Calculate the area of triangle  $AEC$ . (4)

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DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



**Question 9 continued**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Area with horizontal dotted lines for writing.



P 5 3 3 9 2 R A 0 2 7 3 2

Question 9 continued

Handwriting practice area with 25 horizontal dotted lines.

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



**Question 9 continued**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Area with horizontal dotted lines for writing.

**(Total for Question 9 is 17 marks)**



P 5 3 3 9 2 R A 0 2 9 3 2

DO NOT WRITE IN THIS AREA

10 The curve  $C$  has equation  $y^2 = 16x$  where  $y \geq 0$

Given that the point  $A$  with coordinates  $(a, 2a)$  where  $a \neq 0$  lies on  $C$ ,

(a) find the value of  $a$ . (2)

The line  $l$  passes through  $A$  and has gradient  $-2$

Given that  $l$  crosses the  $x$ -axis at the point  $B$ ,

(b) find the  $x$  coordinate of  $B$ . (2)

The finite region enclosed by  $C$ ,  $l$  and the  $x$ -axis is rotated through  $360^\circ$  about the  $x$ -axis.

(c) Using algebraic integration, find, to 3 significant figures, the volume of the solid generated. (5)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Horizontal dotted lines for writing answers.



Question 10 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

A large rectangular area with a dotted border, containing numerous horizontal dotted lines for writing.



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

**Question 10 continued**

Area with horizontal dotted lines for writing.

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

**(Total for Question 10 is 9 marks)**

**TOTAL FOR PAPER IS 100 MARKS**

