

Please check the examination details below before entering your candidate information

Candidate surname

Other names

Centre Number

Candidate Number











## Pearson Edexcel International GCSE

### Tuesday 21 May 2024

Morning (Time: 2 hours)

Paper  
reference

# 4PM1/01

## Further Pure Mathematics

### PAPER 1



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.*
- You must **NOT** write anything on the formulae page.  
Anything you write on the formulae page will gain **NO** credit.

### 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 ►

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## International GCSE in Further Pure Mathematics Formulae sheet

**Mensuration**Surface area of sphere =  $4\pi r^2$ Curved surface area of cone =  $\pi r \times$  slant heightVolume of sphere =  $\frac{4}{3}\pi r^3$ **Series****Arithmetic series**Sum to  $n$  terms,  $S_n = \frac{n}{2}[2a + (n-1)d]$ **Geometric series**Sum to  $n$  terms,  $S_n = \frac{a(1-r^n)}{(1-r)}$ Sum to infinity,  $S_\infty = \frac{a}{1-r}$   $|r| < 1$ **Binomial series** $(1+x)^n = 1 + nx + \frac{n(n-1)}{2!}x^2 + \dots + \frac{n(n-1)\dots(n-r+1)}{r!}x^r + \dots$  for  $|x| < 1, n \in \mathbb{Q}$ **Calculus****Quotient rule (differentiation)**

$$\frac{d}{dx} \left( \frac{f(x)}{g(x)} \right) = \frac{f'(x)g(x) - f(x)g'(x)}{[g(x)]^2}$$

**Trigonometry****Cosine rule**In triangle  $ABC$ :  $a^2 = b^2 + c^2 - 2bc \cos A$ 

$$\tan \theta = \frac{\sin \theta}{\cos \theta}$$

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

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

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

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

$$\tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$$

$$\tan(A-B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$$

**Logarithms**

$$\log_a x = \frac{\log_b x}{\log_b a}$$

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**Question 2 continued**

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**(Total for Question 2 is 5 marks)**





**Question 3 continued**

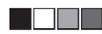
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**(Total for Question 3 is 8 marks)**





**Question 4 continued**

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**(Total for Question 4 is 8 marks)**





**Question 5 continued**

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**(Total for Question 5 is 9 marks)**



6 The line  $l$  passes through the point  $A$  with coordinates  $(-2, 2)$  and the point  $B$  with coordinates  $(3, 12)$

The point  $C$  with coordinates  $(p, q)$  lies on  $l$  such that  $AC : CB = 3 : 2$

- (a) Find the value of  $p$  and the value of  $q$  (2)

The line  $k$  is perpendicular to  $l$  and passes through the point  $C$

- (b) Show that an equation of  $k$  is  $2y + x - 17 = 0$  (4)

The line  $k$  crosses the  $x$ -axis at the point  $D$

- (c) Find the exact length of  $CD$  (3)

The point  $X$  with coordinates  $(m, n)$  lies on  $l$  such that

$$\text{area of triangle } DXC = 80 \text{ units}^2$$

Given that  $m > 0$

- (d) find the value of  $m$  and the value of  $n$  (7)

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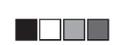
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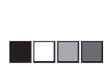
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**Question 6 continued**

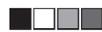
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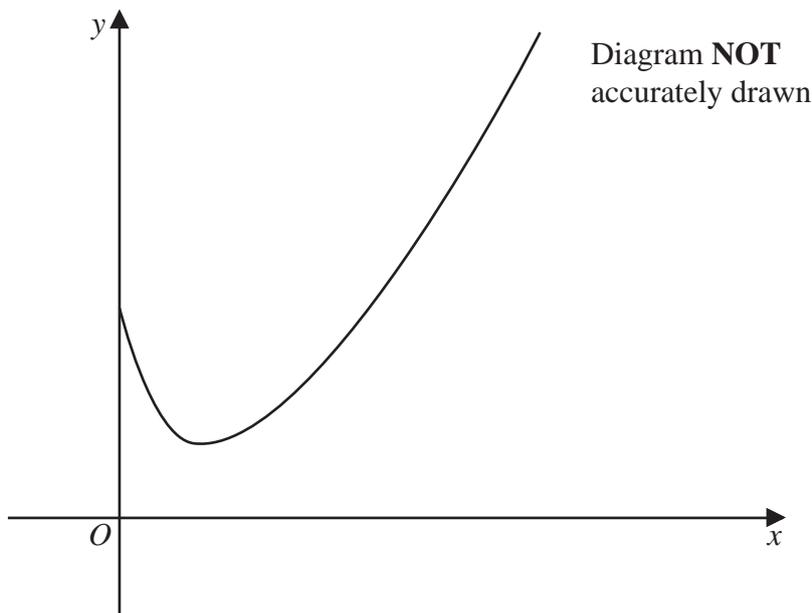
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**(Total for Question 6 is 16 marks)**



7



**Figure 1**

Figure 1 shows a sketch of part of the curve  $C$  with equation

$$y = \frac{x^2}{4} - 3\sqrt{x} + 8$$

The point  $P$  lies on  $C$  and has coordinates  $(4, a)$

(a) Show that  $a = 6$  (1)

The line  $L$  is the normal to  $C$  at the point  $P$

(b) Show that an equation of  $L$  is  $5y + 4x - 46 = 0$  (6)

The finite region  $R$  is bounded by the curve  $C$ , the line  $L$ , the  $x$ -axis and the line with equation  $x = 1$

(c) Use calculus to find the exact area of  $R$  (6)

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**Question 7 continued**

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**Question 7 continued**

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**(Total for Question 7 is 13 marks)**





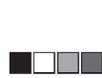
**Question 8 continued**

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**Question 8 continued**

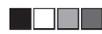
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**(Total for Question 8 is 12 marks)**





**Question 9 continued**

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**Question 9 continued**

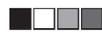
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**(Total for Question 9 is 9 marks)**





**Question 10 continued**

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**Question 10 continued**

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