

Please check the examination details below before entering your candidate information

Candidate surname	Other names
Centre Number	Candidate Number
<input style="width: 25px; height: 25px; border: 1px solid black;" type="text"/> <input style="width: 25px; height: 25px; border: 1px solid black;" type="text"/> <input style="width: 25px; height: 25px; border: 1px solid black;" type="text"/> <input style="width: 25px; height: 25px; border: 1px solid black;" type="text"/>	<input style="width: 25px; height: 25px; border: 1px solid black;" type="text"/> <input style="width: 25px; height: 25px; border: 1px solid black;" type="text"/> <input style="width: 25px; height: 25px; border: 1px solid black;" type="text"/> <input style="width: 25px; height: 25px; border: 1px solid black;" type="text"/>

Pearson Edexcel International GCSE

Time 2 hours	Paper reference	4PM1/02
--------------	-----------------	----------------

Further Pure Mathematics

PAPER 2



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 ►

P71666A

©2022 Pearson Education Ltd.

Q:1/1/1/1/1/




Pearson

International GCSE in Further Pure Mathematics Formulae sheet

MensurationSurface 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

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

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



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 answers.

(Total for Question 2 is 6 marks)



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 answers.

(Total for Question 3 is 9 marks)



Question 4 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Area for writing answers, consisting of multiple horizontal dotted lines.



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 7 marks)



Question 5 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Area for writing answers, consisting of multiple horizontal dotted lines.



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 answers.

(Total for Question 5 is 9 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.

(Total for Question 6 is 8 marks)



Question 7 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Area for writing answers, consisting of multiple horizontal dotted lines.



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 11 marks)



8

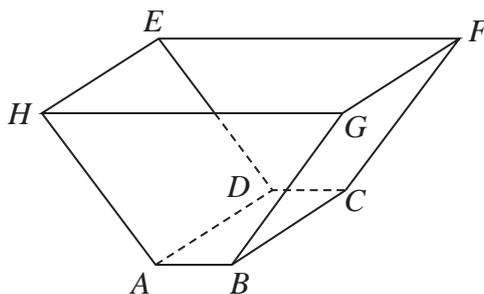


Diagram NOT accurately drawn

Figure 2

Figure 2 shows a waste paper basket in the shape of a right prism with 5 faces and a cross section that is a trapezium. The top, $EFGH$, of the waste paper basket is open.

The base of the prism $ABCD$ is a rectangle with

$$AB = DC = 2x \text{ cm and } AD = BC = h \text{ cm}$$

The cross sections $HGBA$ and $EFCD$ are such that

$$EF = HG = 8x \text{ cm and } AH = BG = CF = DE = 5x \text{ cm}$$

The top, $EFGH$, of the waste paper basket is such that

$$EH = FG = h \text{ cm}$$

The volume of the waste paper basket is 2250 cm^3

The total surface area of the 5 faces of the waste paper basket is $S \text{ cm}^2$

- (a) Show that $S = 40x^2 + \frac{1350}{x}$ (5)

Given that x can vary,

- (b) use calculus, to find, to 3 significant figures, the value of x for which S is a minimum. (5)
 Justify that this value of x gives a minimum value of S

- (c) Find, to 3 significant figures, the minimum value of S (2)

.....

.....

.....

.....

.....

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 for writing answers, consisting of multiple horizontal dotted lines.



Question 8 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Area for writing answers, consisting of multiple horizontal dotted lines.

(Total for Question 8 is 12 marks)



9 The straight line L_1 passes through the point A with coordinates $(4, 7)$ and has gradient m , where $m < 0$

Another straight line L_2 is perpendicular to L_1 and passes through the point B with coordinates $(4, k)$ where $k \neq 7$

The lines L_1 and L_2 intersect at the point C .

Given that the y coordinate of C is Y

(a) show that $Y = \frac{7 + m^2k}{m^2 + 1}$ (7)

Given that the triangle ABC is isosceles,

(b) find the value of m (5)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

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 for writing answers, consisting of multiple horizontal dotted lines.



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 12 marks)



10 Solve the equation

$$\log_4 x + \log_{16} x + \log_2 x = 10.5$$

Show your working clearly.

(5)

Area with horizontal dotted lines for working.

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



Question 10 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

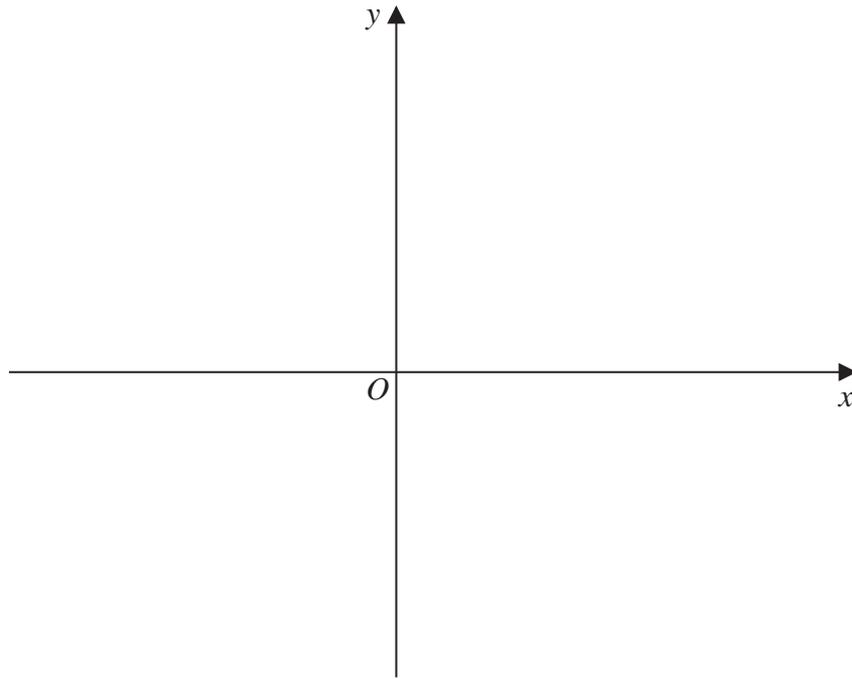
DO NOT WRITE IN THIS AREA

Area with horizontal dotted lines for writing.

(Total for Question 10 is 5 marks)



Question 11 continued



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

A series of horizontal dotted lines for writing the answer.



Question 11 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Area for writing answers, consisting of multiple horizontal dotted lines.



