



Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

Forename(s)

Candidate signature

AS MATHEMATICS

Unit Pure Core 2

Wednesday 24 May 2017

Morning

Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:

- the blue AQA booklet of formulae and statistical tables.
- You may use a graphics calculator.

Instructions

- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- Write the question part reference (eg (a), (b)(i) etc) in the left-hand margin.
- You must answer each question in the space provided for that question. If you require extra space, use an AQA supplementary answer book; do **not** use the space provided for a different question.
- Do not write outside the box around each page.
- Show all necessary working; otherwise marks for method may be lost.
- Do all rough work in this book. Cross through any work that you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 75.

Advice

- Unless stated otherwise, you may quote formulae, without proof, from the booklet.
- You do not necessarily need to use all the space provided.

For Examiner's Use	
Question	Mark
1	
2	
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6	
7	
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9	
TOTAL	



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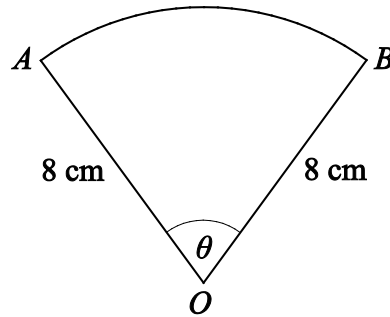
IB/G/Jun17/E2

MPC2

Answer **all** questions.

Answer each question in the space provided for that question.

- 1** The diagram shows a sector OAB of a circle with centre O and radius 8 cm.



The angle AOB is θ radians and the **perimeter** of the sector is 22 cm.

- (a) Find the value of θ .

[2 marks]

- (b) Find the area of the sector.

[2 marks]

QUESTION
PART
REFERENCE

Answer space for question 1



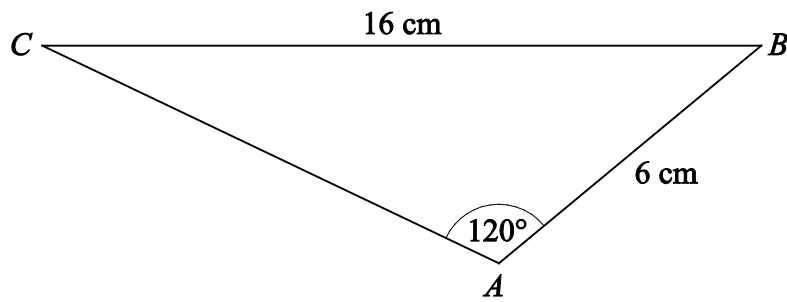
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2

The diagram shows a triangle ABC .



The size of angle BAC is 120° and the lengths of AB and BC are 6 cm and 16 cm respectively.

- (a) Show that angle ACB is 19° , correct to the nearest degree.

[3 marks]

- (b) Calculate the area of triangle ABC , giving your answer in cm^2 to three significant figures.

[3 marks]

QUESTION
PART
REFERENCE

Answer space for question 2



Turn over ►



3 (a) Express $\frac{\sqrt{27^x}}{3^{2x-1}}$ in the form 3^p , where p is an expression in terms of x .

[3 marks]

(b) Hence solve the equation $\frac{\sqrt{27^x}}{3^{2x-1}} = \sqrt[3]{81}$.

[2 marks]

QUESTION
PART
REFERENCE

Answer space for question 3



QUESTION
PART
REFERENCE**Answer space for question 3****Turn over ►**

4 The n th term of a geometric series is u_n , where $u_n = 162 \left(\frac{2}{3}\right)^n$.

(a) Find the value of u_1 and the value of u_2 .

[2 marks]

(b) Find the sum to infinity of the series.

[3 marks]

(c) Find the smallest value of k for which $\sum_{n=k}^{\infty} u_n < 2.5$.

[3 marks]

QUESTION
PART
REFERENCE

Answer space for question 4



Turn over ►



- 5** A curve is defined for $x > 0$. The gradient of the curve at the point (x, y) is given by

$$\frac{dy}{dx} = x^{\frac{3}{2}} - 2x$$

- (a) Show that there is a single value of x for which the curve has a stationary point. **[2 marks]**
- (b) Find $\frac{d^2y}{dx^2}$ and hence show that the curve has a minimum point. **[3 marks]**
- (c) The line with equation $y = 2$ is a tangent to the curve. Find the equation of the curve. **[4 marks]**

QUESTION
PART
REFERENCE

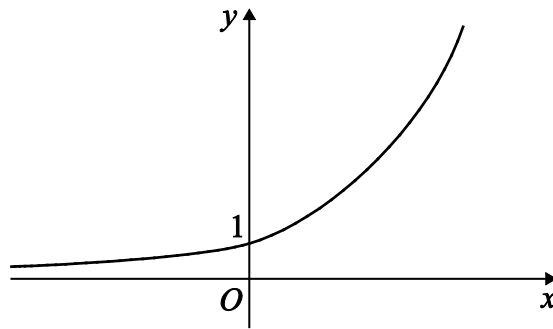
Answer space for question 5



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- 6** The diagram shows a sketch of the curve $y = 2^{3x}$.



- (a) (i)** Use the trapezium rule with five ordinates (four strips) to find an approximate value for $\int_0^1 2^{3x} dx$. Give your answer to two decimal places.

[4 marks]

- (ii)** State how you could obtain a better approximation to the value of $\int_0^1 2^{3x} dx$ using the trapezium rule.

[1 mark]

- (iii)** The point $P(1, k)$ lies on the curve $y = 2^{3x}$. Use your answer to part **(a)(i)** to find an approximate value for the area of the region bounded by the curve, the line $x = 0$ and the line $y = k$. Give your answer to two decimal places.

[3 marks]

- (b)** The graph of $y = 2^{3x}$ can be mapped onto the graph of $y = 2^{3x-4}$ either by a translation or by a stretch.

- (i)** Describe the translation.

[2 marks]

- (ii)** Describe the stretch.

[2 marks]

- (c)** Use logarithms to solve the equation $2^{3x-4} = 7$, giving your value of x to three significant figures.

[2 marks]



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[illegible]

Turn over ►



- 7 (a)** The region bounded by the curve $y = 7x + 6 - \frac{1}{x^2}$, the x -axis and the lines $x = 1$ and $x = 2$ lies above the x -axis. Show that the area of this region is 16.

[5 marks]

- (b)** The point Q lies on the curve $y = 7x + 6 - \frac{1}{x^2}$. The normal to this curve at Q is parallel to the line $2y + 8x = 3$. Find an equation of this normal at Q .

[6 marks]QUESTION
PART
REFERENCE**Answer space for question 7**

[illegible]

Turn over ►



- 8 (a)** Solve the equation $\cos \theta = \frac{2}{3}$, giving all values of θ to the nearest degree in the interval $0^\circ \leq \theta \leq 360^\circ$.

[2 marks]

- (b) (i)** Given that $4 \tan \theta \sin \theta = 4 - \cos \theta$, show that $3 \cos^2 \theta + 4 \cos \theta - 4 = 0$.

[3 marks]

- (ii)** By solving the quadratic equation in part **(b)(i)**, explain why $\cos \theta$ can only take one value.

[2 marks]

- (c)** Hence solve the equation $4 \tan 4x \sin 4x = 4 - \cos 4x$, giving all values of x to the nearest degree in the interval $0^\circ \leq x \leq 180^\circ$.

[4 marks]

QUESTION
PART
REFERENCE**Answer space for question 8**

[illegible]

Turn over ►



Given that $3\log_2(c+2) - \log_2\left(\frac{c^3}{2} + k\right) = 1$, express $(c+1)^2$ in terms of k .

QUESTION	PART	REFERENCE
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[illegible]

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