

CANDIDATE  
NAME

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CENTRE  
NUMBER

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CANDIDATE  
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**MATHEMATICS**

**9709/11**

Paper 1 Pure Mathematics 1 (P1)

**May/June 2019**

**1 hour 45 minutes**

Candidates answer on the Question Paper.

Additional Materials: List of Formulae (MF9)

**READ THESE INSTRUCTIONS FIRST**

Write your centre number, candidate number and name in the spaces at the top of this page.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, glue or correction fluid.

**DO NOT WRITE IN ANY BARCODES.**

Answer **all** the questions in the space provided. If additional space is required, you should use the lined page at the end of this booklet. The question number(s) must be clearly shown.

Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place in the case of angles in degrees, unless a different level of accuracy is specified in the question.

The use of an electronic calculator is expected, where appropriate.

You are reminded of the need for clear presentation in your answers.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [ ] at the end of each question or part question.

The total number of marks for this paper is 75.

This document consists of **21** printed pages and **3** blank pages.



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1 The term independent of  $x$  in the expansion of  $\left(2x + \frac{k}{x}\right)^6$ , where  $k$  is a constant, is 540.

(i) Find the value of  $k$ . [3]

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(ii) For this value of  $k$ , find the coefficient of  $x^2$  in the expansion. [2]

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- 2 The line  $4y = x + c$ , where  $c$  is a constant, is a tangent to the curve  $y^2 = x + 3$  at the point  $P$  on the curve.

(i) Find the value of  $c$ . [3]

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(ii) Find the coordinates of  $P$ . [2]

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9 The function  $f$  is defined by  $f(x) = 2 - 3 \cos x$  for  $0 \leq x \leq 2\pi$ .

(i) State the range of  $f$ . [2]

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(ii) Sketch the graph of  $y = f(x)$ . [2]







(ii) Find the  $x$ -coordinate of the other stationary point on the curve. [1]

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(iii) Determine the nature of each of the stationary points. [2]

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