

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 2018**

**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 **19** printed pages and **1** blank page.



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1 (i) Find the first three terms in the expansion, in ascending powers of  $x$ , of  $(1 - 2x)^5$ . [2]

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(ii) Given that the coefficient of  $x^2$  in the expansion of  $(1 + ax + 2x^2)(1 - 2x)^5$  is 12, find the value of the constant  $a$ . [3]

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(b) The  $n$ th term of a progression is  $p + qn$ , where  $p$  and  $q$  are constants, and  $S_n$  is the sum of the first  $n$  terms.

(i) Find an expression, in terms of  $p$ ,  $q$  and  $n$ , for  $S_n$ . [3]

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(ii) Given that  $S_4 = 40$  and  $S_6 = 72$ , find the values of  $p$  and  $q$ . [2]

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- (iii) Find an expression for  $fg(x)$  and deduce the range of  $fg$ . [4]

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The function  $h$  is defined by  $h : x \mapsto 4 + x - \frac{1}{2}x^2$  for  $x \geq k$ .

- (iv) Find the smallest value of  $k$  for which  $h$  has an inverse. [2]

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10 The curve with equation  $y = x^3 - 2x^2 + 5x$  passes through the origin.

(i) Show that the curve has no stationary points. [3]

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(ii) Denoting the gradient of the curve by  $m$ , find the stationary value of  $m$  and determine its nature. [5]

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