Write your name, centre number and candidate number in the boxes below.

Surname	Other names

Centre number | | | | | |

Candidate number | | | | |

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Series

Time allowed: 2 hours 10 minutes

Subject code **0606**

Additional Mathematics

Questions from Paper 1 and Paper 2

You must have: a ruler marked in centimetres and millimetres, a protractor, compasses, a pen, an HB pencil and an eraser.
Questions 1-4 (Paper 1): no calculator.
Questions 5-10 (Paper 2): calculator allowed.

Total marks

/ 86

Instructions

- Answer every question in the space provided on this paper.
- Write in black or dark blue ink. Pencil may be used for diagrams and graphs.
- Fill in your name, centre number and candidate number above.
- Show your working: a correct method can earn marks even if the answer is wrong.
- Unless a question says otherwise, give answers that are not exact to 3 significant figures, and angles in degrees to 1 decimal place.

Information

- This paper has 10 questions worth 86 marks in total.
- The marks for each question or part are shown in brackets, for example [3].

Advice

- Read every question through once before you write anything.
- Use the marks in brackets to judge how long to spend on each part.
- If you finish early, go back and check your working.

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Print at 100% (Actual size) so diagrams keep their real measurements.

1 **(i)** Find the first 3 terms of the expansion, in ascending powers of x, of $(1 + 3x)^6$. [2]

(ii) Hence find the coefficient of x^2 in the expansion of $(1 + 3x)^6 (1 - 3x - 5x^2)$. [3]

Binomial expansion Click for more variations

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2 **(i)** Find the first 3 terms, in descending powers of x, in the expansion of $\left(x+\frac{2}{x^2}\right)^6$. [3]

(ii) Hence find the term independent of x in the expansion of $\left(2-\frac{4}{x^3}\right)\left(x+\frac{2}{x^2}\right)^6$. [2]

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3 The 7th and 10th terms of an arithmetic progression are 158 and 149 respectively.

(a) Find the common difference and the first term of the progression. [3]

(b) Find the least number of terms of the progression for their sum to be negative. [3]

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Arithmetic and geometric progressions Click for more variations

4 The coefficient of x^2 in the expansion of $(2 + px)^6$ is 60.

(i) Find the value of the positive constant p. [3]

(ii) Using your value of p, find the coefficient of x^2 in the expansion of $(3 - x)(2 + px)^6$. [3]

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5 The first three terms in the expansion of $(a+bx)^5(1+x)$ are $32-208x+cx^2$. Find the value of each of the integers a, b and c. [7]

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6 The first three terms, in descending powers of x, in the expansion of $\left(3x^2 - a\right)^n \left(1 + \frac{1}{x^2}\right)^2$ can be written as $729x^{12} + 972x^{10} + bx^8$, where a, b and n are constants.

Find the values of a, b and n. [9]

Binomial expansion Click for more variations

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7 **(a)** An arithmetic progression has twelve terms. The sum of the first three terms is -36 and the sum of the last three terms is 72. Find the first term and the common difference. [5]

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(b) The first three terms of a geometric progression are 1, 1.2 and 1.44. Find the smallest value of n such that the sum of the first n terms is greater than 500. [5]

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8 **(a)** A geometric progression has first term 64 and common ratio 0.5.

(i) Find the 10th term. [2]

(ii) Find the sum of the first 10 terms. [2]

(iii) Find the sum to infinity. [1]

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(b) An arithmetic progression is such that $S_{20} - 400 = 2S_{10}$ and $u_1 : u_6$ is 1 : 5. Find the sum of the first 3 terms of this progression. [6]

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9 An arithmetic progression has first term a and common difference d. The third term is 13 and the tenth term is 41.

(a) Find the value of a and of d. [4]

(b) Find the number of terms required to give a sum of 2555. [4]

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(c) Given that S_n is the sum to n terms, show that $S_{2k} - S_k = 3k(1+2k)$. [4]

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10 An arithmetic progression, A, has first term a and common difference d.
The 2nd, 14th and 17th terms of A form the first three terms of a convergent geometric progression, G, with common ratio r.

(a) **(i)** Given that $d \neq 0$, find two expressions for r in terms of a and d and hence show that $a = -17d$. [6]

(ii) Find the value of r. [2]

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(b) The first term of the geometric progression, G, is q and the sum to infinity is $\frac{256}{3}$.

Find the sum of the first 20 terms of the **arithmetic** progression, A. [7]

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