Surname	
Other Names	
Candidate Signature	

Centre Number						Candidate Number				

Examiner Comments	

Total Marks

MATHEMATICS

AS LEVEL QUESTION COMPILATION

CM

Questions on: Sequences and Series (Binomial Expansion)

Instructions to candidates:

• In the boxes above, write your centre number, candidate number, your surname, other names and signature.

• Answer ALL of the questions.

• You must write your answer for each question in the spaces provided.

• You may use a calculator.

Information to candidates:

• Full marks may only be obtained for answers to ALL of the questions.

• The marks for individual questions and parts of the questions are shown in round brackets.

• There are 5 questions in this question paper. The total mark for this paper is 40.

Advice to candidates:

• You should ensure your answers to parts of the question are clearly labelled.

• You should show sufficient working to make your workings clear to the Examiner.

• Answers without working may not gain full credit.

1 5 3 3 2 2 2 1 8 0 0 0 4

1 Expand

$$(3-2x)^5$$

giving each term in its simplest form. **(4)**

Question 1 continued

TOTAL 4 MARKS

2 (a) Find the first four terms, in ascending powers of x, of the binomial expansion of $(1 + ax)^{12}$, where a is a constant. Give each term in its simplest form. **(3)**

Given that the coefficient of x^2 in this expansion is 594,

(b) find the possible values of a. **(3)**

Question 2 continued

TOTAL 6 MARKS

3 (a) Find the first 4 terms, in ascending powers of x, of the binomial expansion of

$$(2 - kx)^7$$

where k is a non-zero constant. Give each term in its simplest form. **(4)**

Given that the coefficient of x^3 is 20 times greater than the coefficient of x,

(b) find the value(s) of k. **(3)**

Question 3 continued

TOTAL 7 MARKS

4 (a) Find, in ascending powers of x, the first 4 terms of the binomial expansion of

$$\left(1+\frac{x}{3}\right)^{10}$$

giving each term in its simplest form. **(4)**

(b) Use your expansion to find an approximation for $(1.038)^{10}$, giving your answer to 4 decimal places. **(3)**

(c) Explain how you could make your answer to part (b) more accurate. **(1)**

Question 4 continued

TOTAL 8 MARKS

5 (a) Find the first 3 terms, in ascending powers of x, in the binomial expansion

$$(1+px)^9$$

where p is a constant. Give each term in its simplest form. **(3)**

The first 3 terms are $1, -18x$ and qx^2, where q is a constant.

(b) Find the value of p and the value of q. **(3)**

Question 5 continued

TOTAL 6 MARKS

6 (a) In ascending powers of x, find the first 4 terms of the binomial expansion of

$$\left(1-\frac{x}{4}\right)^6$$

giving each term in its simplest form. **(3)**

(b) Hence find, in ascending powers of x, the first 3 terms of the binomial expansion of

$$\left(2-\frac{x}{5}\right)\left(1-\frac{x}{4}\right)^6$$

giving each term in its simplest form. **(3)**

Question 6 continued

TOTAL 6 MARKS

7 (a) In ascending powers of x, find the first 4 terms of the binomial expansion of

$$(1-5x)^7$$

giving each term in its simplest form. **(3)**

$$g(x) = (a+bx)(1-5x)^7$$

Given that the binomial expansion of $g(x)$ contains the terms 3 and $-109x$,

(b) (i) find the values of a and b,

(ii) find the coefficient of x^3 in the binomial expansion of $g(x)$. **(5)**

Question 7 continued

TOTAL 8 MARKS

8 (a) In ascending powers of x, find the first three terms in the binomial expansion of

$$\left(3-\frac{x}{4}\right)\left(2+\frac{x}{5}\right)^5$$

up to and including the term in x^2. **(4)**

(b) Given that n is a positive integer, use the definition

$${}^nC_r = \frac{n!}{r!(n-r)!}$$

to prove that ${}^nC_1 = n$. **(1)**

In the expansion of $(3x + 1)^p$, where p is a positive integer, the coefficient of x is 24.

(c) (i) Find the value of p. **(2)**

(ii) Determine the coefficient of x^2 in this expansion. **(2)**

Question 8 continued

TOTAL 9 MARKS