Arithmetic and Geometric Progression
Question Paper 4

Level	International A Level
Subject	Maths
Exam Board	CIE
Topic	Series
Sub Topic	Arithmetic and Geometric Progression
Booklet	Question Paper 4

Time Allowed: **65 minutes**

Score: **/54**

Percentage: **/100**

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	'77.5%	70%	62.5%	57.5%	45%	<45%

1 **(a)** The sixth term of an arithmetic progression is 23 and the sum of the first ten terms is 200. Find the seventh term. [4]

(b) A geometric progression has first term 1 and common ratio r. A second geometric progression has first term 4 and common ratio $\frac{1}{4}r$. The two progressions have the same sum to infinity, S. Find the values of r and S. [3]

2 **(a)** An arithmetic progression contains 25 terms and the first term is −15. The sum of all the terms in the progression is 525. Calculate

   (i) the common difference of the progression, [2]

  (ii) the last term in the progression, [2]

 (iii) the sum of all the positive terms in the progression. [2]

(b) A college agrees a sponsorship deal in which grants will be received each year for sports equipment. This grant will be $4000 in 2012 and will increase by 5% each year. Calculate

   (i) the value of the grant in 2022, [2]

  (ii) the total amount the college will receive in the years 2012 to 2022 inclusive. [2]

3 The first and second terms of a progression are 4 and 8 respectively. Find the sum of the first 10 terms given that the progression is

  (i) an arithmetic progression, [2]

 (ii) a geometric progression. [2]

4 A television quiz show takes place every day. On day 1 the prize money is $1000. If this is not won the prize money is increased for day 2. The prize money is increased in a similar way every day until it is won. The television company considered the following two different models for increasing the prize money.

    Model 1:   Increase the prize money by $1000 each day.

    Model 2:   Increase the prize money by 10% each day.

On each day that the prize money is not won the television company makes a donation to charity. The amount donated is 5% of the value of the prize on that day. After 40 days the prize money has still not been won. Calculate the total amount donated to charity

  (i) if Model 1 is used, [4]

 (ii) if Model 2 is used. [3]

5 **(a)** A circle is divided into 6 sectors in such a way that the angles of the sectors are in arithmetic progression. The angle of the largest sector is 4 times the angle of the smallest sector. Given that the radius of the circle is 5 cm, find the perimeter of the smallest sector. [6]

    (b) The first, second and third terms of a geometric progression are $2k + 3$, $k + 6$ and k, respectively. Given that all the terms of the geometric progression are positive, calculate

        (i) the value of the constant k, [3]

        (ii) the sum to infinity of the progression. [2]

6 **(a)** A geometric progression has a third term of 20 and a sum to infinity which is three times the first term. Find the first term. [4]

    (b) An arithmetic progression is such that the eighth term is three times the third term. Show that the sum of the first eight terms is four times the sum of the first four terms. [4]

7 **(a)** The fifth term of an arithmetic progression is 18 and the sum of the first 5 terms is 75. Find the first term and the common difference. [4]

    (b) The first term of a geometric progression is 16 and the fourth term is $\frac{27}{4}$. Find the sum to infinity of the progression. [3]