# Arithmetic and Geometric Progression
## Question Paper 2

| Level | International A Level |
|---|---|
| Subject | Maths |
| Exam Board | CIE |
| Topic | Series |
| Sub Topic | Arithmetic and Geometric Progression |
| Booklet | Question Paper 2 |

**Time Allowed:**          **60  minutes**

**Score:**                        **/50**

**Percentage:**             **/100**

**Grade Boundaries:**

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

**1** The 1st, 2nd and 3rd terms of a geometric progression are the 1st, 9th and 21st terms respectively of an arithmetic progression. The 1st term of each progression is 8 and the common ratio of the geometric progression is $r$, where $r \neq 1$. Find

    **(i)** the value of $r$, [4]

    **(ii)** the 4th term of each progression. [3]

**2** The first term in a progression is 36 and the second term is 32.

    **(i)** Given that the progression is geometric, find the sum to infinity. [2]

    **(ii)** Given instead that the progression is arithmetic, find the number of terms in the progression if the sum of all the terms is 0. [3]

**3** **(a)** In an arithmetic progression the sum of the first ten terms is 400 and the sum of the next ten terms is 1000. Find the common difference and the first term. [5]

    **(b)** A geometric progression has first term $a$, common ratio $r$ and sum to infinity 6. A second geometric progression has first term $2a$, common ratio $r^2$ and sum to infinity 7. Find the values of $a$ and $r$. [5]

**4** **(a)** An athlete runs the first mile of a marathon in 5 minutes. His speed reduces in such a way that each mile takes 12 seconds longer than the preceding mile.

    **(i)** Given that the $n$th mile takes 9 minutes, find the value of $n$. [2]

    **(ii)** Assuming that the length of the marathon is 26 miles, find the total time, in hours and minutes, to complete the marathon. [2]

    **(b)** The second and third terms of a geometric progression are 48 and 32 respectively. Find the sum to infinity of the progression. [4]

**5** **(a)** In a geometric progression, the sum to infinity is equal to eight times the first term. Find the common ratio. [2]

    **(b)** In an arithmetic progression, the fifth term is 197 and the sum of the first ten terms is 2040. Find the common difference. [4]

**6** The third term of a geometric progression is $-108$ and the sixth term is 32. Find

   **(i)** the common ratio, [3]

   **(ii)** the first term, [1]

  **(iii)** the sum to infinity. [2]

**7** **(a)** The first and last terms of an arithmetic progression are 12 and 48 respectively. The sum of the first four terms is 57. Find the number of terms in the progression. [4]

  **(b)** The third term of a geometric progression is four times the first term. The sum of the first six terms is $k$ times the first term. Find the possible values of $k$. [4]