1. Question | 0606 Feb-March 2025 P1 V2 Q8

8 The first term of a geometric progression is 10.
This geometric progression has a positive common ratio r.

The first term of an arithmetic progression is also 10.
This arithmetic progression has a negative common difference d.

The second term of the geometric progression is the same as the fourth term of the arithmetic progression.
The third term of the geometric progression is the same as the sixth term of the arithmetic progression.

(a) Find the values of r and d. [6]

(b) Determine whether the geometric progression has a sum to infinity. [1]

2. Question | 0606 May-June 2025 P1 V1 Q11

11 An arithmetic progression has common difference d.
The 3rd term of this progression is 10.

(a) Write down expressions for the 1st term and the 2nd term of this progression.
Give your answers in terms of d only. [2]

(b) When each of the first 3 terms is squared, the sum of these squares is 140 .
There are two possible values for d.

Using your answer to part **(a)**, find the sum of the first 200 terms of the progression with the smaller value of d. [7]

Question 12 is printed on the next page.

3. Question | 0606 May-June 2025 P1 V2 Q7

7 A geometric progression has a 4th term of $\frac{8k^6}{27}$ and a 6th term of $\frac{32k^{10}}{243}$, where k is a constant.

The common ratio of this geometric progression is positive.

(a) Find the common ratio in terms of k and the value of the first term of this geometric progression. [4]

(b) Given that this geometric progression has a sum to infinity of 3, find the possible values of k. [3]

4. Question part 1/2 | 0606 Oct-Nov 2025 P1 V1 Q5

5 **(a)** In an arithmetic progression:

- the first term is 3
- the sum of the first 10 terms is 4 times the sum of the first 5 terms.

Find the common difference. [3]

4. Question part 2/2 | 0606 Oct-Nov 2025 P1 V1 Q5

(b) The 1st, 2nd and 5th terms of another arithmetic progression are the 1st, 2nd and 3rd terms of a geometric progression.

It is given that the 1st terms of the progressions are **not** 0.
Find the common ratio, r, where $r \neq 1$, of the geometric progression. [4]

5. Question | 0606 Oct-Nov 2025 P1 V2 Q3

3 The sum of the first two terms of a geometric progression is 9.
The sum to infinity of this geometric progression is 25.

(a) Find the possible values of the common ratio of this geometric progression. [4]

(b) Find the first term of this geometric progression for each possible value of the common ratio. [2]

6. Question part 1/2 | 0606 Oct-Nov 2025 P1 V3 Q10

10 **(a)** An arithmetic progression has first term a and common difference d.

Given that $S_{20} = 3 \times S_{10}$, find a in terms of d. [3]

6. Question part 2/2 | 0606 Oct-Nov 2025 P1 V3 Q10

(b) A geometric progression, A, has common ratio r, where $|r| < 1$.
The terms of this progression are $a_1, a_2, a_3 \ldots$.

Another geometric progression, B, has terms $b_1, b_2, b_3 \ldots$, where

$$b_1 = a_2, \quad b_2 = a_4, \quad b_3 = a_6 \ldots .$$

The sum to infinity of A is S_A and the sum to infinity of B is S_B.

Find $\frac{S_B}{S_A}$ in terms of r.

Give your answer in its simplest form. [5]

7. Question | 0606 Oct-Nov 2025 P1 V3 Q12

12 **(a)** Write down the coefficient of x^r in the binomial expansion of $(2+x)^{59}$. [1]

(b) For this expansion, find the value of r for which the coefficient of x^r is equal to the coefficient of x^{r+1}. [4]

7 **(a)** In an arithmetic progression, the 5th term is equal to $\frac{1}{3}$ of the 16th term. The sum of the 5th term and the 16th term is equal to 33.

Find the sum of the first 10 terms of this progression. [6]

(b) In a geometric progression, the sum of the first two terms is equal to 16. The sum to infinity is equal to 25.

Find the possible values of the first term. [6]

9. Question | 0606 Feb-March 2026 P1 V2 Q4

4 In an arithmetic progression:

- the common difference is -2
- the sum of the first 4 terms is equal to the sum of the first 10 terms.

Find the first term. [3]

10. Question | 0606 May-June 2026 P1 V1 Q9

9 **(a)** A geometric progression has common ratio r and first term a, where $a \neq 0$.
The 4th term is -8 times the 7th term.

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

(ii) The sum of the first 5 terms of this progression is $\frac{99}{32}$.

Find the value of a. [2]

(b) The first three terms of a different geometric progression are $\cos\theta\sin\theta$, $\cos\theta\sin^3\theta$ and $\cos\theta\sin^5\theta$, for $0 < \theta < \frac{\pi}{2}$.

Show that the sum to infinity of this progression is $\tan\theta$. [4]

11. Question | 0606 May-June 2026 P1 V2 Q4

4 An arithmetic progression has first term $u_1 = 400$ and common difference $d = -2$.

(a) Find the 81st term and the 100th term. [2]

(b) Find the sum of all the terms from the 81st to the 100th, $u_{81} + u_{82} + \ldots + u_{100}$. [3]

12. Question | 0606 May-June 2026 P1 V2 Q10

10 It is given that a geometric progression has the following terms.

2nd term	$11x - 1$
3rd term	$x + 5$
4th term	$x - 1$

(a) Given that $x > 0$, find the common ratio and first term of the progression. [6]

(b) The sum to infinity of this progression is $\frac{k}{3}$ where k is an integer.

Find the value of k. [2]

13. Question | 0606 May-June 2026 P1 V3 Q2

2 An arithmetic progression has first term a and common difference d, where $a \neq 0$ and $d \neq 0$.

- The sum of the 6th and 11th terms is 0.
- The sum of the first 6 terms is -30.

Find the values of a and d. [5]