

1) Find the first term and the common difference for each arithmetic sequence described below.

- (a) The 5th term is 21 and the 10th term is 41.
- (b) The 3rd term is 12 and the 8th term is -18.
- (c) The 4th term is 14 and the 15th term is 47.

2) Find the sum of all the 3-digit natural numbers which are divisible by 5, i.e. $100 + 105 + 110 + 115 + \dots + 995$.

3) For the arithmetic series $5 + 7 + 9 + 11 + \dots$, find a formula for S_n , the sum of the first n terms.

Hence find how many terms must be taken to give a sum of 192.

4) A geometric sequence has second term 6 and fifth term 162.
Find the tenth term of this sequence.

5) A geometric sequence has sixth term $\frac{32}{33}$ and seventh term $1\frac{31}{33}$.

Find the sum of the first 10 terms of this sequence.

6) Find an expression for the sum of the first n terms of the geometric sequence 10, 30, 90, 270, ...

Hence find:

- (a) the number of terms which must be taken to give a sum of 32 800
- (b) the least number of terms which must be taken to give a sum exceeding 1 000 000.

7) For the arithmetic sequence 3, 7, 11, 15, ..., find a formula for u_n , the n th term.

- Hence find:
- (a) the 20th term;
 - (b) which term is 235;
 - (c) which term is the first term to exceed 500.

8) For the arithmetic sequence 8, 14, 20, 26, ..., find a simple expression for S_n , the sum of the first n terms.

- Hence find:
- (a) the sum of the first 40 terms
 - (b) how many terms must be taken to give a sum of 13 000
 - (c) the least number of terms which must be taken to give a sum exceeding 20 000.

9) The second term of an arithmetic sequence is 7 times the fifth term, and the sum of the first six terms is 72.

- (a) Find the first term and common difference.
(b) Find also the sum of the first 45 terms.

10) A geometric sequence begins 2, 6, 18, 54, ...

- (a) Find the 9th term of this sequence.
(b) Find the sum of the first 12 terms.

11) Let S_n denote the sum of the first n terms of the geometric series

$$9 + 18 + 36 + 72 + \dots$$

- (a) Find a formula for S_n .
(b) How many terms must be taken to give a sum of 2295?

12) The third term of a geometric sequence is 75 and the sixth term is 9375.

Find the sum of the first eight terms of this sequence.

13) Explain why the geometric series $\frac{4}{5} + \frac{8}{15} + \frac{16}{45} + \frac{32}{135} + \dots$ has a sum to infinity, and find the value of the sum to infinity.

14) The first term of a geometric series is 28 and the series has a sum to infinity of 16.

Find the second and third terms of this sequence.

Answers

1a) $a = 1, d = 5$ b) $a = 24, d = -6$ c) $a = 5, d = 3$

2) 19800 3) 12 4) 39366 5) 31 6)a) 8 b) 12

7)a) 79 b) 59 c) 126

8a) 5000 b) 65 c) 81 9a) $a = -3, d = 6$ b) 5805

10)a) 13122 b) 531440 11a) 2295 b) 8

12) 292968 13) $2\frac{2}{5}$ 14) -21, $15\frac{3}{4}$