GEOMETRIC SEQUENCES

1 Which of the following are geometric sequences?

(a) $3, 6, 12, 24, \ldots$ **(b)** $8, -2, \frac{1}{2}, -\frac{1}{8}, \ldots$ **(c)** $2, 5, 11, 23, \ldots$ **(d)** $\frac{1}{9}, \frac{1}{3}, 1, 3, \ldots$ **(e)** $\frac{1}{2}, \frac{1}{4}, \frac{1}{6}, \frac{1}{8}, \ldots$

2 For the geometric sequence $1, 3, 9, 27, \ldots$ find:

(a) the value of a **(b)** the value of r **(c)** the expression for T_n

(d) the 10th term **(e)** the value of k if $T_k = 6561$.

4 Find the sixth term of the sequence 4, 6, 9, 13.5, … .

5 Find the first term and the common ratio of the geometric sequence in which $T_3 = 25$ and $T_5 = 156.25$.

7 Find the first three terms of a geometric sequence in which:

(a) the sixth term is 160 and the seventh term is 320

(b) the fifth term is 4 and the eighth term is $-\frac{1}{2}$.

8 If $2p + 1$, $5p$ and $12p - 4$ are successive terms of a geometric sequence, find the value of p.

10 For x and y it is given that 1, x and y form an arithmetic sequence while 1, y and x form a geometric sequence. Find the value of x and y.

12 The population of a certain town is 10 000. If the population decreases each year by 10% of the population in the preceding year, find the population in 5 years' time.

14 Given that a, ar, ar^2, ar^3, … is a geometric sequence, show that the sequence $\log a$, $\log ar$, $\log ar^2$, $\log ar^3$, … is arithmetic.

15 Find a number which, when added to each of 2, 6, 13 gives three numbers in geometric sequence.

16 In a homogeneous nutrient medium the number of bacteria present doubles every hour. If there are initially 200 bacteria present, how many will be present after:

(a) 4 hours **(b)** 10 hours?

(c) If there are N bacteria present after t hours, write down a formula that gives the number of bacteria present after t hours.

18 The population of a colony of wading birds is decreasing by 15% each year. The initial population is 30000 birds.

(a) Find how many birds remain after 5 years (to the nearest thousand).

(b) Find when the population is equal to 9000.

(c) Sketch the graph of the population as a function of time.