

Practice test - Number sequences and recursion

- 1** Explain the difference between an arithmetic sequence and a geometric sequence. Give an example of each type of sequence as part of your explanation.

What types of lines do they generate?

- 2** The first seven numbers in a Fibonacci sequence are: 1, 1, 2, 3, 5, 8, 13,...

- a** How are the numbers in a Fibonacci sequence made?
b List the first 25 Fibonacci numbers.
c With the aid of your list of Fibonacci numbers, complete the following table.

Every	3rd	Fibonacci number is divisible by	...
...	4th
...	5th
...	6th
...	7th

- d** What do you notice about the list of divisors you have found in the table above?
e Use your answer to part **d** to predict the number which will divide every 8th Fibonacci number. Check that this divisor does divide every 8th Fibonacci number in your list.

a)

b)

c)

d)

e)

3 Without the addition of fertiliser, the annual crop from a potato farm would only be 80% of the previous year's crop. A farm produced 15 tonnes of potatoes in its first year of production. Assume that no fertiliser is used. Give answers correct to two decimal places where necessary.

- a** List the size of the potato crop for each of the first 4 years.
- b** What will be the total potato production for the first 4 years?
- c** In which year would the annual potato crop be less than a third of the crop produced in the first year?

a)

b)

c)

4 a Explain how your calculator can be used to generate the first five terms of the difference equation:

$$I_{n+1} = 3 \times t_n + 4, \quad t_1 = 6$$

b List the first five terms.

a)

b)

- 5 a The following recurrence relation can be used to model a compound interest investment of \$45 000 paying interest compounding at the rate of 7.5% per year.

$$V_0 = 45\,000, \quad V_{n+1} = 1.075V_n$$

Use the recurrence relation to find the value of the investment after 12 years.

- b A car was valued at \$35 000 at the time of purchase. The reducing balance depreciation of the car was 18% per year. The depreciating value of the car can be modeled by the recurrence relation:

$$V_0 = 35\,000, \quad V_{n+1} = 0.92V_n$$

Use the recurrence relation to find the value of the car after 10 years.
