

## 6.D Arithmetic & Geometric Sequences

Date \_\_\_\_\_

Arithmetic Sequence  $\Leftrightarrow$  Constant Difference

Geometric Sequence  $\Leftrightarrow$  Constant Ratio

### General Term:

Arithmetic Sequence:  $u_n = u_1 + (n - 1)d$

Geometric Sequence:  $u_n = u_1 r^{n-1}$

## THE COMPOUND INTEREST FORMULA

We can calculate the value of a compounding investment using the formula

$$u_{n+1} = u_1 \times r^n$$

where  $u_1$  = initial investment  
 $r$  = growth multiplier for each period  
 $n$  = number of compounding periods  
 $u_{n+1}$  = amount after  $n$  compounding periods.

Example: \$5000 is invested for 4 years at 7% per annum (p.a.) compounded annually. What will it amount to at the end of this period (to the nearest cent)?

**Classwork:** Solve each of the following. Determine if they fit the Arithmetic or Geometric model first.

- Valéria joins a social networking website. After 1 week she has 34 online friends. At the end of 2 weeks she has 41 friends, after 3 weeks she has 48 friends, and after 4 weeks she has 55 friends.
  - Show that Valéria's number of friends forms an arithmetic sequence.
  - Assuming the pattern continues, find the number of online friends Valéria will have after 12 weeks.
  - After how many weeks will Valéria have 150 online friends?
- A nest of ants initially contains 500 individuals. The population is increasing by 12% each week.
  - How many ants will there be after:
    - 10 weeks?
    - 20 weeks?
  - Use technology to find how many weeks it will take for the ant population to reach 2000.

3. In each case, determine what the value of  $k$  must be to create the appropriate sequence given the three consecutive terms:

a) Arithmetic sequence given 3 consecutive terms:  $k - 1, 2k + 3, 7 - k$

b) Geometric sequence given 3 consecutive terms:  $k - 1, 2k + 3, 7 - k$

4. **a** What will an investment of \$3000 at 10% p.a. compound interest amount to after 3 years?  
**b** How much of this is interest?
5. How much money must be invested now if you require \$20 000 for a holiday in 4 years' time and the money can be invested at a fixed rate of 7.5% p.a. compounded annually?
6. What will an investment of ¥100 000 amount to after 5 years if it earns 8% p.a. compounded twice annually?