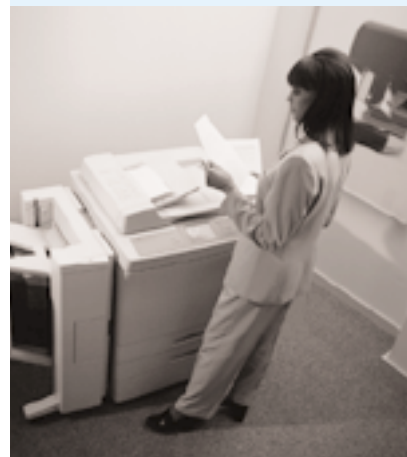


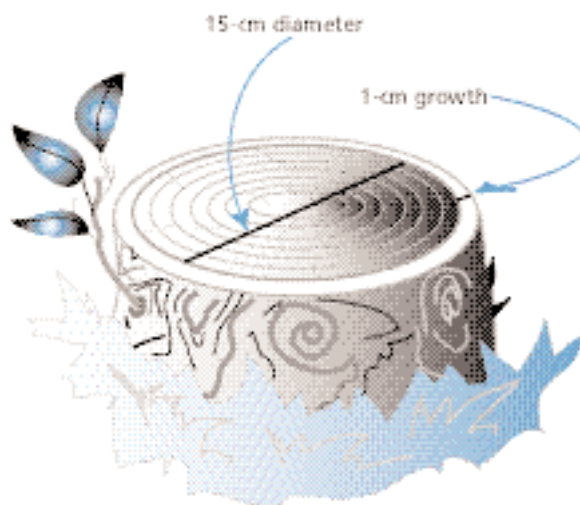
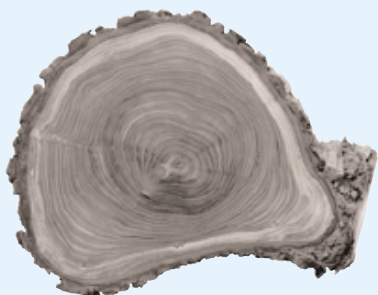
- (a) Create a sequence of 13 terms showing the number of *E. coli* cells after 12 divisions or a time period of four hours.
- (b) Is the sequence in part (a) an arithmetic sequence, a quadratic sequence, a cubic sequence, or a geometric sequence? Explain.
- (c) How many *E. coli* cells can, in theory, be produced in one day?
31. A photograph is placed on a photocopier. The reduction setting is 0.7, which means that the area of the photocopy will be 0.7 or 70% of the area of the original photograph. The reduced photocopy is placed back on the photocopier and another reduced copy is made.
- (a) If the original photograph has an area of  $100 \text{ cm}^2$ , what are the areas of the first and second copies?
- (b) Suppose the last copy is repeatedly placed back on the photocopier and reduced. Write a sequence to show the area of each of the first 10 copies.
- (c) Is the sequence in part (b) an arithmetic sequence, a quadratic sequence, a cubic sequence, or a geometric sequence? Explain.
- (d) Which copy will be the first to have an area less than  $1 \text{ cm}^2$ ?
32. In a compound interest investment, you earn interest on all the interest earned in previous years plus the amount you invested. The following sequence shows the value of an investment of \$1000 earning an annual interest rate of 5% for each of three years: { $\$1050$ ,  $\$1102.50$ ,  $\$1157.63$ }.
- (a) How do you know the sequence is a geometric sequence?
- (b) Find the value of the investment after 10 years.
33. The population of Halifax, Nova Scotia, was about 356 000 in the year 2000. Over the past five years, it has been growing at about 1% each year. If the population continues to grow at this rate, when will it be greater than 400 000?



## Chapter Project

### Plant and Tree Growth

Trees grow in diameter each year. A tree with a diameter of 15 cm adds a ring of 1 cm annually, as shown in the diagram of its cross section.



- Make a sequence of 10 terms to show the diameter of the tree when it is from 1 to 10 years old.
- Make a sequence of 10 terms to show the circumference of the tree when it is from 1 to 10 years old.
- Make a sequence of 10 terms to show the cross-sectional area of the tree when it is from 1 to 10 years old.
- Name each sequence in parts (a), (b), and (c). Explain your decisions.

#### - Note -

Recall that for a circle with radius  $r$  and diameter  $d$ , the following formulas can be used to find the circumference,  $C$ :

$$C = \pi d \text{ or } C = 2\pi r$$

For a circle with radius  $r$  and diameter  $d$ , the following formulas can be used to find the area,  $A$ :

$$A = \frac{1}{4} \pi d^2 \text{ or } A = \pi r^2$$

## PUTTING IT TOGETHER

### CASE STUDY 1: JET FUEL CONSUMPTION

A Boeing 747-400 carries 215 745 L of fuel, making it possible to fly extremely long routes, such as from Los Angeles, U.S.A., to Melbourne, Australia. The plane uses an average of 12 L of fuel per kilometre of travel. The amount of fuel remaining after each kilometre can be expressed as the sequence {215 733, 215 721, 215 709, ...}.

- Continue the sequence for another seven terms.
- Name the type of sequence in part (a) and explain your reasoning.
- Describe a relation to find the  $n^{\text{th}}$  term,  $t_n$ , in the sequence in part (a).
- Use the rule in part (c) to find the number of kilometres that the plane can fly and have 50 000 L of fuel remaining.
- Suppose that the plane had a fuel-tank leak, which continued to worsen over the trip, and the amount of fuel remaining after each kilometre (expressed as a sequence) was {215 733, 212 733, 207 733, 200 733, 191 733, 180 733, 167 733, 152 733, 135 733, 116 733, ...}. Name this new sequence.
- Find the distance that the plane can travel before it runs out of fuel.

### EXTENSION

Jet fuel costs about \$0.50 per litre.

- Make a sequence with 10 terms representing the cost per kilometre.
- Name the type of sequence in part (a) and explain your reasoning.
- Make a rule or relation to find the  $n^{\text{th}}$  term,  $t_n$ .
- Use the rule in part (c) to find the cost of fuel to fly from Los Angeles to Melbourne, a distance of close to 12 791 km.

|     |     |     |
|-----|-----|-----|
| \$5 | \$5 | \$5 |
| \$5 | \$1 | \$5 |
| \$5 | \$5 | \$5 |

|     |     |     |     |
|-----|-----|-----|-----|
| \$5 | \$5 | \$5 | \$5 |
| \$5 | \$1 | \$1 | \$5 |
| \$5 | \$1 | \$1 | \$5 |
| \$5 | \$5 | \$5 | \$5 |

## CASE STUDY 2: TILING COSTS

A company charges \$1 for installing each ordinary tile and \$5 for each edge tile. The installation costs of the first tiling arrangements, shown in the margin, are \$41 and \$64.

- Draw diagrams of the next three tiling arrangements. Find the costs of installing them.
- Make a sequence with five terms showing the costs to install the five tiling arrangements.
- Name the type of sequence made in part (b).
- Use a number pattern to find the cost of the next two tiling arrangements.

## EXTENSION

- Make a sequence of five terms using installation costs of \$5 for each ordinary tile and \$10 for each edge tile.
- Name the type of sequence made in part (a).

# REVIEW

## Key Terms

|   | page |
|---|------|
| arithmetic sequence   | 15   |
| common difference   | 15   |
| cubic sequence  | 25   |
| degree  | 27   |
| Fibonacci number  | 9    |
| Fibonacci sequence  | 9    |
| first-level differences ( $D_1$ ),<br>second-level<br>differences ( $D_2$ ),<br>and so on | 21   |
| geometric sequence  | 30   |
| infinite sequence   | 5    |
| quadratic rule or<br>relation   | 22   |
| quadratic sequence  | 22   |
| sequence  | 2    |
| sequence of differences   | 15   |
| slope   | 4    |
| term  | 2    |
| $t_n$ , the $n^{\text{th}}$ term of a<br>sequence   | 19   |

## You Will Be Expected To

- Use sequences of differences and graphing to name arithmetic, geometric, quadratic, cubic, and other types of sequences.
- Define and state some properties of the Fibonacci sequence.
- Solve problems by looking for patterns and extending them.
- Explain the relationship between the sequences of differences and the degree of a power sequence.
- Explain the relationship between  $D_1$ , the sequence of first-level differences, and the slope of the graph of the linear relation building an arithmetic sequence.
- Use patterns,  $D_1$ , or the slope of a graph to make a rule or relation to build arithmetic sequences.
- Examine the relationship between geometric sequences and see that the terms of the geometric relationship are found by multiplying the previous term by a common (constant) value.

## Summary of Key Concepts

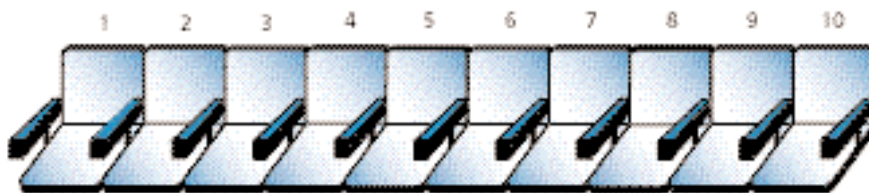
### 1.1 Patterns in Sequences

You saw patterns in the numbers in a sequence and used these patterns to solve problems. You drew diagrams, made organized lists, and solved simpler problems in order to see a pattern. Once the pattern was seen, it was extended to solve another problem.

You also looked at the properties of the Fibonacci sequence. The Fibonacci sequence has the initial terms 1 and 1, and is extended by adding the two previous terms to find the next. For example, the first five terms are  $\{1, 1, 2, 3, 5, \dots\}$ , where each term is the sum of the previous two terms.

#### Example 1

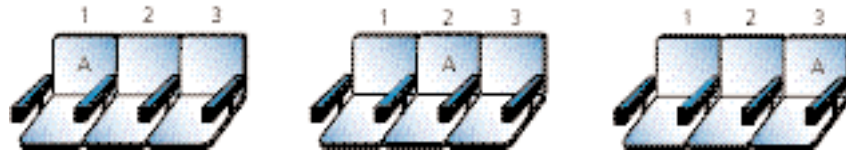
In how many different ways can two people sit in a row of hockey arena seats numbered from 1 to 10?



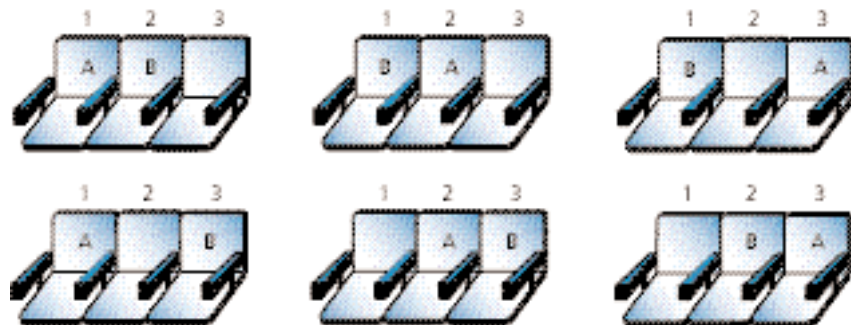
**Solution**

You can simplify the problem by using a smaller number of seats.

- (a) If there are two seats, two people have two ways to sit.
- (b) If there are three seats, Person A has three choices.



Once Person A chooses a seat, Person B has only two choices.



There are  $3 \times 2 = 6$  possible ways for two people to sit in three seats.

- (c) You can draw more diagrams, list the number of ways to sit two people, and make a table or a sequence. Notice the patterns in the table.

$$2 \times 3 = 6$$

|                   |   |   |    |    |   |   |   |   |    |
|-------------------|---|---|----|----|---|---|---|---|----|
| Seats             | 2 | 3 | 4  | 5  | 6 | 7 | 8 | 9 | 10 |
| Ways for 2 to sit | 2 | 6 | 12 | 20 |   |   |   |   |    |

$$3 \times 4 = 12$$

|                   |   |   |    |    |   |   |   |   |    |
|-------------------|---|---|----|----|---|---|---|---|----|
| Seats             | 2 | 3 | 4  | 5  | 6 | 7 | 8 | 9 | 10 |
| Ways for 2 to sit | 2 | 6 | 12 | 20 |   |   |   |   |    |

$$4 \times 5 = 20$$

|                   |   |   |    |    |   |   |   |   |    |
|-------------------|---|---|----|----|---|---|---|---|----|
| Seats             | 2 | 3 | 4  | 5  | 6 | 7 | 8 | 9 | 10 |
| Ways for 2 to sit | 2 | 6 | 12 | 20 |   |   |   |   |    |

These patterns can be used to complete the table.

$$5 \times 6 = 30, 6 \times 7 = 42, 7 \times 8 = 56, 8 \times 9 = 72, 9 \times 10 = 90$$

|                   |   |   |    |    |    |    |    |    |    |
|-------------------|---|---|----|----|----|----|----|----|----|
| Seats             | 2 | 3 | 4  | 5  | 6  | 7  | 8  | 9  | 10 |
| Ways for 2 to sit | 2 | 6 | 12 | 20 | 30 | 42 | 56 | 72 | 90 |

The table shows that there are 90 ways for two people to sit in a row of 10 hockey seats.

- (d) You could also think that Person A has 10 seats to choose from, while Person B has 9 seats to choose from. Therefore, there are  $10 \times 9 = 90$  ways for two people to sit in a row of 10 hockey seats.
- (e) You can use the pattern to make a rule to find the number of ways for two people to sit in any number of seats: in this case,  $w = n(n - 1)$ , where  $n$  is the number of arena seats and  $w$  is the number of ways to seat two people. This rule shows that if  $n = 10$ ,  $w = (10)(9) = 90$ . Therefore, two people have 90 different ways to sit in a row of 10 hockey seats.

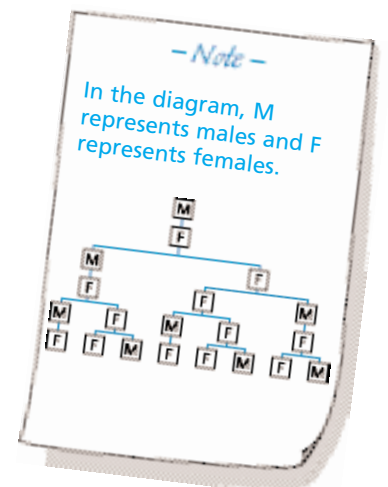
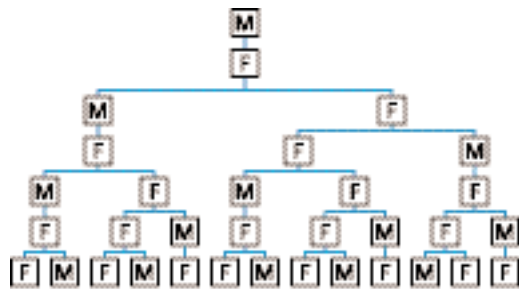
### Example 2

A male bee (M) has only one parent, his mother, whereas a female bee (F) has both a father and a mother. The family tree in the margin shows the number of *ancestors* (or members of past generations) of a male bee.

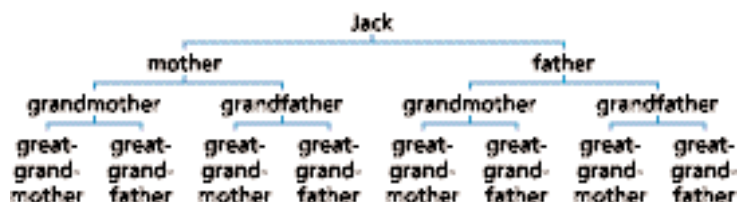
- (a) Extend the family tree to the next generation of ancestors.
- (b) Write the number of bees in each past generation as a sequence, with  $t_1$  equal to 1, the male bee at the top of the family tree.
- (c) Name the sequence that you created in part (a).
- (d) How would a sequence describing the ancestors of a person be different from that of the male bee?

### Solution

(a)



- (b) {1, 1, 2, 3, 5, 8, 13, ...}
- (c) The sequence is a Fibonacci sequence because each term is the sum of the two previous terms, and the first two terms are 1 and 1.
- (d) The sequence would be {1, 2, 4, 8, ...}, which is neither a Fibonacci sequence nor an arithmetic sequence.



### 1.2 Number Patterns: Part 1

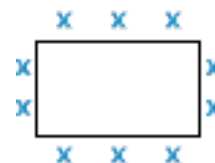
You have looked at sequences and how values in a sequence are connected. You have used some of these patterns to create rules to help you make predictions.

You can use sequences of common differences to find the type of rule used to make terms in a sequence. For example, if you subtract consecutive terms in a sequence and the values are always the same, then the sequence is arithmetic. The first-level common difference,  $D_1$ , equals the slope of the graph of the linear relation or rule used to make the arithmetic sequence. You can use a pattern,  $D_1$ , or the slope of the graph to find the rule that builds an arithmetic sequence.

#### Example 3

In the school cafeteria, 10 people can sit together at one rectangular table.

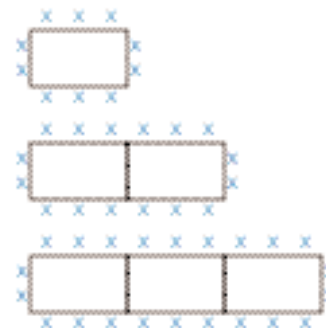
When two tables are pushed end to end, 16 people can sit together.



- (a) Draw diagrams and write a sequence with 10 terms to show the number of people who can sit together when 1 to 10 tables are placed end to end.
- (b) Name the type of sequence that you created in part (a).
- (c) Find the rule or relation used to build the sequence.
- (d) How many people can sit at 30 tables placed end to end?
- (e) Repeat parts (a) to (d) by putting the tables side by side instead of end to end.

**Solution**

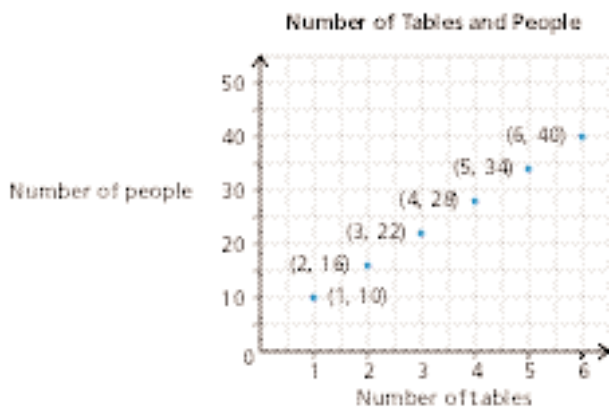
- (a) The sequence is {10, 16, 22, 28, 34, 40, 46, 52, 58, 64}.
- (b) Each time one table is added, two seats are lost from the next table and, therefore, six seats are added for each table between the end tables. The sequence of first-level differences,  $D_1$ , is a constant, 6, and so the sequence must be an arithmetic sequence.
- (c) A rule or relation can be found by using the common difference, 6, and the initial term, 10, as shown.



and so on

$$\begin{aligned}
 t_1 &= 10 + (0 \times 6) \\
 t_2 &= 10 + (1 \times 6) \\
 t_3 &= 10 + (2 \times 6) \\
 t_4 &= 10 + (3 \times 6) \\
 t_5 &= 10 + (4 \times 6) \\
 t_n &= 10 + (n - 1) \times 6 \quad \text{or} \quad t_n = 4 + 6n
 \end{aligned}$$

You can also graph the sequence and find the slope, which is equal to  $D_1$ .



$$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{16 - 10}{1} = 6$$

The rule can be stated simply as *keep adding 6 to the first term, 10*. More formally, the rule is *add  $n - 1$  increases of 6 to the first term, 10*, which can be written in symbols as

$$t_n = 10 + (n - 1) \times 6 \quad \text{or} \quad t_n = 4 + 6n.$$

- (d) The number of people who can sit at 30 tables can be found by reasoning that 10 people sit at the first table and then 29 tables, each sitting 6 people, would be added:  $10 + 29 \times 6 = 184$ . Or, we can use the rule created in part (c): The number of people who can sit at 30 tables can be found by substituting 30 for  $n$  in the relation

$$\begin{aligned}
 t_n &= 4 + 6n: \\
 t_{30} &= 4 + (6 \times 30) = 184
 \end{aligned}$$

- (e) Using similar reasoning and calculations, the side-by-side table group gives the sequence  $\{10, 14, 18, 22, 26, 30, 34, 38, 42, 46\}$ . The sequence has  $D_1 = 4$  and is, therefore, an arithmetic sequence. The rule building the sequence is  $t_n = 6 + 4n$ .

The number of people who can sit at 30 tables can be found by reasoning that 10 people sit at the first table and then 29 tables, each sitting 4 people, would be added:  $10 + 29 \times 4 = 126$ .

The number of people who can sit together at 30 tables placed side by side can also be solved using the rule  $t_n = 6 + 4n$ :

$$t_{30} = 6 + (4 \times 30) = 126.$$

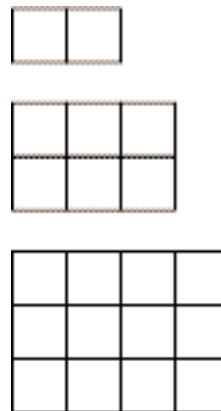
### 1.3 Number Patterns: Part 2

If you subtract consecutive terms and the answers are not constant, then you can form a new sequence of differences. If you subtract the consecutive terms again and the answers are all the same, the original sequence is a quadratic sequence and the terms can be found using a quadratic rule or relation. The second set of answers is called the sequence of second-level differences,  $D_2$ .

If  $D_2$  is not constant, you can keep subtracting consecutive terms to make  $D_3$ , and so on. If any of these sequences contains the same number, a power sequence such as a cubic sequence has been identified.

#### Example 4

Squares are joined together to make rectangles of different areas. The areas of the rectangles are used to build a number sequence:  $\{2, 6, 12\}$ .



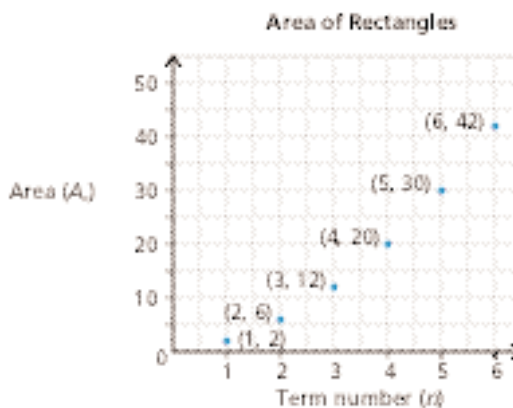
- (a) Find the areas of the next three rectangles and write them as the next three terms in the sequence.
- (b) Name the type of sequence in part (a).

### Solution

(a) The areas of the next three rectangles are 20, 30, and 42, and the sequence is  $\{2, 6, 12, 20, 30, 42\}$ .

(b) Graphing shows that the sequence is not an arithmetic sequence but may be a quadratic sequence.

The sequence of first-level differences,  $D_1$ , is  $\{4, 6, 8, 10, 12\}$ , and the sequence of common second-level differences,  $D_2$ , is  $\{2, 2, 2, 2\}$ . The constant term 2 in  $D_2$  means that the original sequence is a quadratic sequence.



Some patterns in nature can be used to build sequences that are neither arithmetic, quadratic, nor cubic sequences. Often, sequences such as the following are geometric sequences. In a geometric sequence, each term is multiplied by the same number to give the next term. In the following sequence, each term is multiplied by three to find the new term:  $\{2, 6, 18, 54, 162, \dots\}$

### Example 5

Jack wants to trace his family tree back five generations, to his great-great-great-grandparents. He has made a start by asking his parents for the names of their parents and grandparents. Now his family tree looks like the diagram of human ancestors on page 38.

- (a) Each time Jack goes back one generation, how does the number of his ancestors in that generation increase? Is the sequence on page 38 a geometric sequence? Explain.
- (b) Extend the sequence to six terms. How many great-great-great-grandparents are there in Jack's family tree?

### Solution

(a) The number of ancestors in each generation doubles, since each ancestor has two parents. Each term in the sequence  $\{1, 2, 4, 8, \dots\}$  is multiplied by the same number to get the next term. Therefore, the sequence is a geometric sequence.

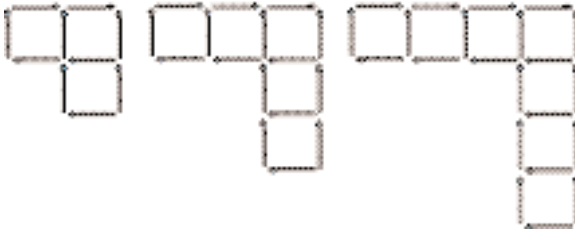
(b) The sequence extended to six terms is  $\{1, 2, 4, 8, 16, 32\}$ . There are 32 great-great-great-grandparents in Jack's family tree.

# PRACTICE

## 1.1 Patterns in Sequences

- A bus, empty except for the driver, picks up five passengers at Stop 1, drops off two passengers at Stop 2, picks up five passengers at Stop 3, drops off two passengers at Stop 4, and so on.
  - Write the number of passengers on the bus as a sequence of 10 terms with the first term equal to 5.
  - Describe any patterns that you notice.
  - Describe what you notice about the value of the odd-numbered terms:  $t_1, t_3, t_5,$  and so on.
  - Describe what you notice about the value of the even-numbered terms:  $t_2, t_4, t_6,$  and so on.
  - How many passengers will be on the bus at Stop 16?
  - At what stop will the bus carry 48 passengers?

- Write a sequence using the numbers of matchsticks that make each of the three figures.



- Draw the next figure. Count the matchsticks to find another term in the sequence.
- Describe any patterns that you notice.
- Use a pattern to find the number of matchsticks needed to form the 100<sup>th</sup> figure.

- The number of ways that the numbers 1 and 2 can be combined to form the numbers 1 to 4 is shown. (Assume that the order of the numbers 1 and 2 matters.)

$$\begin{array}{ll}
 1 = 1 & 1 \text{ way} \\
 2 = 1 + 1, 2 & 2 \text{ ways} \\
 3 = 1 + 1 + 1, 2 + 1, 1 + 2 & 3 \text{ ways} \\
 4 = 1 + 1 + 1 + 1, 1 + 1 + 2, \\
 \quad 1 + 2 + 1, 2 + 1 + 1, 2 + 2 & 5 \text{ ways}
 \end{array}$$

- Describe any patterns that you notice in the number of ways to use 1 and 2 to make numbers.
- Predict the number of ways that 1 and 2 can be combined to make these numbers.
  - 5
  - 6
  - 7
- If the number of ways to combine 1 and 2 to make numbers is written as a sequence, what type of sequence is it like?

## 1.2 Number Patterns: Part 1

- Make sequences by choosing
  - all numbers in any column
  - all numbers that lie along any diagonal
  - all numbers in any row

|    |    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|----|
| 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 |
| 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 |
| 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 |
| 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 |

- Explain why each sequence is arithmetic.
- Write a relation to describe each arithmetic sequence.

5. A sequence is made by starting with 4 and then adding 7 each time: {4, 11, 18, ...}.
- Explain why the sequence is an arithmetic sequence.
  - Create a rule to find  $t_n$ , the  $n^{\text{th}}$  term in the sequence, and use the rule to find  $t_{50}$ .
  - Which term number has a value slightly greater than 1000? Explain your thinking.
6. One-dollar coins are stacked on top of each other to form coin towers. Tower 1 has five coins. Every new tower has eight more coins than the previous one.
- Explain why the dollar-values of the towers form an arithmetic sequence.
  - What is the value in dollars of the 20<sup>th</sup> tower?
  - Which tower will be the first to be worth more than \$1000?
  - Describe the shape of the graph of the value of the tower versus the tower number.
  - Explain how the answers to parts (a) to (d) would change if the towers used two-dollar coins instead of one-dollar coins.
7. Jack had a party. The first time the doorbell rang, four guests entered. On each ring after that, two more guests arrived.
- For each ring, write the total number of guests as a sequence. What type of sequence is it? Explain.
  - How many guests will have arrived at the party after 10 rings?
8. Jack began his exercise with 20 sit-ups a day. Each day, he planned to increase the number of sit-ups by 3.
- How many sit-ups will he have to do to meet his goal on the 30<sup>th</sup> day?
  - On what day does he expect to do just over 500 sit-ups?

9. The following figures are wooden cubes that have been glued together. All exposed square faces, including those on the bottom of each block, are to be painted.



- Write, as a sequence, the number of square faces to be painted in each figure.
  - Look for a pattern to extend the sequence to 10 terms.
  - Name the type of sequence in part (b).
  - Find a rule or relation to get  $t_n$ , the  $n^{\text{th}}$  term in the sequence.
  - Use the rule or relation to find the number of square faces to be painted in the 20<sup>th</sup> figure.
  - Which figure has 98 square faces to be painted?
10. Name each arithmetic sequence and explain your thinking.
- {2, 16, 54, 128, 250, 432, 686, ...}
  - {51, 52, 53, 54, 55, 56, ...}
  - {-9, -7, -5, -3, -1, 1, 3, ...}
  - {1, 2, 4, 8, 16, 32, 64, ...}
  - $\left\{ \frac{1}{2}, 2\frac{1}{2}, 4\frac{1}{2}, 6\frac{1}{2}, 8\frac{1}{2}, 10\frac{1}{2}, 12\frac{1}{2}, 14\frac{1}{2}, \dots \right\}$
  - {0.3, -4.7, -9.7, -14.7, -19.7, -24.7, ...}
11. (a) For each arithmetic sequence that you identified in Question 10, find the rule or relation used to build the sequence.
- (b) Use each rule or relation in part (a) to find  $t_{50}$ .
12. Make arithmetic sequences of at least five terms where
- $t_1 = 4$  and  $D_1 = -3$
  - $t_2 = 10$  and  $D_1 = 3.5$
  - $t_3 = -4$  and  $D_1 = -2$
  - $t_5 = 4\frac{1}{2}$  and  $D_1 = \frac{3}{4}$

### 1.3 Number Patterns: Part 2

13. Each of the triangles is made from the smallest triangle in the diagram.



- (a) Make a sequence showing the number of small triangles in each larger triangle.  
 (b) Describe any patterns that you notice.  
 (c) Use a pattern to predict the number of small triangles in the 100<sup>th</sup> triangle.
14. In a round-robin tournament, each competing team is to play with every other team.
- (a) Copy and complete the following table to find the number of games that would have to be planned for a round-robin tournament with 10 teams.

|                 |   |   |   |   |   |   |   |   |    |
|-----------------|---|---|---|---|---|---|---|---|----|
| Number of teams | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Number of games | 1 | 3 |   |   |   |   |   |   |    |

- (b) Describe any number patterns that you see. Explain how these patterns can be used to find the number of games for 20 teams.
- (c) Write the numbers in the second row of the table as a sequence. Do the numbers make an arithmetic, quadratic, Fibonacci, or some other type of sequence? How do you know?
- (d) Use a pattern to find a rule for the sequence in part (c).
- (e) The 1999–2000 National Hockey League season had 1148 games for its 28 teams. Use the rule in part (d) to find the number of games if each hockey team played each other team only once.
15. The first term of a sequence is 3 and the sequence of first-level differences is {2, 4, 6, 8, ...}.
- (a) Find the first six terms of the sequence.  
 (b) Explain why the sequence in part (a) is not an arithmetic sequence.  
 (c) Name the sequence in part (a).
16. A person writes and sends an e-mail message to four people. The next day, these four people each forward the e-mail message to four other people. This process continues each day.
- (a) Write the first six terms of the sequence in which each term is the number of people who receive this e-mail message each day.  
 (b) Is the sequence in part (a) a Fibonacci sequence, arithmetic sequence, quadratic sequence, cubic sequence, or geometric sequence?
17. A wise man asked a king to pay him in grains of rice instead of gold. He wanted one grain of rice placed on the first square of a chessboard, two grains placed on the second square, four grains placed on the third square, and so on for all 64 squares.
- (a) Write a sequence of 10 terms where each term is the number of grains of rice on a square.  
 (b) Is the sequence in part (a) an arithmetic sequence, a quadratic sequence, a cubic sequence, or a geometric sequence? Explain.  
 (c) How many grains of rice would be placed on the 64<sup>th</sup> square?  
 (d) Repeat parts (a) to (c), assuming that the wise man wanted the amount on each next square to be tripled instead of doubled.