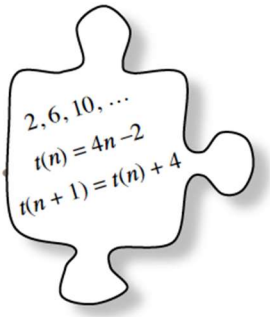
0.13 How else can I write the equation?



Recursive Sequences

In this chapter you have been writing equations for arithmetic sequences so that you could find the value of any term in the sequence, such as the 100th term, directly. Today you will investigate recursive sequences. A term in a recursive sequence depends on the term(s) before it.

- **1.** Look at the following sequence:

  –8, –2, 4, 10, …

  a. What are two ways that you could find the 10th term of the sequence? What is the 10th term?
  b. If you have not done so already, write an equation that lets you find the value of any term $t(n)$. This kind of equation is called an **explicit equation**.
  c. The next term after $t(n)$ is called $t(n + 1)$. Write an equation to find $t(n + 1)$ if you know what $t(n)$ is. An equation that depends on knowing other terms is called a **recursive equation**.

- **2.** Alejandro used the recursive equation from part (c) of problem A-72 to write a sequence and came up with the following sequence:

  0, 6, 12, 18, 24

  a. Does Alejandro's sequence match the recursive equation from problem 1?
  b. Why did Alejandro get a different sequence than the one from problem 1? How can you mathematically write down the information he needs so that he can write the correct sequence?

- **3.** The Fibonacci sequence is a famous sequence that appears many times in mathematics. It can describe patterns found in nature, such as the number of petals on flowers, the arrangements of seeds in sunflowers, or scales on pinecones. It is named after Leonardo of Pisa, who was known as Fibonacci. He introduced the sequence to Western European mathematicians in 1202, though it had been described earlier by others including mathematicians in India.

  The equation that describes the Fibonacci sequence can be written as:

  $t(1) = 1$
  $t(2) = 1$
  $t(n + 1) = t(n) + t(n – 1)$

  a. Write the first 10 terms of the Fibonacci sequence.
  b. Is the Fibonacci sequence arithmetic, geometric, or neither?
  c. Describe what you would need to do in order to find the 100th term of the Fibonacci sequence. Do not actually calculate the 100th term.