

NEW OUTCOME: Analyze and make predictions about arithmetic and geometric sequences and series.

**TASK:** Creating and using rules for sequences and series

1. Practice ranges for professional golfers often stack the balls in a pyramid as shown. Answer the question below to help you write a rule for the sequence that represents the number of balls in each row of the front triangular face of the pyramid and then write a rule for the sequence that gives the total number of balls in each layer.



From the top down, the number of balls on the front face is the sequence 1, 2, 3, 4, 5. So, starting at the top with  $n = 1$ , a rule for the sequence is simply  $a(n) = n$  or  $a_n = n$ .

(a) To write a sequence representing the number of balls in each layer, start at the top again with  $n = 1$ . Write the missing coordinates in the ordered pairs in the sequence below.

(1, \_\_\_\_), (2, \_\_\_\_), (3, \_\_\_\_), (4, \_\_\_\_), (5, \_\_\_\_)

(b) The number of balls in each layer is the square of the layer number. The rule for the sequence is  $a(n) = n^2$ . Create a summation by filling in the missing information in each box below.

$$\begin{array}{c} \square \\ \sum \\ k = \square \end{array} \square$$

2. A sequence is defined by the equation  $a(n) = 2n - 1$ .

(a) Find the first three terms of this sequence, denoted by  $a_1, a_2, a_3$ .

(b) Which term has a value of 53?

(c) Explain why there will not be a term that has a value of 70.

3. Write the series for each using sigma notation:

(a)  $12 + 34 + 36 + 48 + 60 + 72$

(b)  $14 + 8 + 2 - 4 - 10 - 16$

4. The first show made in a game earns 1 point. The next made shots are worth 4, 7, 10, ... etc. How many points are scored after the first 12 successful shots?