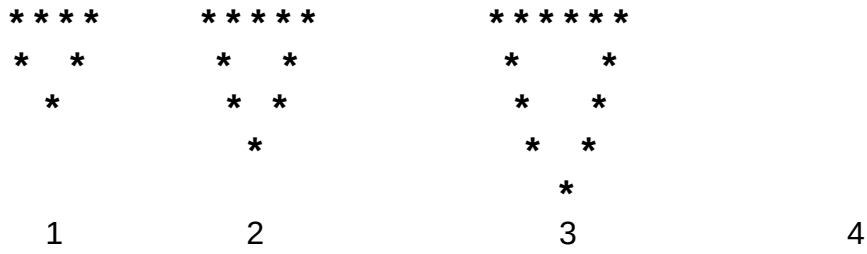
Sequences

A sequence is an ordered list of objects, numbers or events. Young children learn about patterns, which are simple sequences. A repeating pattern can be made of objects, pictures, sounds, or actions. For instance, the pattern of the Macarena is a fun dance. Below is a sequence of young children that has a repeat pattern of 11 children.

Patterns may follow an ABABAB… sequence, or a growing sequence, or other types of sequences. The Fibonacci sequence is one example of a number sequence. Picture sequences can model number sequences. For example, below is a sequence of geometric figures where the number of asterisks needed per figure is increasing. The number below each figure is the figure number, or ordinal count (first, second, third, etc figure).



Draw the fourth figure in the sequence. How many asterisks will you need? Consider what is staying the same and what is changing between each picture in the sequence. Fill in the following table and then determine the formula that will predict the number of asterisks needed to make the *n*th figure in the sequence.

Figure #	# of asterisks	Pattern of change
1	7	
2		
3		
4		
⋮	⋮	
n		

The number of asterisks in the table forms a sequence of numbers. This sequence can go on infinitely. List the first six numbers in the sequence below, separated by commas. Put the “infinitely long” symbol at the end (…)

Arithmetic sequences – these sequences of numbers have a constant difference between the numbers in the list. That means that in between numbers in the list you are adding (or subtracting) the same number over and over. For example, the set of even numbers below has a constant difference of two:

0, 2, 4, 6, 8, 10, 12, … start at zero, add two over and over

Geometric sequences – these sequences of numbers have a constant ratio between the numbers in the list. That means that each number is multiplied by the same ratio (number) to get the next number. For example, the following set of tripling numbers has a constant ratio of three:

4, 12, 36, 108, … start a four, multiply by four over and over

Other sequences – other sequences exist; they may be patterned on square numbers, or have a growing difference, or a visual pattern that we can “see-and-say” but not find a formula for. The Fibonacci sequence is an example of an “other” sequence. What is the pattern in the following sequence?

14, 15, 17, 20, 24, 29, …