

PATTERNS, CONTINUED: RECURSIVE FORMULAS

A **recursive formula** is one that uses the current value and a rule to find the next number in a pattern.

Example: If the first number in a pattern is 4 and to find the next value you add 7, the pattern is as follows: 4, 11, 18, 25, 32 ...

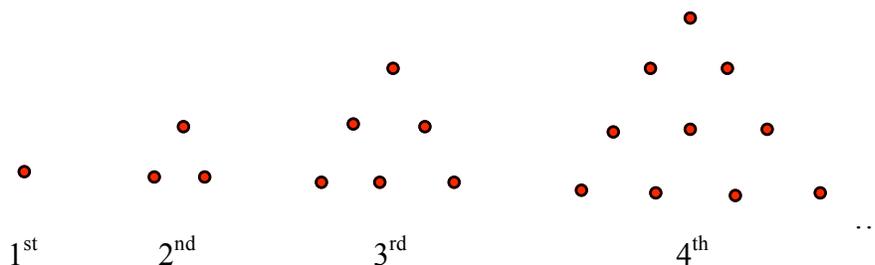
In each case, we use the current value and add 7 to find the next value.

Symbolically, we write this as: the $(n-1)^{\text{st}}$ term + 7 = the n^{th} term.

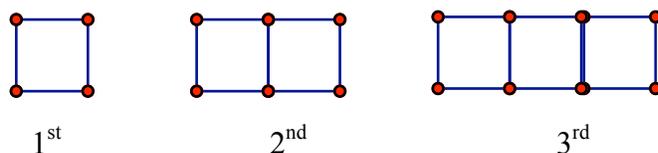
So for our example, the 6th term is the 5th term plus 7, that is, $39 = 32 + 7$.

How can this method be used to find the 10th value in the pattern in the example above?

1. Recall extending this pattern of dots previously.
 - a. If we know there are 21 dots in the 6th object, how many would there be in the 7th object?
 - b. How did you figure this out?
 - c. Describe in words how to find the number of dots in the next object given the number of dots in the current object.
 - d. Now write the statement you created in Part (c) using symbols.



2. Describe the pattern of the square trains below.
 - a. How many “external sides” are there in each of these trains?
 - b. If we know there are 12 sides in the 5th train, how many “external sides” would there be in the 6th train?
 - c. How did you figure this out?
 - d. Describe in words how to find the number of “external sides” in the next object given the number of “external sides” in the current object.
 - e. Now write the statement you created in Part (d) using symbols.
 - f. Answer the same questions again, this time counting *all* sides (so the 5th train has 16 sides).



3. Answer the same questions as in Problem 2 for the hexagon trains in the figure below.

