WRITING RULES If the terms of a sequence have a recognizable pattern, then you may be able to write a rule for the nth term of the sequence.

EXAMPLE 2 Write rules for sequences

WRITE RULES
If you are given only the first several terms of a sequence, there is no *single* rule for the nth term. For instance, the sequence 2, 4, 8, . . . can be given by $a_n = 2^n$ or $a_n = n^2 - n + 2$.

Describe the pattern, write the next term, and write a rule for the nth term of the sequence (a) $-1, -8, -27, -64, \ldots$ and (b) $0, 2, 6, 12, \ldots$.

Solution

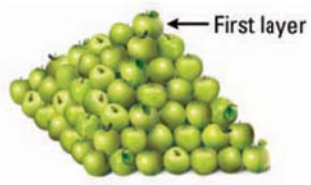
a. You can write the terms as $(-1)^3, (-2)^3, (-3)^3, (-4)^3, \ldots$. The next term is $a_5 = (-5)^3 = -125$. A rule for the nth term is $a_n = (-n)^3$.

b. You can write the terms as $0(1), 1(2), 2(3), 3(4), \ldots$. The next term is $f(5) = 4(5) = 20$. A rule for the nth term is $f(n) = (n - 1)n$.

GRAPHING SEQUENCES To graph a sequence, let the horizontal axis represent the position numbers (the domain) and the vertical axis represent the terms (the range).

EXAMPLE 3 TAKS REASONING: Multi-Step Problem

RETAIL DISPLAYS You work in a grocery store and are stacking apples in the shape of a square pyramid with 7 layers. Write a rule for the number of apples in each layer. Then graph the sequence.



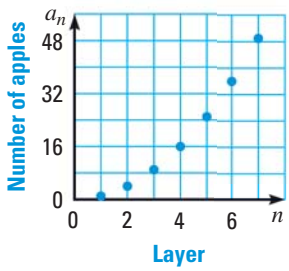
Solution

STEP 1 **Make** a table showing the number of fruit in the first three layers. Let a_n represent the number of apples in layer n.

Layer, n	1	2	3
Number of apples, a_n	$1 = 1^2$	$4 = 2^2$	$9 = 3^2$

STEP 2 **Write** a rule for the number of apples in each layer. From the table, you can see that $a_n = n^2$.

STEP 3 **Plot** the points $(1, 1), (2, 4), (3, 9), \ldots, (7, 49)$. The graph is shown at the right.



AVOID ERRORS
Although the plotted points in Example 3 follow a curve, do *not* draw the curve because the sequence is defined only for integer values of n.

GUIDED PRACTICE for Examples 2 and 3

4. For the sequence $3, 8, 15, 24, \ldots$, describe the pattern, write the next term, graph the first five terms, and write a rule for the nth term.

5. WHAT IF? In Example 3, suppose there are 9 layers of apples. How many apples are in the 9th layer?