EXAMPLE 2 Write a rule for the *n*th term

Write a rule for the *n*th term of the sequence. Then find a_7.

a. 4, 20, 100, 500, . . .

b. 152, −76, 38, −19, . . .

Solution

a. The sequence is geometric with first term $a_1 = 4$ and common ratio $r = \frac{20}{4} = 5$. So, a rule for the nth term is:

$a_n = a_1 r^{n-1}$ Write general rule.

$= 4(5)^{n-1}$ Substitute 4 for a_1 and 5 for r.

The 7th term is $a_7 = 4(5)^{7-1} = 62{,}500$.

AVOID ERRORS
In the general rule for a geometric sequence, note that the exponent is $n - 1$, not n.

b. The sequence is geometric with first term $a_1 = 152$ and common ratio $r = \frac{-76}{152} = -\frac{1}{2}$. So, a rule for the nth term is:

$a_n = a_1 r^{n-1}$ Write general rule.

$= 152\left(-\frac{1}{2}\right)^{n-1}$ Substitute 152 for a_1 and $-\frac{1}{2}$ for r.

The 7th term is $a_7 = 152\left(-\frac{1}{2}\right)^{7-1} = \frac{19}{8}$.

EXAMPLE 3 Write a rule given a term and common ratio

One term of a geometric sequence is $a_4 = 12$. The common ratio is $r = 2$.

a. Write a rule for the nth term.

b. Graph the sequence.

Solution

a. Use the general rule to find the first term.

$a_n = a_1 r^{n-1}$ Write general rule.

$a_4 = a_1 r^{4-1}$ Substitute 4 for n.

$12 = a_1(2)^3$ Substitute 12 for a_4 and 2 for r.

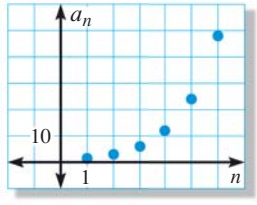
$1.5 = a_1$ Solve for a_1.

So, a rule for the nth term is:

$a_n = a_1 r^{n-1}$ Write general rule.

$= 1.5(2)^{n-1}$ Substitute 1.5 for a_1 and 2 for r.

b. Create a table of values for the sequence. The graph of the first 6 terms of the sequence is shown. Notice that the points lie on an exponential curve. This is true for *any* geometric sequence with $r > 0$.



n	1	2	3	4	5	6
a_n	1.5	3	6	12	24	48

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