

12. Geometric Sequences

Explicit: $a_n = a_1 \cdot r^{n-1}$

Recursive: $a_1 = \underline{\hspace{2cm}}$
 $a_n = r(a_{n-1})$

You must always know your first term and the common ratio to write an explicit formula!

a. Create an explicit and recursive formula for the following:

2, 6, 18, 54, ...

$a_1 = 2$ $r = 3$
 Explicit: $a_n = 2(3)^{n-1}$

Recursive: $a_1 = 2$
 $a_n = 3(a_{n-1})$

b. Create an explicit and recursive formula for the following:

81, 27, 9, 3, ...

$a_1 = 81$ $r = 1/3$
 Explicit: $a_n = 81(1/3)^{n-1}$

Recursive: $a_1 = 81$
 $a_n = \frac{1}{3}(a_{n-1})$

c. Determine the 12th term in the sequence: 5, 15, 45, ...

$a_1 = 5$ $r = 3$
 $a_n = 5(3)^{n-1}$

$a_{12} = 5(3)^{12-1}$

$a_{12} = 885,735$

d. Determine the 10th term in the sequence: 0.1, 0.5, 2.5, ...

$a_1 = 0.1$ $r = 5$
 $a_n = 0.1(5)^{n-1}$

$a_{10} = 0.1(5)^{10-1}$

$a_{10} = 195,312.5$

e. Determine the first five terms of the sequence: $a_n = -2 \cdot 3^{n-1}$

-2, -6, -18, -54, -162

f. Determine the first five terms of the sequence: $a_1 = 6$
 $a_n = \frac{1}{2}(a_{n-1})$

6, 3, 1.5, .75, .375

g. Write the explicit formula given the following:

$a_4 = 192$ and $a_5 = 768$

1 2 3 4 5
 3 12 48 192 768
 $\times 4$ $\times 4$ $\times 4$ $\times 4$

$a_n = 3(4)^{n-1}$

h. Write the explicit formula given the following:

$a_2 = -6$ and $a_3 = -18$

1 2 3
 2 -6 -18
 $\times 3$ $\times 3$

$a_n = -2(3)^{n-1}$