Geometric Sequences

Write and explicit rule that describes the number of items used to construct the pattern in terms of the term number, *n*.

1.

SOLUTION:

The first one has 1 block.

The second one has 4 blocks.

The third one has 9 blocks.

1, 4, 9, … the number of blocks is equal to n^2

ANSWER:

n^2

For questions 7 and 8, use the following situation.

Science

Roger dropped a ball from a height of 1000 centimeters. The height of the ball is 80% of the previous height after each bounce of the ball. Roger can create a geometric sequence that shows the height of the ball at the end of each bounce.

800, 640, 512, 409.6, …

7. What is the height of the ball after the 5^{th} bounce?

SOLUTION:

"The height of the ball is 80% of the previous height after each bounce of the ball." Therefore, to get the next height, multiply the previous height by 80%.

409.6 is height #4, so to get height #5, multiply 409.6 by 80%

409.6 * .8 = 327.68 centimeters

ANSWER:

327.68 centimeters

8. Write a function rule that describes the height of the ball, $f(n)$, after the number of bounces, n, the ball makes.

SOLUTION:

$a_1 = 800$, r = 0.8

$f(n) = a_1 * r^{n-1}$

$f(n) = 800 * 0.8^{n-1}$

ANSWER:

$f(n) = 800 * 0.8^{n-1}$

Write a recursive rule and an explicit rule.

12. 2, 6, 18, 54, 162, …

SOLUTION:

Recursive: each number results from multiplying 3 to the previous number, and the first number, $a_1 = 2$. So, $a_n = 3a_{n-1}$.

Explicit: the difference between each number is 3, but the first number is 2. So, $a_n = 2 * 3^{n-1}$,

ANSWER:

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

Explicit: $a_n = 2 * 3^{n-1}$

14. 1.5, 7.5, 37.5, 187.5, …

SOLUTION:

Recursive: each number results from multiplying 5 to the previous number, and the first number, $a_1 = 1.5$. So, $a_n = 5a_{n-1}$.

Explicit: the difference between each number is 5, but the first number is 1.5. So, $a_n = 1.5 * 5^{n-1}$.

ANSWER:

Recursive: $a_1 = 1.5$; $a_n = 5a_{n-1}$

Explicit: $a_n = 1.5 * 5^{n-1}$

15. 64, 16, 4, 1, 0.25, …

SOLUTION:

Recursive: each number results from dividing 4 into the previous number, and the first number, $a_1 = 64$. So, $a_n = \frac{1}{4}a_{n-1}$.

Explicit: the difference between each number is $\frac{1}{4}$, but the first number is 64. So, $a_n = 64 * (\frac{1}{4})^{n-1}$.

ANSWER:

Recursive: $a_1 = 64$; $a_n = \frac{1}{4}a_{n-1}$.

Explicit: $a_n = 64 * (\frac{1}{4})^{n-1}$

For each recursive and explicit rule given below, write the first 4 terms in the sequence.

18. $a_1 = 3$; $a_n = 4a_{n-1}$

$a_n = 3 * 4^{n-1}$

SOLUTION:

$a_1 = 3$, and the common ratio is 4, so 3*4 = 12, 12*4 = 48, 48*4 = 192

ANSWER:

3, 12, 48, 192

19. $a_1 = 625$; $a_n = \frac{1}{5}a_{n-1}$

$a_n = 625 *(\frac{1}{5})^{n-1}$

SOLUTION:

$a_1 = 625$, and the common ratio is $\frac{1}{5}$, so $625*\frac{1}{5} = 125$, $125*\frac{1}{5} = 25$, $25*\frac{1}{5} = 5$

ANSWER:

625, 125, 25, 5