Name:_____

Date:_____ Class Period:____

Geometric Sequences

A GEOMETRIC sequence is one that has a COMMON RATIO.

In other words, you Multiply or Divide the same number to get to the next term.

There are 2 different ways you can write a sequence.

Recursive Formula

A recursive formula finds the next term of a sequence by using the previous term.

Formula:

$a_1 =$

$a_n = r(a_{n-1})$

$a_1 =$ 1st Term

$a_n =$ Term Desired

$n =$ Term #

$a_{n-1} =$ Previous Term

$r =$ common ratio

Example: Given the sequence, write the recursive formula:

7, 21, 63, 189,...

$r = \frac{21}{7} = 3$

$a_1 = 7$

$a_1 = 7$

$a_n = 3(a_{n-1})$

Explicit Formula

An explicit formula uses a formula/Equation that will determine each term.

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

Formula:

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

$a_n =$ _____

$a_1 =$ _____

$n =$ _____

$r =$ _____

Example: Given the sequence, write the explicit formula:

7, 21, 63, 189,... Find a_{30}

$a_n = 7(3)^{n-1}$

$a_{30} = 7(3)^{30-1} = 4.8 \times 10^{14}$

Name _____ Date _____ Class _____

LESSON 12-1

Practice A

Geometric Sequences

Find the common ratio of each geometric sequence. Then find the next three terms in each geometric sequence.

$r = \frac{\text{2nd Term}}{\text{1st Term}}$

1. 1, 4, 16, 64, … $\frac{4}{1}$

   common ratio: 4

   256 1024 4096

2. 10, 100, 1000, 10,000, …

   common ratio: 10

   100,000 1,000,000 10,000,000

3. 128, 64, 32, 16, …

   common ratio: $\frac{1}{2}$

   8 4 2

4. 4, –20, 100, –500, … $\frac{-20}{4}$

   common ratio: −5

   2500 −12500 62500

5. The first term of a geometric sequence is 2 and the common ratio is 4. Find the 6th term. Specific → Explicit

   $a_n = 2(4)^{n-1}$

   2048

6. The first term of a geometric sequence is –3 and the common ratio is 2. Find the 8th term.

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

   −384

7. The first term of a geometric sequence is 7 and the common ratio is –2. Find the 9th term.

   $a_n = 7(-2)^{n-1}$

   1792

8. What is the 5th term of the geometric sequence 9, 27, 81, 243, …?

   $9(3)^{5-1}$

   common ratio (r): 3

   first term (a_1): 9

   5th term: 729

9. What is the 13th term of the geometric sequence –2, 4, –8, 16, …?

   $-2(-2)^{n-1}$

   common ratio (r): −2

   first term (a_1): −2

   13th term: −8192

10. Martin got a job at a starting pay of $8.00 per hour. His boss told him that if he works hard he can get a raise each year. The table shows Martin's wage for the first few years. Find Martin's hourly wage after 6 years. Round to the nearest cent.

    common ratio (r): 1.2

    first term (a_1): 8

    6th term: $19.91

    $8(1.2)^{6-1}$

Term / Year	Hourly Wage ($)
1	$8.00
2	$9.60
3	$11.52

9.60 ÷ 8.00

Given the first term and the common ratio of a geometric sequence find the first five terms and the explicit formula.

15) $a_1 = 0.8,\ r = -5$

16) $a_1 = 1,\ r = 2$

Given the first term and the common ratio of a geometric sequence find the recursive formula and the three terms in the sequence after the last one given.

17) $a_1 = -4,\ r = 6$

$a_n = 6(a_{n-1})$

$a_2 = -24$
$a_3 = -144$
$a_4 = -864$

18) $a_1 = 4,\ r = 6$

$a_n = 6(a_{n-1})$

$a_2 = 24$
$a_3 = 144$
$a_4 = 864$

19) $a_1 = 2,\ r = 6$

$a_n = 6(a_{n-1})$

$a_2 = 12$
$a_3 = 72$
$a_4 = 432$

20) $a_1 = -4,\ r = 4$

$a_n = 4(a_{n-1})$

$a_2 = -16$
$a_3 = -64$
$a_4 = -256$

Given a term in a geometric sequence and the common ratio find the first five terms, the explicit formula, and the recursive formula.

21) $a_4 = 25,\ r = -5$

22) $a_1 = 4,\ r = 5$

Given two terms in a geometric sequence find the 8th term and the recursive formula.

23) $a_4 = -12$ and $a_5 = -6$

24) $a_5 = 768$ and $a_2 = 12$

25) $a_1 = -2$ and $a_5 = -512$

26) $a_5 = 3888$ and $a_3 = 108$