6.1 Geometric Sequences
Homework

Name: _____

Date: _____ Block: _____

Explicit Formula: $a_n = a_1 \cdot r^{n-1}$		**Recursive Formula:** $a_1 = \#$, $a_n = a_{n-1} \cdot r$	
a_n = the nth term in the sequence	r = the common ratio	a_n = the nth term in the sequence	r = the common ratio
a_1 = the 1st term in the sequence	n = the term number	a_1 = the 1st term in the sequence	n = the term number

Write the recursive formula for the given sequences and then give the next 3 terms in the sequence.

1. 5, 15, 45, 135, ...

Explicit Formula: $a_n = 5 \cdot 3^{n-1}$

Recursive Formula: $a_n = a_{n-1} \cdot 3$, $a_1 = 5$

$a_1 =$ 5

$r =$ 3

Next three terms: 405, 1215, 3645

2. 12, 24, 48, 96, ...

Explicit Formula: $a_n = 12 \cdot 2^{n-1}$

Recursive Formula: $a_n = a_{n-1} \cdot 2$, $a_1 = 12$

$a_1 =$ 12

$r =$ 2

Next three terms: 192, 384, 768

3. $12, 6, 3, \frac{3}{2}, \ldots$

Explicit Formula: $a_n = 12 \cdot \left(\frac{1}{2}\right)^{n-1}$

Recursive Formula: $a_n = a_{n-1} \cdot \frac{1}{2}$, $a_1 = 12$

$a_1 =$ 12

$r =$ $\frac{1}{2}$

Next three terms: $\frac{3}{4}, \frac{3}{8}, \frac{3}{16}$

4. $100, 10, 1, \frac{1}{10}, \ldots$

Explicit Formula: $a_n = 100 \cdot \left(\frac{1}{10}\right)^{n-1}$

Recursive Formula: $a_n = a_{n-1} \cdot \frac{1}{10}$, $a_1 = 100$

$a_1 =$ 100

$r =$ $\frac{1}{10}$

Next three terms: $\frac{1}{100}, \frac{1}{1000}, \frac{1}{10000}$

Given the recursive formula below, list the first four terms.

5. $a_1 = 2$ and $a_n = a_{n-1} \cdot 4$

2, 8, 32, 128

6. $a_1 = 3$ and $a_n = a_{n-1} \cdot 3$

3, 9, 27, 81

7. $a_1 = 24$ and $a_n = a_{n-1} \cdot \frac{1}{2}$

24, 12, 6, 3

8. $a_1 = 9$ and $a_n = a_{n-1} \cdot \frac{1}{3}$

9, 3, 1, $\frac{1}{3}$

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

9. $a_5 = 162$ and $r = 3$

$162 = a_1 \cdot 3^{5-1}$

$162 = a_1 \cdot 81$

$2 = a_1$

Explicit Formula: $a_n = 2 \cdot 3^{n-1}$

Recursive Formula: $a_n = a_{n-1} \cdot 3$, $a_1 = 2$

First Three Terms: 2, 6, 18

10. $a_7 = 729$ and $r = 3$

$729 = a_1 \cdot 3^{7-1}$

$729 = a_1 \cdot 729$

$1 = a_1$

Explicit Formula: $a_n = 1 \cdot 3^{n-1}$

Recursive Formula: $a_n = a_{n-1} \cdot 3$, $a_1 = 1$

First Three Terms: 1, 3, 9

11. $a_4 = \frac{1}{2}$ and $r = \frac{1}{2}$

$\frac{1}{2} = a_1 \cdot \left(\frac{1}{2}\right)^3$

$\frac{1}{2} = a_1 \cdot \frac{1}{8}$

$4 = a_1$

Explicit Formula: $a_n = 4 \cdot \left(\frac{1}{2}\right)^{n-1}$

Recursive Formula: $a_n = a_{n-1} \cdot \frac{1}{2}$, $a_1 = 4$

First Three Terms: 4, 2, 1

12. $a_5 = 1215$ and $r = \frac{1}{3}$

$1215 = a_1 \cdot \left(\frac{1}{3}\right)^4$

$1215 = a_1 \cdot \frac{1}{81}$

$98415 = a_1$

Explicit Formula: $a_n = 98415 \cdot \left(\frac{1}{3}\right)^{n-1}$

Recursive Formula: $a_n = a_{n-1} \cdot \frac{1}{3}$, $a_1 = 98415$

First Three Terms: 98415, 32805, 10935

Determine whether the following sequences are arithmetic, geometric, or neither. Identify the common difference or common ratio. Then, if possible, write the explicit and recursive formula for each.

13) -9, -3, 3, 9, 15 (+6)

Arithmetic $d=6$

e: $a_n = -9 + (n-1)6$

$a_n = 6n - 15$

r: $a_n = a_{n-1} + 6$, $a_1 = -9$

14) 0, 1, 2, 3, 4 (+1)

Arithmetic $d=1$

e: $a_n = 0 + (n-1)1$

$a_n = n-1$

r: $a_n = a_{n-1} + 1$, $a_1 = 0$

15) 4, 12, 36, 108 (*3)

geometric $r=3$

e: $a_n = 4 \cdot 3^{n-1}$

r: $a_n = a_{n-1} \cdot 3$, $a_1 = 4$

16) $\frac{1}{3}$, 1, 3, 9

geometric $r=3$

e: $a_n = \frac{1}{3} \cdot 3^{n-1}$

r: $a_n = a_{n-1} \cdot 3$, $a_1 = \frac{1}{3}$

17) -9, -7, -5, -3, -1 (+2)

Arithmetic $d=2$

$a_n = -9 + (n-1)2$

e: $a_n = 2n - 11$

r: $a_n = a_{n-1} + 2$, $a_1 = -9$

18) 1, 2, 4, 8, 16 (*2)

geometric $r=2$

e: $a_n = 1 \cdot 2^{n-1}$

r: $a_n = a_{n-1} \cdot 2$, $a_1 = 1$

19) 30, 304, 3044, 30444

neither

*adding a 4 each time isn't a sequence

20) -20, -10, 0, 10, 20

arithmetic $d=10$

e: $a_n = -20 + (n-1)10$

$a_n = 10n - 30$

r: $a_n = a_{n-1} + 10$, $a_1 = -20$