Warm Up: Write a recursive and an explicit equation for each of the following.

1. 1, 3, 5, 7, …
2. 7, 4, 1, –2, –5, …
3. 13, 18, 23, 28, …
4. –22, –15, –8, –1, …

Reflection: Summarize what you know so about arithmetic sequences.

Notes 4-3
Sec1H Geometric Sequences Unit 4

Geometric Sequence:

Pattern that is multiplying.

Example 1: Are the following examples or non-examples of geometric sequences? How do you know?

1. 4, 8, 16, 32, … yes
2. -4, -2, 0, 2, … NO
3. $\frac{1}{2}, \frac{1}{6}, \frac{1}{18}, \frac{1}{54}, \ldots$ yes
4. -3, 6, -12, 24, … Yes

Example 2:

- Find the common ratio and the initial value of the following sequence.

3, 15, 75, 375, …

Rate of change
CR = x5
IV = $\frac{3}{5}$

- Now write the explicit equation for the sequence.

$f(n) = a(b)^n$

$f(n) = a(b)^n$
$f(n) = \frac{3}{5}(5)^n$

- Now write the recursive formula.

$a_n = b[a_{n-1}]; \quad a_0 = a$

(Common Ratio; Initial Value)

Rate of Change

$a_n = b[a_{n-1}] \quad a_0 = IV$

$a_n = 5[a_{n-1}] \quad a_0 = \frac{3}{5}$

- Now check your recursive formula by rebuilding the sequence.

$a_0 = \frac{3}{5}$

$a_1 = 5[a_{1-1}] = 5[a_0] = 5[\frac{3}{5}]$

$a_2 = 5(a_{2-1}] = 5(a_1) = 5(3)$

a_0	$\frac{3}{5}$
a_1	3
a_2	15
a_3	
a_4	

Example 3: Growth & Decay

A tire is losing 2% of its air each day. Write an explicit, and recursive formula that would calculate how many pounds of air are in the tire after d days if it starts with 40 pounds.

$R = a_n = RC[a_{n-1}] \quad a_0 = IV = a = 40 \quad b = RC$

$E = f(n) = a(b)^n$

$RC = (1 - .02)$

$R = a_n = (.98)(a_{n-1}) \quad a_0 = 40 \quad RC = (.98)$

$f(n) = 40(.98)^n$

Practice: First, determine if the sequence is geometric; if it is write the explicit and recursive formula for each.

1. $\frac{3}{4}, \frac{3}{8}, \frac{3}{16}, \frac{3}{32}, \ldots$

2. 405, 135, 45, 15, …

1215 — $\cdot\frac{1}{3}$ $\cdot\frac{1}{3}$ $\cdot\frac{1}{3}$ $\cdot\frac{1}{3}$ $RC = \frac{1}{3}$

$R = a_n = \frac{1}{3}[a_{n-1}] \quad a_0 = 1215$

$E: f(n) = 1215(\frac{1}{3})^n$

3. $\frac{1}{2}, \frac{3}{10}, \frac{9}{50}, \frac{27}{250}, \ldots$

4. 500, 300, 180, 108, …

5. 100, 75, 50, 25, …

6. 5, -10, 20, -40, …

7. $\frac{2}{3}, \frac{1}{2}, \frac{1}{3}, \frac{1}{6}, \ldots$

8. 2, 6, 18, 54, …