

9.3 Geometric Sequences

- I can identify a geometric sequence and state its common ratio.
- I can write an explicit rule for a geometric sequence.
 - Given a term and common ratio.
 - Given a sequence.
- I can find the n th term of a geometric sequence.

p. 46-47 Geometric Sequences 9.3

p. 46-47 Geometric Sequences 9.3

Warm-up : Write the sequence in your notes

{ 20, 14, 8, ...

p. 46

- a. Identify the common difference.

$$d = -6$$

- b. Write the Explicit Formula

$$a_n = a_1 + (n-1)(d)$$

$$a_n = 20 + (n-1)(-6)$$

- c. Find the 75th term using your Explicit Formula

$$n = 75$$

$$a_{75} = 20 + (75-1)(-6)$$

$$\boxed{-424}$$

Yesterday we learned about arithmetic sequences.

Are the following Arithmetic sequences?
Explain why or why not.

{ 1, 2, 3, 4, 5, ... *yes*

{ 1, 2, 4, 8, 16, ... *no*
 ∨ ∨ ∨
 x2 x2 x2

Geometric Sequences

p. 47

Geometric Sequence: a sequence where each term after the 1st is found by multiplying the previous term by a constant.

Common Ratio (r): the number you multiply by to get the next term.

You can find the Common Ratio by dividing any term in the sequence by its previous term. $r = a_n / a_{n-1}$

G
E
O
M
E
T
R
I
C

S
E
Q
U
E
N
C
E

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

a_n = n^{th} term in the sequence

a_1 = first term in the sequence

r = common ratio

n = # of term in the sequence

1. Determine the next terms of the geometric sequence then write the Explicit Formula

p. 47

{ 5, 15, 45, 135, 405, 1215, ...

$a_1 = \underline{5}$

$r = \underline{3}$

Explicit Formula

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

- Use the Explicit Formula to find the 9th term

$n=9$

$$a_9 = 5(3)^{(9-1)}$$

32805

2. Determine the next terms of the geometric sequence then write the Explicit Formula

$$\{-3, 9, -27, \underline{81}, \underline{-243}, \underline{729}, \dots\}$$

$$\frac{-27}{9} = -3$$

$$\frac{9}{-3} = -3$$

$$a_1 = \underline{-3}$$

Explicit Formula

$$r = \underline{-3}$$

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

Use the Explicit Formula to find the 9th term

$$n=9 \quad a_9 = -3(-3)^{(9-1)}$$

$$\boxed{-19,683}$$

Find the nth term using an Explicit Formula

$$3. \quad a_1 = 200 \quad r = \frac{1}{2} \quad n = 7$$

$$a_n = 200 \left(\frac{1}{2}\right)^{n-1}$$

$$a_7 = 200 \left(\frac{1}{2}\right)^{(7-1)} = \boxed{3.125}$$

$$4. \quad a_1 = 2 \quad r = 3 \quad n = 15$$

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

$$a_{15} = 2(3)^{(15-1)}$$

$$\boxed{a_{15} = 9,565,938}$$

Write an Explicit Formula for the nth term of the geometric sequence. Then find a_8 using your formula.

p. 46

5. 5, 10, 20, 40, ...

a.) Explicit Formula

$$a_1 = 5$$

$$r = 2$$

$$a_n = 5(2)^{n-1}$$

b.) Find a_8

$$a_8 = 5(2)^{8-1}$$

$$a_8 = 640$$

6. 6, -30, 150, -750, ...

a.) Explicit Formula

$$a_1 = 6$$

$$r = -5$$

$$a_n = 6(-5)^{n-1}$$

b.) Find a_8

$$a_8 = 6(-5)^{8-1}$$

$$a_8 = -468,750$$

Closing Question

p. 46

You decide to try a new savings plan. You will deposit \$10 at the end of week 1, \$20 at the end of week 2, and \$40 at the end of week 3. You will continue this pattern.

- What kind of sequence is this? Arithmetic / Geometric
- Write an Explicit Formula that represents the sequence described
- Using your formula from part B, how much money will you deposit in week 10?

Is this a sustainable pattern of savings?

Practice!