Algebra 1 7.7

rule

Identify and generate geometric sequences

Relate geometric sequences to exponential functions

sequence

arithmetic sequence (3.5)

geometric sequence 7.7 mult. rule

common ratio rule (2)

whiteboards

Quiz 7.5-7.6

3, 7, 11, 15 ... arith.

2, 4, 8, 16 ... geom.

What is the first term? What is common ratio?

Example 2 Find Terms of Geometric Sequences

Find the next three terms in each geometric sequence.

a. 1, −4, 16, −64, . . . 256, −1024, 4096

r = −4

$\frac{-16}{16}$ $\frac{16}{-4}$ $\frac{-4}{1}$

−4 −4 −4

1(?) = - 4
- 4(?) = 16
16(?) = - 64

26. The first term of a geometric series is 1 and the common ratio is 9. What is the 8th term of the sequence?

$r = 9$

1, 9, 81, 729, 6561, 59049, 531,441

1 2 3 4 5 6 7 8

4,782,969

Is there a better way?

term 8

$1 \cdot 9^7$

4,782,969

Look for patterns...

term #	ans.	
1	1	$\times 9$
2	9	$\times 9^2$
3	81	9^3
4	729	9^4
5	6561	9^5
⋮	⋮	

KeyConcept *n*th term of a Geometric Sequence

The nth term a_n of a geometric sequence with first term a_1 and common ratio r is given by the following formula, where n is any positive integer and $a_1, r \neq 0$.

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

$= (\text{first term})(\text{ratio})^{\text{loss}}$

GeMA

Example 3 Find the *n*th Term of a Geometric Sequence

a. Write an equation for the *n*th term of the sequence −6, 12, −24, 48, … .

-6(?)=12

find a_1 -6

find r $r=-2$

answer the question

$$(-6)(-2)^{n-1}$$

$$(-6)(-2)^{6}$$

$$-6 \cdot 64 = -384$$

GuidedPractice

3. Write an equation for the nth term of the geometric sequence 96, 48, 24, 12, … . Then find the tenth term of the sequence.

find a_1 96
find r $\div 2$ $\times \frac{1}{2}$
answer the question

$$y = (96)\left(\frac{1}{2}\right)^{n-1}$$

$$= (96)\left(\frac{1}{2}\right)^{9}$$

$$= 0.1875$$

28. What is the 15th term of the geometric sequence $-9, 27, -81, \ldots$?

find a_1
find r
write an equation
answer the question