Algebra II

11-3

Geometric Sequences

Geometric Sequence - terms vary by a common ratio (r)

(multiply or divide)

Example of an Geometric Sequence -

r=2

5	10	20	40	80	...	1280
a_1	a_2	a_3	a_4	a_5		a_n

Formula for finding the n^{th} term of an ~~Arithmetic~~ Geometric Sequence -

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

term number

ratio

1st term

Find a formula for the n^{th} term of each geometric sequence.

1) 2, 6, 18, 54, . . .

$r=3$, a_1

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

$\boxed{a_n = 2 \cdot 3^{n-1}}$

Find the specified term of each geometric sequence.

9) 320, 80, 20, 5, . . . ; a_8

$\div 4$, $r = \frac{1}{4}$

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

$a_8 = 320\left(\frac{1}{4}\right)^{8-1}$

$= 320\left(\frac{1}{4}\right)^{7}$

$= 0.020 = \frac{5}{256}$

Find the geometric mean of each pair of numbers.

always positive

19) 2,8

$\boxed{4}$

$r=2$, $2, \_, 8$, a_1, a_3

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

$a_3 = 2r^{3-1}$

$8 = 2r^2$

$\sqrt{4} = \sqrt{r^2}$

$2 = |r|$

Insert the given number of geometric means between each pair.

23) Three; 5, 80

$5, \_, \_, \_, 80$, a_1, a_5

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

$a_5 = 5r^{5-1}$

$80 = 5r^4$

$\sqrt[4]{16} = \sqrt[4]{r^4}$

$2 = |r|$

Tell whether each sequence is arithmetic or geometric. Then find a formula for the n^{th} term.

29) 25, 33, 41, 49, . . ., a_n

$d = 8$ $+8$

a_1

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

$a_n = 25 + 8(n-1)$

or

$a_n = 25 + 8n - 8$

$a_n = 17 + 8n$

either

Find a formula for the n^{th} term of each sequence. The sequences are neither arithmetic nor geometric.

37) $\frac{2}{1}, \frac{3}{4}, \frac{4}{9}, \frac{5}{16}, \ldots, \frac{n+1}{n^2}$

a_1 a_2 a_3 a_4 a_n

$a_n = \frac{n+1}{n^2}$

Assignment:
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