Name Key Date Hour

Geometric Sequences
Alg 2 Trig

Opener:

Use the following arithmetic sequence to answer the questions below: 11, 20, 29, ...

1. a) Find the common difference: +9

   b) What variable represents this in the formula? d

2. What is the formula for this sequence? $a_n = 11 + 9(n-1)$

3. Find a_8: $= 11 + 9(8-1) = 74$

4. One of the terms in the sequence is 101. Find the term number.

$101 = 11 + 9(n-1)$
$90 = 9(n-1)$
$10 = n-1$
$11 = n$

Ok, good. Now.....

Use the following sequence to answer the questions below: 30, 120, 480, ...

Is there a common difference, common ratio, neither, or both? common ratio

Find the value if possible: 4

$\frac{120}{30} = 4$ $\frac{480}{120} = 4$

* choose a term and divide it by the previous term

Formula for a geometric sequence:

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

$a_n =$ n^{th} term
$a_1 =$ 1st term
$r =$ common ratio
$n =$ # of term

5. a) What is the formula for this sequence: **30, 120, 480, …** $r=4$

$a_n = 30 \cdot 4^{n-1}$

b) Find a_6: $= 30 \cdot 4^{6-1} = 30{,}720$

c) One of the terms is 1,966,080. Find the term number: _____

$1966080 = 30 \cdot 4^{n-1}$

$65536 = 4^{n-1}$ MUST USE LOGS!

$\log 65536 = (n-1)\log 4$

$8 = n-1$

$9 = n$

Let's Practice:

1) Find the formula and the indicated term of each sequence:

a) 4, −7, −18, …. find a_{10}

arithmetic $a_n = 4 - 11(n-1)$ $a_{10} = -95$

b) $a_1 = 4096$, $r = \frac{1}{4}$ $n = 8$ geometric

$a_n = 4096 \cdot \frac{1}{4}^{(n-1)}$ $a_8 = \frac{1}{4}$

c) 38, 46, 54, 62, … find a_{25} arithmetic

$a_n = 38 + 8(n-1)$ $a_{25} = 230$

d) $\frac{5}{2}, \frac{5}{3}, \frac{10}{9}, \ldots$ find a_7 geom

$\frac{\frac{5}{3}}{\frac{5}{2}} = \frac{5}{3} \cdot \frac{2}{5} = \frac{2}{3} = r$

$a_n = \frac{5}{2} \cdot \frac{2}{3}^{n-1}$ $a_7 = \frac{160}{729}$

e) $a_1 = 5$ $r = -3$ $n = 6$ geom

$a_n = 5 \cdot -3^{n-1}$ $a_6 = -1215$