#9:

Name Key
8A; Algebra 1

Date _____
Period _____

Homework

1) Determine whether each of the following sequences is arithmetic, geometric or neither. Explain your decisions.

a) -4, 1, 6, 11, ...
+5 +5 +5
arithmetic
$d = 5$
* Adding by 5 repeatedly

b) 2, 8, 32, 128, ...
·4 ·4 ·4
geometric
$r = 4$
* multiplying by 4 repeatedly

c) 1.5, 4.5, 13.5, 40.5, ...
·3 ·3 ·3
geometric
$r = 3$
* multiplying by 3 repeatedly

2) For each of the following geometric sequences, find the common ratio. Then write the explicit formula for the sequence.

a) 10, 20, 40, 80, ...
·2 ·2 ·2
$a_1 = 10$ $r = 2$
$a_n = a_1 \cdot r^{n-1}$
$a_n = 10 \cdot 2^{n-1}$

b) 7, -7, 7, -7, ...
·-1 ·-1 ·-1
$a_1 = 7$ $r = -1$
$a_n = a_1 \cdot r^{n-1}$
$a_n = 7 \cdot (-1)^{n-1}$
* must be in ( ) b/c it's Neg!

c) 100, 50, 25, 12.5, ...
$\cdot \frac{1}{2}$ $\cdot \frac{1}{2}$ $\cdot \frac{1}{2}$
$a_1 = 100$ $r = \frac{1}{2}$
$a_n = a_1 \cdot r^{n-1}$
$a_n = 100 \cdot \left(\frac{1}{2}\right)^{n-1}$

3) What is the 14th term of the geometric sequence: 3, 9, 27, 81, ... $n = 14$
* must get explicit formula 1st
$a_1 = 3$
$r = 3$
$a_n = a_1 \cdot r^{n-1}$
$a_n = 3^1 \cdot 3^{n-1}$
$a_n = 3^{1+n-1}$
$a_n = 3^n$
$a_n = 3^n$
$a_{14} = 3^{14}$
$a_{14} = 4,782,969$

4) What is the 11th term of the sequence: -2, 10, -50, 250,...
* must determine explicit formula 1st
$a_1 = -2$
$r = -5$
$a_n = a_1 \cdot r^{n-1}$
$a_n = -2 \cdot (-5)^{n-1}$
* must be in ( ) b/c it's Negative
$n = 11$
$a_n = -2 \cdot (-5)^{n-1}$
$a_{11} = -2 \cdot (-5)^{(11-1)}$
$a_{11} = -2 \cdot (-5)^{10}$
$a_{11} = -19,531,250$
* must use ( ) in calc too!

5) What is the 8th term of the following sequence: 1, 3, 9, 27, ...
* must determine explicit formula 1st
$a_1 = 1$
$r = 3$
$a_n = a_1 \cdot r^{n-1}$
$a_n = 1 \cdot 3^{n-1}$
$a_n = 3^{n-1}$
$n = 8$
$a_n = 3^{n-1}$
$a_8 = 3^{(8-1)}$
$a_8 = 3^7$
$a_8 = 2187$

6) Given the first term and the common ratio, find the first four terms and the explicit formula for the following. : $a_1 = 1$, $r = 2$

must get 1st

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

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

$a_n = 2^{n-1}$

$n=2$: $a_n = 2^{n-1}$, $a_2 = 2^{(2-1)}$, $a_2 = 2^1$, $a_2 = 2$

$n=3$: $a_n = 2^{n-1}$, $a_3 = 2^{(3-1)}$, $a_3 = 2^2$, $a_3 = 4$

$n=4$: $a_n = 2^{n-1}$, $a_4 = 2^{(4-1)}$, $a_4 = 2^3$, $a_4 = 8$

7) The first term of a geometric sequence is -0.25 and the common ratio is -8. Find the 7th term.

$a_1 = -0.25$

$r = -8$

*must derive the explicit formula 1st

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

$a_n = -0.25 \cdot (-8)^{n-1}$

*must brac() b/c it's negative

$n=7$: $a_n = -0.25 \cdot (-8)^{n-1}$, $a_7 = -0.25 \cdot (-8)^{(7-1)}$, $a_7 = -0.25 \cdot (-8)^6$, $a_7 = -0.25 \cdot 26,214$, $a_7 = -65,536$

8) Round 1 of a tennis tournament starts with 128 players. After each round, half the players have lost and are eliminated from the tournament. Therefore, in round 2 there are 64 players, in round 3 there are 32 players and so on. Decide if this scenario describes an arithmetic or geometric sequence. Then, write the formula for the sequence.

$a_1 = 128$, $r = \frac{1}{2}$

Geometric sequence

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

$a_n = 128 \cdot \left(\frac{1}{2}\right)^{n-1}$

9) Gabe and Erik are finding the 9th term of the geometric sequence: -5, 10, -20,... Is either of them correct? Explain.

Gabe

$r = \frac{10}{-5} = -2$

$a_9 = -5(-2)^{9-1}$

$= -5(512)$

$= -2560$

this should be $(-2)^8 = 256$ not $(-2)^9 = -512$

Erik

$r = \frac{10}{-5} = -2$

$a_9 = -5(-2)^{9-1}$

$= -5(-256)$

$= 1280$

this should be +256

$a_1 = -5$

$r = -2$

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

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

should be in ()

$n=9$: $a_n = -5 \cdot (-2)^{n-1}$, $a_9 = -5 \cdot (-2)^{(9-1)}$, $a_9 = -5 \cdot (-2)^8$, $a_9 = -5 \cdot 256$, $a_9 = -1280$

must put in() in the calculator too

Neither of them are correct