Math 4 Honors
Lessons 5-6 & 5-7 Review

Name ______________________
Date ______________________

1. Consider the sequence described by the rule:
$$\begin{cases} a_1 = -1.75 \\ a_{k+1} = a_k - 2, \; k \geq 1 \end{cases}$$
   a. Circle the type of formula: recursive or explicit
   b. Find the first five terms of the sequence.

   -1.75, -3.75, -5.75, -7.75, -9.75

   c. Circle one classification: arithmetic, geometric, or neither.
   d. Write the other type of rule for the sequence.

   $a_K = -2K + .25$

2. Consider the sequence described by the rule:
$$a_n = 2(1.12)^n$$
   a. Circle the type of formula: recursive or explicit
   b. Find the first five terms of the sequence.

   2.24, 2.5088, 2.8099, 3.147, 3.5247

   c. Circle one classification: arithmetic, geometric, or neither.
   d. Write the other type of rule for the sequence.

$$\begin{cases} a_1 = 2.24 \\ a_{n+1} = a_n * 1.12, \; n \geq 1 \end{cases}$$

3. Consider the sequence described by the rule:
$$b_n = \frac{\lceil n + .3 \rceil}{2}$$
   a. Circle the type of formula: recursive or explicit
   b. Find the first five terms of the sequence.

   1, 1.5, 2, 2.5, 3

   c. Circle one classification: arithmetic, geometric, or neither.

4. A sequence is defined by the explicit rule: $a_n = -4n - 5$ Find its recursive rule.

Arithmetic!

$$\begin{cases} a_1 = -9 \\ a_{n+1} = a_n - 4, \; n \geq 1 \end{cases}$$

5. A sequence is defined by the explicit rule: $a_n = n^2 - 3n$ Find its recursive rule.

$a_1 = 1 - 3 = -2$

$a_{n+1} = (n+1)^2 - 3(n+1)$
$= \underbrace{n^2 + 2n + 1 - 3n}_{} - 3$
$= a_n + 2n - 2$

OVER →

$$\begin{cases} a_1 = -2 \\ a_{n+1} = a_n + 2n - 2, \; n \geq 1 \end{cases}$$

Show work for the following:

6. Expand: $\sum_{k=-2}^{3}(4k-k^2)$.

$-7$

7. Expand: $\sum_{i=-5}^{-2}(3^i)$.

$40/243 \approx .164609$

8. Expand: $\sum_{j=2}^{5}\frac{n+1}{n+j}$. $=\frac{1207}{420} \approx 2.874$

9. Write using summation notation: $(1*1)+(2*4)+(3*16)+(4*64)$.

$$\sum_{i=1}^{4}(i \cdot n^{i-1})$$

10. Let S(*n*) be the statement: $\sum_{i=1}^{n}((2i)^2)=\frac{2n(n+1)(2n+1)}{3}$

a. Find $\boxed{\sum_{i=1}^{6}((2i)^2)}$ and show that it is true for $\boxed{S(6)}$.

$=4+16+36+64+100+144$
$=364$ ✓

$$S(6)=\frac{2\cdot 6(6+1)(2\cdot 6+1)}{3}$$
$=364$ ✓

b. Write $\sum_{i=1}^{n+1}((2i)^2)$ recursively.

$$\sum_{i=1}^{n+1}((2i)^2)=\sum_{i=1}^{n}((2i)^2)+(2(n+1))^2$$

c. Use (a) and (b) to find $\sum_{i=1}^{7}((2i)^2)$

$$\boxed{\sum_{i=1}^{7}((2i)^2)}=\boxed{\sum_{i=1}^{6}((2i)^2)}+(2(6+1))^2$$

$=364+14^2$

560 ✓ $=560$ ✓

11. Find the first term of a geometric sequence where $g_4 = 0.015$ and $g_7 = 0.001875$.

*No guessing & checking; show your work algebraically.*

**Set up & solve a system of equations!**

$.015 = r^3 \cdot g_1$ $\qquad$ $.001875 = r^6 \cdot g_1$

$\frac{.015}{r^3} = g_1$ $\qquad$ $\frac{.001875}{r^6} = g_1$

$$\frac{.015}{r^3} = \frac{.001875}{r^6}$$

$$.015r^6 - .001875r^3 = 0$$

$$.015r^3(r^3 - .125) = 0$$

$$r^3 = .125$$

$$r = .5$$

$$\frac{.015}{(.5)^3} = g_1$$

$$\boxed{g_1 = .12}$$