NAME _____ DATE_____

ALG RH SEQUENCES PRACTICE PROBLEM SET

1. Determine is each set of sequences is Arithmetic, Geometric or neither. If arithmetic, state the value of ***d***. If geometric, state the value of ***r***.

a. $6, -2, -10, \ldots$

Arithmetic, $d = -8$

b. $-5.7, -4.5, -3.3, -2.1, \ldots$

Arithmetic, $d = 1.2$

c. $2,\ 5,\ 10,\ 13,\ 26, \ldots$

Neither

d. $\frac{2}{5}, -\frac{3}{5}, \frac{9}{10}, -\frac{27}{20}, \ldots$

Geometric, $r = -\frac{3}{2}$

2. For each sequence, write a *recursive formula*, an *explicit formula* and a *simplified explicit formula*

Involves the Previous Term

a. $180,\ 145,\ 110, \ldots$

$a_1 = 180$

$a_n = a_{n-1} - 35$

$a_n = 180 - 35(n-1)$ ← Explicit

$a_n = 180 - 35n + 35$

$a_n = -35n + 215$ ← simplified Explicit

b. $-40, -20, -10, \ldots$

$a_1 = -40$ $r = \frac{1}{2}$

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

$a_n = -40\left(\frac{1}{2}\right)^{n-1}$

already simplified

3. Find the 35th term given the following arithmetic sequence: $-20, -29, -38, \ldots$

$a_n = -20 - 9(n-1)$

$a_{35} = -20 - 9(34)$

$a_{35} = -326$

35th Term is -326

4. Find the 12th term given the following geometric sequence: $-3, 9, -27, 81, \ldots$

$a_n = -3(-3)^{n-1}$

$a_{12} = -3(-3)^{11}$

$a_{12} = 531{,}441$

5. Find the first 4 terms in the following sequence that is defined recursively: $\boxed{f(n+1) = -2f(n) + 7}$ and $f(1) = -4$

$f(1) = -4$

$f(2) = -2(-4) + 7$
$= 15$

$f(3) = -2(15) + 7$
$= -23$

$f(4) = -2(-23) + 7$
$= 53$

$-4, 15, -23, 53$

6. Find the first 4 terms of the following sequence that is defined recursively: $a_n = \frac{(a_{n-1})^2}{4}$ and $a_1 = 2$

$a_1 = 2$

$a_2 = \frac{2^2}{4}$

$a_2 = 1$

$a_3 = \frac{1^2}{4}$

$a_3 = \frac{1}{4}$

$a_4 = \frac{(\frac{1}{4})^2}{4}$

$a_4 = \frac{1}{64}$

$\boxed{2, 1, \frac{1}{4}, \frac{1}{64}}$

7. Find the first four terms of the following sequence: $a(n) = \frac{2 \cdot a(n-1)}{n}$, $a(1) = 4$

$a(1) = 4$

$a(2) = \frac{2(4)}{2}$

$a(2) = 4$

$a(3) = \frac{2(4)}{3}$

$a(3) = \frac{8}{3}$

$a(4) = \frac{2(\frac{8}{3})}{4}$

$a(4) = \frac{4}{3}$

$\boxed{4, 4, \frac{8}{3}, \frac{4}{3}}$

8. Given an arithmetic sequence where the 4th term is 8 and the 13th term is 53, find the 39th term.

$13 - 4 = 9$

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

$8 = a_1 + 5(4-1)$

$8 = a_1 + 5(3)$

$8 = a_1 + 15$ $\quad a_1 = -7$

$8 + 9d = 53$

$9d = 45$

$d = 5$

$a_n = -7 + 5(n-1)$

$a_{39} = -7 + 5(39-1)$

$a_{39} = -7 + 5(38)$

$\boxed{a_{39} = 183}$

9. Given a geometric sequence where the 3rd term is -32 and the 5th term is -512, find the 8th term.

$5 - 3 = 2$

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

$-32 = a_1 \cdot 4^{3-1}$

$-32 = a_1 \cdot 4^2$ $\quad a_1 = -2$

$-32 = a_1 \cdot 16$

$-32 \cdot r^2 = -512$

$r^2 = 16$

$r = 4$

$a_n = -2(4)^{n-1}$

$a_8 = -2(4)^{8-1}$

$a_8 = -2(4)^7$

$\boxed{a_8 = -32768}$

10. Find the number of terms in each sequence. (Algebraically)

a. 2, 5, 8, ..., 299

$a_n = 2 + 3(n-1)$

$299 = 2 + 3(n-1)$

$297 = 3n - 3$

$300 = 3n$

$n = 100$

$\boxed{100 \text{ terms}}$

b. 2, 6, 18, ..., 1458

$a_n = 2(3)^{n-1}$

$1458 = 2(3)^{n-1}$

$729 = 3^{n-1}$

$3^6 = 3^{n-1}$

$6 = n - 1$

$7 = n$

$\boxed{7 \text{ terms}}$