PRACTICE: SEQUENCES

DAY 15

Tell whether the following sequences are arithmetic, geometric or neither.
If it is arithmetic, find the common difference, if it is geometric, find the common ratio.

	Sequence	Geometric or Arithmetic	Common Difference or Ratio
1	5, 9, 13, 17, ...	Arithmetic	$d = 4$
2	3, 6, 12, 24, ...	Geometric	$r = 2$
3	40, 10, $\frac{5}{2}$, $\frac{5}{8}$, ...	Geometric	$r = \frac{1}{4}$
4	4, 7, 12, 19, ...	Arithmetic	$d = 3$

Fill out the table.

		Sequence	Explicit Formula	Recursive Formula	10th Term
A	5	5, 11, 17, 23, ...	$a_n = 5 + 6(n-1)$	$a_1 = 5$ $a_n = (a_{n-1}) + 6$	$a_{10} = 5 + 6(9)$ $a_{10} = 59$
A	6	60, 52, 44, 36,...	$a_n = 60 - 8(n-1)$	$a_1 = 60$ $a_n = (a_{n-1}) - 8$	$a_{10} = 60 - 8(9)$ $a_{10} = 60 - 72$ $a_{10} = -12$
G	7	40, 20, 10, 5, $\frac{5}{2}$, ...	$a_n = 40\left(\frac{1}{2}\right)^{n-1}$	$a_1 = 40$ $a_n = \frac{(a_{n-1})}{2}$	$a_{10} = 40\left(\frac{1}{2}\right)^9$ $a_{10} \approx 0.078$
G	8	1.6, 3.2, 4.8, 6.4,...	$a_n = 1.6(2)^{n-1}$	$a_1 = 1.6$ $a_n = 2(a_{n-1})$	$a_{10} = 1.6(2)^9$ $a_{10} = 1.6(512)$ $a_{10} = 819.2$
G	9	152, -76, 38, -19,...	$a_n = 152\left(-\frac{1}{2}\right)^{n-1}$	$a_1 = 152$ $a_n = -\frac{1}{2}(a_{n-1})$	$a_{10} = 152\left(-\frac{1}{2}\right)^9$ $a_{10} = -0.297$
G	10	4, 20, 100, 500, ...	$a_n = 4(5)^{n-1}$	$a_1 = 4$ $a_n = 5(a_{n-1})$	$a_{10} = 4(5)^9$ $a_{10} = 3.84 \times 10^{11}$
A	11	2, $\frac{5}{3}$, $\frac{4}{3}$, 1, ...	$a_n = 2 - \frac{1}{3}(n-1)$	$a_1 = 2$ $a_n = (a_{n-1}) - \frac{1}{3}$	$a_{10} = 2 - \frac{1}{3}(9)$ $a_{10} = 2 - 3$ $a_{10} = -1$

12. Write the first 5 terms of each sequence:

a) $a_n = 2n + 5$

$a_1 = 2(1)+5 = 7$

$a_2 = 2(2)+5 = 9$

$a_3 = 2(3)+5 = 11$

$a_4 = 2(4)+5 = 13$

$a_5 = 2(5)+5 = 15$

b) $a_1 = 1$; $a_n = a_{n-1} + 4$

$a_1 = 1$

$a_2 = 5$

$a_3 = 9$

$a_4 = 13$

$a_5 = 17$

c) $a_1 = 2$; $a_n = 3 \cdot a_{n-1}$

$a_1 = 2$

$a_2 = 6$

$a_3 = 18$

$a_4 = 54$

$a_5 = 162$

d) $a_n = n^3 + 2$

$a_1 = 1^3+2 = 3$

$a_2 = 2^3+2 = 10$

$a_3 = 3^3+2 = 29$

$a_4 = 4^3+2 = 66$

$a_5 = 5^3+2 = 127$

e) $a_n = \frac{n}{n+1}$

$a_1 = \frac{1}{1+1} = \frac{1}{2}$

$a_2 = \frac{2}{2+1} = \frac{2}{3}$

$a_3 = \frac{3}{4}$

$a_4 = \frac{4}{5}$

$a_5 = \frac{5}{6}$

f). $a_n = 3^n - 2$

$a_1 = 3^1-2 = 1$

$a_2 = 3^2-2 = 7$

$a_3 = 3^3-2 = 25$

$a_4 = 3^4-2 = 79$

$a_5 = 3^5-2 = 241$

For the following ARITHMETIC sequences, write the explicit formula.

13. $a_{19} = 48$, $d = 3$

$48 = a_1 + 3(19-1)$

$48 = a_1 + 3(18)$

$-6 = a_1$

$a_n = -6 + 3(n-1)$

14. $a_{12} = -3$; $d = -7$

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

$-3 = a_1 + (-7)(12-1)$

$-3 = a_1 - 77$

$74 = a_1$

$a_n = 74 - 7(n-1)$

15. $a_{10} = 30$; $d = \frac{7}{2}$

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

$30 = a_1 + \frac{7}{2}(10-1)$

$30 = a_1 + \frac{63}{2}$

$-\frac{63}{2} \qquad -\frac{63}{2}$

$1.5 = a_1$

$a_n = -1.5 + \frac{7}{2}(n-1)$

16. $a_{12} = 10$, $d = -3$

$10 = a_1 - 3(12-1)$

$10 = a_1 - 3(11)$

$10 = a_1 - 33$

$43 = a_1$

$a_n = 43 - 3(n-1)$