Algebra 2
Final Exam Practice

Name Key Hr________

Sequences & Series

For question #1 & 2, find the first four terms of the sequence described:

1. $a_1 = 5, r = 3$

5, 15, 45

2. $a_1 = 2, d = 6$

2, 8, 14

For question #3-6, find the sum of the given series:

3. $\sum_{k=2}^{6} 3(2)^{k-1}$

$= 3(2)^1 + 3(2)^2 + 3(2)^3 + 3(2)^4 + 3(2)^5$

$= 6 + 12 + 24 + 48 + 96$

$= 186$

4. $4 + 11 + 18 + 25 + \ldots n = 10$

$a_n = 7n - 3$

$a_{10} = 7(10) - 3$

$a_{10} = 70 - 3 = 67$

$S_{10} = 10\left(\frac{4+67}{2}\right)$

$= 355$

5. $1 + 2 + 4 + 8 + 16 \ldots n = 20$

$S_{20} = 1 \cdot \left(\frac{2^{20} - 1}{2 - 1}\right)$

$= 1,048,575$

6. $\sum_{k=1}^{4} 7k - 3$

$= [7(1) - 3] + [7(2) - 3] + [7(3) - 3] + [7(4) - 3]$

$= 4 + 11 + 18 + 25$

$= 58$

For question #7-10, find the specific term in the sequence.

7. a_{19} in the sequence of $\frac{1}{2}, 3, 18, 108 \ldots$

$a_{19} = \left(\frac{1}{2}\right) \cdot 6^{18}$

$a_{19} = 5.07 \times 10^{13}$

8. a_{17} in the sequence of $11, 20, 29, \ldots$

$a_{17} = 9(17) + 2$

$a_{17} = 155$

9. $a_1 = 20, d = 3, a_{20} = ?$

$a_{20} = 20 + (19)(3)$

$a_{20} = 77$

10. $a_1 = -5, r = 2, a_{12} = ?$

$a_{12} = (-5)(2^{11})$

$a_{12} = -10,240$

11. Find the missing terms in the arithmetic sequence: 16, 10, 4, -2, -8

$-8 = 16 + (5 - 1)d$

$-24 = 4d \qquad d = -6$

12. Find the missing terms in the geometric sequence: 7, 14, 28, 56, 112

$112 = 7 \cdot r^{5-1}$

$\sqrt[4]{16} = \sqrt[4]{r^4} \qquad r = 2$

For question #13 & 14, write an explicit equation for the n^{th} term of the sequence.

13. 3, 24, 192, ...

$a_n = 3 \cdot 8^{n-1}$

14. -13, 1, 15, ...

$a_n = 14n - 27$

or

$a_n = -13 + 14(n-1)$

For question #15 & 16, identify where the term falls in the given sequence.

15. Complete the statement: 117 is the 76 *th* term of -33, -31, -29, -27, ...

$117 = -33 + (n-1)(2)$

$150 = 2(n-1)$

$75 = n-1$

$76 = n$

16. Complete the statement: 118,098 is the 10 *th* term of 6, 18, 54, 162, ...

$118{,}098 = 6 \cdot 3^{n-1}$

$19683 = 3^{n-1}$

$3^9 = 3^{n-1}$

$9 = n-1$

$n = 10$

OR

$118{,}098 = 6 \cdot 3^{n-1}$

$19683 = 3^{n-1}$

$\text{Log } 19683 = \text{Log } 3^{n-1}$

$\frac{\text{Log } 19683}{\text{Log } 3} = \frac{(n-1)\text{Log } 3}{\text{Log } 3}$

$9 = n-1$

$n = 10$

17. Find the sum of the first 50 positive multiples of 5.

$5 + 10 + 15 + 20 + \cdots$

$a_{50} = 5(50)$

$a_{50} = 250$

$S_{50} = 50\left(\frac{5+250}{2}\right)$

$S_{50} = 6375$

18. Write a recursive rule for the following sequence: 16, 26, 36, 46, ...

$a_1 = 16$

$a_n = a_{n-1} + 10$