Practice with Sequences and Series

Formulas	
Arithmetic Sequences Recursively: $a_{n+1} = a_n + d$ Explicitly: $a_n = a_1 + (n-1)d$ *Geometric Sequences* Recursively: $a_{n+1} = a_n \cdot r$ Explicitly: $a_n = a_1(r)^{n-1}$	*Arithmetic Series* $S_n = \frac{n(a_1 + a_n)}{2}$ *Geometric Series* $S_n = \frac{a_1(1-r^n)}{1-r}$

1. Find the sum of the first eight terms of the series $3 - 12 + 48 - 192 + \ . \ . \ . \ .$

2. If the first term of a geometric sequence is 12 and the fourth term is 324, find a formula for the *n*th term.

3. Find the sum of the first 12 terms of an arithmetic sequence if $a_{12} = -29$ and the common difference is –3.

4. Evaluate $\sum_{i=0}^{8} 256\left(\frac{3}{2}\right)^i$.

5. If the first and last terms of an arithmetic series are 5 and 27, respectively, and the series has a sum of 192, then find the number of terms in the series.

6. A person places 1 penny in a piggy bank on the first day of the month, 2 pennies on the second, 4 pennies on the third, and so on. Will this person be a millionaire at the end of a 31 day month? Justify your answer.

7. For an arithmetic series that sums to 1,485, it is known that the first term is 6 and the last term is 93. Algebraically determine the number of terms summed in this series.

8. Simeon starts a retirement account where he will place \$50 into the account on the first month and increase his deposit by \$5 per month each month after. If he saves this way for the next 20 years, how much will the account contain in principal?

9. A college savings account is constructed so that \$1,000 is placed into the account on January 1st of each year with a guaranteed 3% yearly return in interest, applied at the end of each year to the balance in the account. If this is repeatedly done, how much money will be in the account after the \$1,000 is deposited at the beginning of the 19th year?

10. Find the first four terms of the recursive sequence defined below.

$$a_1 = -3$$
$$a_n = a_{(n-1)} - n$$

11. Use the recursive sequence defined below to express the next three terms as fractions reduced to lowest terms.

$$a_1 = 2$$
$$a_n = 3\left(a_{n-1}\right)^{-2}$$

12. Express the sum $7+14+21+28+\ \ldots\ +105$ using sigma notation.