Name:_____ Date:_____

Math 10/11 Honors: Section 3.3 Finite and Infinite Geometric Series

1. Find the sum for the following geometric series. Show all your work and steps:

a) $S = 8+4+2+.....\frac{1}{128}$	b) $S = 3+6+12+.....3072$
c) $S = \sqrt{2}+2+2\sqrt{2}+.....256$	d) $S = -\frac{1}{8}+0.25+-0.5+.....256$
e) $S = \frac{64}{81}+\frac{32}{27}+\frac{16}{9}+.....\frac{729}{16}$	f) $S = \frac{125}{64}-\frac{25}{16}+\frac{5}{4}-.....+\frac{1024}{3125}$

2. Given that each of the following series are infinite, determine the sum. Show all your work and steps.

a) $S = 27+9+3+1+.....$	b) $S = 2+1.8+1.62+1.458+.....$
c) $S = 0.4+\frac{3}{100}+\frac{3}{1000}+\frac{3}{10000}+.....$	d) $S = 11+16+8+4+2+.....$
e) $S = 256-128\sqrt{2}+128-2\sqrt{64}+.....$	f) $S = \frac{64}{125}+\frac{16}{25}+\frac{4}{5}+.....$

3. Given the information of a geometric sequence, find the indicated unknown value:

a) $S_2 = 5,\ S_4 = 85,\ r =$	b) $S_3 = 19,\ S_\infty = 27,\ r =$
c) $a = 12,\ r = 2,\ S_n = 762,\ n = ?$	d) $t_2 = 3x,\ t_3 = 2x - 1,\ t_4 = 7x + 8,\ S_6 =$
e) $a = x + 2,\ t_2 = 3x,\ t_3 = x^2 + 8,\ S_5 =$	f) $1 + x + x^2 + x^3 + ... = 20\ ;\ x = ?$

4. What is the sum of the following geometric series?

$$12 + \frac{3}{4} + \frac{9}{16} + \frac{27}{64} + ...$$

5. The sum of the first 8 terms of a geometric series is 1020 with a common ratio of -2. Determine the first term.

6. The sum of an infinite geometric series is 1 and the common ratio is $-\frac{2}{5}$, determine the 3rd term.

7. Determine the 8th term of an infinite geometric series with $S_\infty = 24$ and $r = \frac{3}{4}$

8. A ball is dropped from a height of 2.0m to a floor. After each bounce, the ball rises to 63% of its previous height. What is the total vertical distance the ball has travelled after 5 bounces? What is the total vertical distance the ball travelled after it comes to rest?

9. If the sum of a geometric series is given by the formula $S_n = 4 - 8(-7)^{n-1}$, determine the value of t_5.

10. An oil well produces 30,000 barrels of oil during its first month of production. Suppose its production drops by 5% each month. Estimate the total production before the well runs dry.

11. If the sum of "n" terms of a geometric series is $S_n = 2(3^n - 1)$, determine the 5th term of this series.

12. A contest winner is given two prizes to choose from. Prize A is given $20,000,000 right away. Prize "B" is given $1 in the first year, $2 in the next year, $4, $8, ….. each following year for the next 30 years. After how many years will sum of Prize B surpass the Prize A?

13. For any geometric series, what is the value of $S_{n+1} - S_n$ equal to?

14. The sum of the 1st and 2nd term of a geometic sequence is 4 and the sum of the 3rd and 4th term is 36. Determine the sum of the first 8 terms.

15. Let $S_n = 1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + ... + \frac{1}{2^{n-1}}$. Prove algebraically that S_n is less than "2" for all values of "n". Justify your answer.

16. Let $S_n = 1 + \frac{1}{3} + \frac{1}{9} + \frac{1}{27} + ... + \frac{1}{3^{n-1}}$. Prove algebraically that S_n is less than "1.5" for all values of "n". Justify your answer.

17. For what values of "x" will the series have a finite sum? $1+\left(\frac{x-2}{3}\right)+\left(\frac{x-2}{3}\right)^2+\left(\frac{x-2}{3}\right)^3+....$

18. The geometric series $a+ar+ar^2+....$ has a sum of 7, and the terms involving odd powers of "r" have a sum of 3. What is $a+r$?

19. In a sequence of numbers, the sum of the first "n" terms is equal to $5n^2+6n.$ What is the sum of the 3rd, 4th, and 5th terms of the original sequence.

20. Challenge: AIME II 2012 #2 Two geometric sequences $a_1,a_2,a_3,.....$ and $b_1,b_2,b_3,...$ have the same common ratio, with $a_1=27,\ b_1=99,$ and $a_{15}=b_{11}$. Find the value of a_9

21. Given an geometric series where $\frac{S_4}{S_6}=\frac{117}{133}$ and all six terms are integers, what is the first term and the common ratio?