Name:_____ Date:_____

Math 10/11 Honors Section 3.2 Geometric Sequences

1. Which of the following sequences is geometric. Indicate YES or NO: If YES, indicate the common ratio:

a) 2, 4, 6, 8, 10.....	b) 0.25, 0.50, 1.0, 02.0, 04.0
c) $\frac{2}{3}, \frac{-1}{3}, \frac{1}{6}, \frac{-1}{12}, \frac{1}{24}$	d) $\frac{27}{32}, \frac{9}{16}, \frac{3}{8}, \frac{1}{4}, \frac{1}{6}$
e) $0.75, -0.75, 0.75, -0.75, 0.75$	f) $a+b, a+b^2, a+b^3, a+b^4, a+b^5$
g) $\frac{a}{b}, -\frac{a^2}{b^3}, \frac{a^3}{b^6}, -\frac{a^4}{b^9}, \frac{a^5}{b^{12}}$	h) $\frac{c^2}{d}, \frac{d}{c^2}, \frac{c^2}{d}, \frac{d}{c^2}$

2. If the following is a geometric sequence, indicate the number of terms:

a) 6, 12, 24, ..., 3072	b) 24, 12, 6, ..., $\frac{3}{512}$
c) $\sqrt{3}, -3, 3\sqrt{3}$, ..., $243\sqrt{3}$,	d) $\frac{1}{8}, -0.25, 0.5$, ..., -1024
e) 396, -132, 44, ..., $\frac{44}{729}$	f) $\frac{a^3}{b}, a^2, ab$, ..., $\frac{b^{15}}{a^{13}}$
g) 2048, 512, 128, ..., $\frac{1}{2048}$	h) $x-3, x, 3x+4$, ..., $(x+4)^6$

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

a) $a=-3, r=5, t_4=$	b) $S_2=5, S_4=85, r=$
c) $S_3=26, S_\infty=27, r=$	d) $t_4=\frac{4}{27}, t_7=\frac{32}{729}, S_6=$

e) $a=12,\ r=2,\ S_n=762,\ n=?$	f) $t_2=3x,\ t_3=2x-1,\ t_4=7x+8,\ S_6=$
g) $a=x+2,\ t_2=3x,\ t_3=x^2+8,\ S_5=$	h) $t_3=12,\ t_4=k,\ t_5=48,\ k=$

4. Bacteria grows by division every 20 minutes. One bacterium splits to two in 20 minutes and then it becomes four another 20 minutes later. If one bacterium is put into a culture at 8:30am and the culture is covered at 7:00pm, when was the culture have covered? How many bacteria is there at 7pm?

5. Geometric Means between two terms:
   a. Determine two geometric means between 12 and 48.
   b. Determine two geometric means between x and y

6. What value of "x" in $x,\ 2x+2,\ 3x+3$ will form a geometric sequence?

7. If "a" , "b" and "c" are in a geometric sequence, which are following are also a geometric sequence?
   i) $\frac{1}{a},\ \frac{1}{b},\ \frac{1}{c}$ *ii*) $c,\ -b,\ a$ *iii*) $3^a,\ 3^b,\ 3^c$

8. Determine the value of "x" which makes $3, 3^x, 3^{x-5}$ a geometric sequence?

9. If T_n is the value of the nth term, with $T_n + T_{2n} = x$ and $T_{2n} + T_{3n} = y$, where "x" and "y" are both not equal to zero, which expression is equal to the common ratio?

i) $\left(\frac{x}{y}\right)^n$ *ii*) $\left(\frac{y}{x}\right)^n$ *iii*) $\left(\frac{x}{y}\right)^{\frac{1}{n}}$ *iv*) $\left(\frac{y}{x}\right)^{\frac{1}{n}}$

10. If the first two terms of a geometric sequence are $\sqrt{3},\ \sqrt[3]{3}$ what is the 3rd term?

11. If $t_1 = x + 6,\ t_2 = 2 - 7x,$ and $t_3 = -20x - 4$ are three consecutive terms in a geometric sequence, determine the value(s) of "x"

12. If the nth term of a geometric sequence is given by the formula $S_n = 3\left(\frac{1}{5}\right)^{n-1}$. What is the common ratio?

13. In a geometric sequence, $t_6 = -160$ and $t_9 = 1280$, find the value of t_1.

14. A ball is dropped from a height of 2.0m. After each bounce, it rises to 63% of its previous height. Write a general equation for the height after each bounce. What height does the ball rach after 5 bounces?

15. If $t_5 = 3x + 2$ and $t_7 = 7x - 22$ with a common ratio of $r = -3$, determine t_6 *and* t_8.

16. Determine t_2 of a geometric sequence if $t_4 + t_5 = -3$ and $t_3 + t_4 = -6$

17. Given that $t_1 = 0$ and each term afterwards is equal to half of the previous term plus 1. Give an expression for all terms in the sequence in terms of "n"

18. If a, b and c are positive, consecutive terms of a geometric sequence $\left(that\ is\ \frac{c}{b} = \frac{b}{a} \right)$, then how would the graph of $y = ax^2 + bx + c$ look like? Choose your answer and explain why:

    a) A curve that intersects the x-axis at two distinct points b) Entirely below the x-axis
    c) Entirely above the x-axis d) A straight line e) Tangent to the x-axis

19. A sequence of numbers has 6 as its first term, and every term after the first is defined as follows: If a term, t, is even, the next term in the sequence is $\frac{1}{2}t$. If a term, s, is odd, the next term is $3s + 1$. Thus, the first four terms in the sequence are 6, 3, 10, 5. The 100^{th} term is
    a) 1 b) 2 c) 3 d) 4 e) 6

20. For the previous question, for any value that you pick as the first term, what value will the last term in the sequence be? (Challenge: Proof)

21. Consider sequences of positive real numbers of the form x, 2000, y, …, in which every term after the first is 1 less than the product of its two immediate neighbors. For how many different values of x does the term 2001 appear somewhere in the sequence?

a)1 b) 2 c) 3 d) 4 e) more than 4

A geometric sequence $a, ar, ar^2, \ldots$ is a sequence in which successive terms have a common ratio r. For example, the sequence $2, 10, 50, \ldots$ is a geometric sequence with common ratio $r = 5$ because $\frac{10}{2} = \frac{50}{10} = 5$.

(c) If $y - 1$, $2y + 2$ and $7y + 1$ are the first three terms of a geometric sequence, determine all possible values of y.

(d) For each of the values of y from (c), determine the 6th term of the geometric sequence $y - 1$, $2y + 2$, $7y + 1$, ...

(b) A geometric sequence has 20 terms.
The sum of its first two terms is 40.
The sum of its first three terms is 76.
The sum of its first four terms is 130.
Determine how many of the terms in the sequence are integers.

(A *geometric sequence* is a sequence in which each term after the first is obtained from the previous term by multiplying it by a constant. For example, 3, 6, 12 is a geometric sequence with three terms.)

(b) Determine all possible values of r such that the three term geometric sequence $4, 4r, 4r^2$ is also an arithmetic sequence.
(An *arithmetic sequence* is a sequence in which each term after the first is obtained from the previous term by adding a constant. For example, 3, 5, 7, 9, 11 is an arithmetic sequence.)