$$t_n = a \times r^{n-1} \quad ; \quad r = \frac{t_{n+1}}{t_n} \quad ; \quad t_{n+k} = t_n \times r^k \quad ; \quad S_n = \frac{ar^n - a}{r-1} \quad ; \quad S_n = \frac{a\left(r^n - 1\right)}{r-1} \quad ; \quad S_\infty = \frac{a}{1-r}; \quad 1 < r < 1$$

Pre Calculus 12 Chapter 8 Review Sequences and Series

1	Which of the following is a geometric sequence? A. 1, 4, 9, … B. 2, 4, 10, … C. 12, 7, 2, … D. 18, 12, 8, …
2	As an iceberg melts during the summer, it loses 3% of its mass every 5 days. This iceberg reduces to 40% of its original mass after t days. Which equation could be used to determine the value of t? A. $40 = 100(0.97)^{\frac{t}{5}}$ B. $40 = 100(0.97)^{\frac{5}{t}}$ C. $40 = 100(1.03)^{\frac{t}{5}}$ D. $40 = 100(1.03)^{\frac{5}{t}}$
3	Which of the following sequences is geometric, for all positive values of a? A. $a,\ 2a,\ 3a,\ 4a$ B. $a,\ a^2,\ a^4,\ a^8$ C. $a,\ a^2,\ a^3,\ a^4$ D. $\log a,\ \log a^2,\ \log a^3$
4	The sum of the first four terms of a geometric series with a first term of 5 is given by $S_4 = \frac{5\left(1-3^4\right)}{1-3}$. Determine the common ratio r. A. -3 B. 3 C. 4 D. 5
5	The first and second terms of a geometric sequence have a sum of 15, while the second and third terms have a sum of 60. Use an algebraic method to find the three terms.
6	Sam gave his nephew, Norman, \$1 on his 1st birthday, \$2 on his 2nd birthday, \$4 on his 3rd birthday, and so on. That is, on each subsequent birthday, Sam gave Norman double the previous year's amount. How much money did Sam give Norman on his 15th birthday? A. \$16 383 B. \$16 384 C. \$32 767 D. \$32 768

7	In total, how much money did Sam give Norman up to and including his 21st birthday? A. $1 048 575 B. $1 048 576 C. $2 097 151 D. $2 097 152
8	Determine the number of terms in the geometric sequence $3,\ 6,\ 12,\ \ldots\ ,\ 49\,152$. A. 13 B. 14 C. 15 D. 16
9	Find the sum of the infinite geometric series: $60 - 20 + \frac{20}{3} - \frac{20}{9} + \ \ldots$ A. 15 B. $\frac{400}{9}$ C. 45 D. 90
10	The second and fourth terms of a geometric sequence are 2 and 6. Which of the following is a possible first term? **(A)** $-\sqrt{3}$ **(B)** $-\frac{2\sqrt{3}}{3}$ **(C)** $-\frac{\sqrt{3}}{3}$ **(D)** $\sqrt{3}$ **(E)** 3
11	If the general term of a sequence is defined as $t_n = \frac{n^2+1}{n}$, this sequence can be described in which of the following ways? A. arithmetic sequence, $d = 0.5$ B. geometric sequence, $r = 1.25$ C. geometric sequence, $r = 2.5$ D. neither geometric nor arithmetic
12	Given the following geometric sequence, which of the following terms are in the sequence? Indicate YES or NO $\frac{3}{4},\ -\frac{3}{2},\ 3,\ -6,\ \ldots\ldots\ldots$ a) -384 b) -3072 c) -1536 d) -402653184
13	In a geometric sequence, the 9th term is -5 and the 12th term is 40. Determine the common ratio of this sequence. A. -8 B. -2 C. $-\frac{1}{2}$ D. $-\frac{1}{8}$
14	Write the first 3 terms of the sequence defined by: $t_1 = -2,\quad t_n = 3t_{n-1} - 2,\quad n > 1$ A. $-2,\ -9,\ -30$ B. $-2,\ -9,\ -29$ C. $-2,\ -8,\ -27$ D. $-2,\ -8,\ -26$

15	Given that $2^x,\ 8^y,\ k$ is a geometric sequence, determine k. A. 2^{6y-x} B. 2^{3y-x} C. 2^{10y-5x} D. 2^{2y-2x}
16	Determine the sum of the infinite geometric series $16-12+9-\ldots$ A. $\frac{48}{7}$ B. $\frac{64}{7}$ C. 64 D. no finite sum
17	A ball is bounced such that it always returns back to 65% of it's previous height. If the ball is released at a height of 10meters, then what is the total vertical distance travelled by the ball before it's 5th bounce?
18	The sum of an infinite geometric series is 15. If the 1st term is 6, find the common ratio r. A. $-\frac{3}{5}$ B. $-\frac{2}{5}$ C. $\frac{2}{5}$ D. $\frac{3}{5}$
19	Given that the first three terms of a geometric series is below, for what values of "x" will the sum of the series be convergent ? $(3-2x),\ (3-2x)^2,\ (3-2x)^3,\ldots\ldots$
20	Evaluate: $\sum_{k=2}^{\infty}(-0.3)^k$ A. -0.23 B. 0.07 C. 0.13 D. 0.77
21	If $x-2,\ x+4,\ 5x+2$ are three consecutive terms in a geometric sequence, determine the numerical value(s) of the common ratio(s). A. -1 B. $-4, -1$ C. $-3, 3$ D. $3, -1$

22	The 4th term of a geometric sequence is 250 and the 7th term is -16. Determine the 10th term. A. $-\frac{2}{5}$ B. $\frac{2}{5}$ C. $-\frac{128}{125}$ D. $\frac{128}{125}$
23	Determine the 9th term of the geometric sequence $\frac{1}{20}, \frac{1}{5}, \frac{4}{5}, \ldots$ A. 3 276.80 B. 13 107.20 C. 19 531.25 D. 97 656.25
24	Evaluate: $\sum_{k=1}^{8} 5(3)^k$ A. 5 465 B. 16 395 C. 16 400 D. 49 200
25	Which infinite geometric series has a finite sum? A. $\frac{1}{2} - 1 + 2 - 4 + \ldots$ B. $64 + 48 + 36 + 27 + \ldots$ C. $\frac{1}{24} + \frac{1}{12} + \frac{1}{6} + \frac{1}{3} + \ldots$ D. $16 - 20 + 25 - 31.25 + \ldots$
26	For what values of x $(x \neq 0)$ will the following infinite geometric series have a finite sum? $x + 3x^2 + 9x^3 + \ldots$ A. $-3 < x < 0$ B. $-\frac{1}{3} < x < \frac{1}{3}$ C. $-1 < x < 1$ D. $-3 < x < 3$
27	Determine a value of k for the geometric sequence: $8, k, 20$ A. $\frac{\sqrt{10}}{2}$ B. $2\sqrt{10}$ C. $4\sqrt{5}$ D. $4\sqrt{10}$

28

A new well produces 48 000 L of water in the first month. If the volume of water pumped decreases by 6% each month, determine the total volume of water, in litres, that will be pumped from the well before it runs dry.

A. 51 063.83
B. 93 120
C. 752 000
D. 800 000

29

A ball is dropped from a height of 4 m. After each bounce, the ball rises to 70% of its previous height. What is the maximum height the ball will reach after it hits the ground for the 5th time?

A. 0.47 m
B. 0.67 m
C. 0.96 m
D. 11.09 m

30

If x, 6, $3x$ are three consecutive terms in a geometric sequence, determine the values of x.

A. ± 1
B. $\pm\sqrt{3}$
C. ± 2
D. $\pm 2\sqrt{3}$

31

Determine the fourth term of the sequence defined by $t_n = \frac{(-1)^n}{n+2}$.

A. $-\frac{2}{3}$
B. $-\frac{1}{6}$
C. $\frac{1}{6}$
D. $\frac{2}{3}$

32

If $t_n = \frac{6n+2}{5n+4}$, find t_5.

A. $\frac{13}{14}$
B. $\frac{31}{27}$
C. $\frac{32}{29}$
D. $\frac{67}{59}$

33

In a geometric sequence, $t_3 = 256$ and $t_8 = 781.25$. Find the common ratio r.

A. 1.20
B. 1.25
C. 1.32
D. 3.50

34

Determine n such that the sum of the first n terms of the geometric sequence $3, -6, 12, \ldots$ is $-1\,023$.

A. 9
B. 10
C. 11
D. 12

35 Find the sum of the infinite geometric series whose terms are given by:

$$t_1 = 6$$

$$t_n = \frac{2}{3}t_{n-1}\ ,\ n > 1$$

A. 4
B. 12
C. 18
D. no finite sum

36 Which sigma notation represents the series $0+6+12+18$?

A. $\sum_{k=0}^{4} 6k$

B. $\sum_{k=0}^{3} (6k-6)$

C. $\sum_{k=1}^{4} 6k$

D. $\sum_{k=1}^{4} (6k-6)$

37 If $S_n = n^2 + 3n$, determine an expression for t_n.

A. $n+3$
B. $2n+1$
C. $2n+2$
D. $2n-2$

38 Solve the equation $1 + x + x^2 + x^3 + x^4 + \ldots = 5$

39 In the World Dominoes tournament, 78 125 players are grouped 5 players at each table. One game is played by these 5 players and the winner at each table advances to the next round, and so on until the final game of 5 players. How many rounds would the ultimate winner have played (including the final round)?

40 Determine the sum of n terms of the sequence $3,\ 7,\ 11,\ \ldots\ ,\ 4n-1$.

A. $2n^2 + n$
B. $2n^2 + 5n$
C. $4n^2 + n$
D. $4n - 1$

41 The sum of an infinite geometric series is a positive number S, and the second term in the series is 1. What is the smallest possible value of S?

(A) $\frac{1+\sqrt{5}}{2}$ **(B)** 2 **(C)** $\sqrt{5}$ **(D)** 3 **(E)** 4