P Math 12

Sequences and Series Review

$t_n = ar^{n-1}$ $\qquad$ $S_n = \dfrac{a(1-r^n)}{1-r}$ $\qquad$ $S = \dfrac{a}{1-r}$

1. Find the number of terms in each sequence.

   (a) -6, -12, -24, ..., -192 $\qquad$ (b) -2, 4, -8, ..., 1024

2. In a geometric sequence $t_2 = 3$ and $t_7 = 729$. Determine t_{10}.

3. Determine the value of x which makes 2, 2^x, 2^{x-4},... a geometric sequence.

4. State the general term for the geometric sequence 2, -6, 18, ...

5. Find the indicated sum for each geometric series.

   (a) S_{13} for 4 + 16 + 64 + ... $\qquad$ (b) S_7 for $\dfrac{1}{8}+\dfrac{1}{4}+\dfrac{1}{2}+...$

6. Find the sum of the following geometric series.

   (a) 512 + (-256) + 128 + ... + (-1) $\qquad$ (b) 1 + 3 + 9 + ... + 729

7. How many terms are required in the series (-6) + (-12) + (-24) + ... to add to a sum of -378?

8. A ball is dropped from a height of 5m. The ball rises to 4/5 of the height from which it fell after each bounce. Find the total vertical distance the ball has travelled by the time it hits the ground for the eighth time.

9. Find the sum of the following infinite geometric series, if they exist.

   (a) 4 + 2 + 1 + ... $\qquad$ (b) $5 - 1 + \dfrac{1}{5} - ...$ $\qquad$ (c) -4 + 6 – 9 + ...

10. The first term of a geometric series is 2 and the sum to infinity is 4. Find the common ratio.

11. Use an infinite series to express the following repeated decimals as fractions.

(a) $0.\overline{5}$ (b) $0.\overline{35}$ (c) $0.3\overline{5}$

12. A weather balloon rises 100m the first minute, and each minute after the first it rises 4% less than the previous minute. What is the maximum height the balloon will reach?

13. State the number of terms in each series.

(a) $\sum_{k=1}^{6} 5k$ (b) $\sum_{k=17}^{32} 2^{-k}$ (c) $\sum_{k=-4}^{8} 2k-5$

14. Find the sum of the following series.

(a) $\sum_{k=3}^{8} 3(2^{k-1})$ (b) $\sum_{k=5}^{8} 5(2^{k+1})$ (c) $\sum_{k=0}^{\infty} 5\left(\frac{1}{3}\right)^{k}$

15. Express the following using sigma notation.

(a) 5 + 20 + 80 + ... + 81 920 (b) 3 + 9 + 27 + ... + 2187

Answers

1. (a) 6 (b) 10
2. 19683
3. x = -3
4. $2(-3)^{n-1}$
5. (a) 89 478 484 (b) 127/8
6. (a) 341 (b) 1093
7. 6
8. 36.61m
9. (a) 8 (b) 25/6 (c) no sum
10. 1/2
11. (a) 5/9 (b) 35/99 (c) 32/90
12. 2500m
13. (a) 6 (b) 16 (c) 13
14. (a) 756 (b) 4800 (c) 15/2
15. (a) $\sum_{k=1}^{8} 5(4)^{k-1}$ (b) $\sum_{k=1}^{7} 3^{k}$