

**Sequences and Series Homework Booklet**

1. Determine the common ratio of the sequence: 8, 12, 18, 27, ...  
A.  $\frac{2}{3}$     B.  $\frac{4}{3}$     C.  $\frac{3}{2}$     D. 4
  
2. An aquarium originally containing 30 litres of water loses 6% of its water to evaporation every day. Determine the sequence which shows the number of litres in the aquarium on consecutive days.  
A. 30,  $30(0.94)$ ,  $30(0.94)^2$ ,  $30(0.94)^3$ , ...  
B. 30,  $30(0.06)$ ,  $30(0.06)^2$ ,  $30(0.06)^3$ , ...  
C. 30,  $\frac{30}{1.06}$ ,  $\frac{30}{(1.06)^2}$ ,  $\frac{30}{(1.06)^3}$ , ...  
D. 30,  $\frac{30}{0.94}$ ,  $\frac{30}{(0.94)^2}$ ,  $\frac{30}{(0.94)^3}$ , ...
  
3. Which term of the geometric sequence 5, 15, 45, ... is 885 735?  
A. 10<sup>th</sup>    B. 11<sup>th</sup>    C. 12<sup>th</sup>    D. 13<sup>th</sup>
  
4. Determine an expression which represents:  $\sum_{k=1}^n 4(5)^{k-1}$   
A.  $4(5)^n$     B.  $4(5)^{n-1}$     C.  $1-5^n$     D.  $5^n - 1$
  
5. A ball is dropped from a height of 5 m. After each bounce, it rises to 60% of its previous height. What is the total vertical distance the ball travels before it comes to rest?  
A. 12.5 m    B. 15 m    C. 20 m    D. 25 m
  
6. Determine the common ratio of the geometric series:  $3 - 1 + \frac{1}{3} - \frac{1}{9} + \dots + \frac{1}{243}$   
A. -3    B.  $-\frac{2}{3}$     C.  $-\frac{1}{3}$     D.  $\frac{1}{3}$
  
7. Calculate the 9<sup>th</sup> term of the geometric sequence: 8000, 4000, 2000, ...  
A. 8    B. 15.625    C. 31.25    D. 2 048 000
  
8. If the sum of the first five terms of a geometric series is -328 and the common ratio is -4, determine the first term.  
A. -3.86    B. -1.6    C. 0.96    D. 6.43

9. Evaluate:  $\sum_{k=1}^{\infty} 50\left(\frac{1}{4}\right)^k$
- A.  $\frac{75}{8}$    B.  $\frac{50}{4}$    C.  $\frac{50}{3}$    D.  $\frac{200}{3}$
10. For a geometric sequence,  $t_7 = 5x + 2$  and  $t_{10} = x - 23$ . If the common ratio,  $r$ , is 2, find the value of  $t_{10}$ .
- A.  $-26$    B.  $-24$    C.  $-12$    D.  $-3$
11. The general term of a geometric sequence is  $t_n = 5(-2)^{n-1}$ . Determine the common ratio.
- A.  $-5$    B.  $-2$    C.  $2$    D.  $5$
12. Determine the first term of the expansion of  $\sum_{k=2}^8 3(2^k)$ .
- A. 3   B. 6   C. 12   D. 36
13. Determine the number of terms in the geometric sequence:  $\frac{1}{128}, \frac{1}{32}, \frac{1}{8}, \dots, 2048$
- A. 8   B. 9   C. 10   D. 11
14. Determine the sum of the infinite geometric series:  $3 - 1 + \frac{1}{3} - \frac{1}{9} + \dots$
- A.  $\frac{20}{9}$    B.  $\frac{9}{4}$    C.  $\frac{9}{2}$    D. no finite sum
15. A doctor prescribes medication to be taken for 9 days. The amount taken on the first day is 270 mg. On each successive day, the amount taken is one half the amount taken on the previous day. What is the total amount taken? (Accurate to the nearest mg.)
- A. 538   B. 539   C. 540   D. 541
16. Determine the common ratio of the geometric sequence:  $-4, -1, -\frac{1}{4}, \dots$
- A.  $\frac{1}{4}$    B.  $-\frac{1}{4}$    C. 4   D.  $-4$

17. Bob worked for a company for 5 years. His annual salary was \$38 000. Each year his salary increased by 2% over the previous year's salary. What was the total amount of money Bob earned with this company?

A. \$158621.10    B. \$193800.00    C. \$197753.53    D. \$239708.60

18. Evaluate:  $\sum_{k=3}^7 5(2)^k$

A. 600    B. 635    C. 1240    D. 1270

19. The 3<sup>rd</sup> term of a geometric sequence is 48 and the 6<sup>th</sup> term is  $\frac{81}{4}$ . Find the 1<sup>st</sup> term of the sequence.

A. 3    B. 27    C.  $\frac{256}{3}$     D. 768

20. For what value of  $x$  will the following infinite geometric series have a finite sum?

$$(x+1) + (x+1)^2 + (x+1)^3 + \dots$$

A.  $-1 < x < 0$     B.  $0 < x < 1$     C.  $-2 < x < 1, x \neq 1$     D.  $-2 < x < 0, x \neq -1$

21. Determine the common ratio of the geometric sequence:  $-64, 48, -36, \dots$

A.  $-\frac{4}{3}$     B.  $-\frac{3}{4}$     C.  $\frac{3}{4}$     D.  $\frac{4}{3}$

22. If the sum of  $n$  terms of the geometric sequence  $4, 8, 16, \dots$  is  $S_n = \frac{4(1-2^5)}{1-2}$ , determine the value of  $n$ .

A. 2    B. 4    C. 5    D. 6

23. In the geometric sequence  $\frac{1}{8}, \frac{1}{2}, 2, \dots$ , which term is 524 288?

A. 11    B. 12    C. 13    D. 14

24. Determine the sum of the infinite geometric series:  $\sum_{k=1}^{\infty} 200(0.6)^{k-1}$

A. 125    B. 333    C. 500    D. no finite sum

25. If  $x, 4, 8x$  are three consecutive terms in a geometric sequence, determine the values of  $x$ .

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

26. Calculate the 10<sup>th</sup> term of the geometric sequence: 2, 6, 18, 54, ...  
 A. 1536      B. 3072      C. 39366      D. 118098
27. Evaluate:  $\sum_{k=4}^9 5(2)^k$   
 A. 2480      B. 2555      C. 5040      D. 5110
28. Lana invests in a bond which pays interest at the rate of 2.5% per year compounded annually. After 10 years the value of the bond has increased to \$1267.28. What was the original value of the bond?  
 A. \$136.07      B. \$170.09      C. \$990.00      D. \$1014.75
29. The second term of a geometric series is -16 and the seventh term is 512. Determine the first term.  
 A. -2      B. 2      C. -8      D. 8
30. Determine an expression for the sum of the infinite geometric series:  
 $a - 1 + \frac{1}{a} - \frac{1}{a^2} + \dots$ , where  $a > 1$   
 A.  $\frac{a^2}{a+1}$       B.  $a+1$       C.  $\frac{a^2}{a-1}$       D.  $a-1$
31. Evaluate  $\sum_{k=2}^6 3(3)^{k-2}$   
 A. 242      B. 186      C. 363      D. 728
32. A geometric sequence has a common ratio of 2 and the 12<sup>th</sup> term in the sequence is 16 384. Determine the first term.  
 A. 2      B. 4      C. 8      D. 16
33. Determine the common ratio of the geometric sequence:  $3, \frac{2}{5}, \frac{4}{75}, \dots$   
 A.  $\frac{2}{15}$       B.  $\frac{3}{10}$       C.  $\frac{2}{5}$       D.  $\frac{6}{5}$
34. In a geometric sequence  $t_3 = 45$  and  $t_6 = 1215$  Determine the first term  
 A.  $\frac{3}{5}$       B.  $\frac{5}{3}$       C. 3      D. 5
35. Determine an expression which represents:  $\sum_{k=1}^n 4(5)^{k-1}$   
 A.  $4(5)^n$       B.  $4(5)^{5-1}$       C.  $1-5^n$       D.  $5^n - 1$
36. The exponential function  $y = 2^x$  can be used to determine the number of ancestors you had in a previous generation. For example, if  $x = 2$ , then  $y = 4$  means that 2 generations ago you had 4 ancestors (your 4 grandparents). Determine an expression which represents the total number of ancestors you have had in the last  $n$  generations.  
 A.  $2(2^{n-1} - 1)$       B.  $2^n - 1$       C.  $2^{n+1} - 1$       D.  $2(2^n - 1)$

**Key**

1. C	2. A	3. C	4. D	5. C	6. C
7. C	8. B	9. C	10. B	11. B	12. C
13. C	14. B	15. B	16. A	17. C	18. C
19. C	20. D	21. B	22. C	23. B	24. C
25. B	26. C	27. C	28. C	29. D	30. A
31. C	32. C	33. A	34. D	35. D	36. D