Multiple Choice Section

1. (specs-01)

Determine the common ratio of the geometric sequence $1, -\frac{1}{3}, \frac{1}{9}, -\frac{1}{27}$.

A. -3

B. $-\frac{1}{3}$

C. $\frac{1}{3}$

D. 3

2. (specs-02)

Determine the 14th term of the geometric series: $6 + 12 + 24 + \ldots$

A. 12 288
B. 24 576
C. 49 152
D. 98 304

3. (specs-03)

While training for a race, a runner increases her distance by 10% each day. If she runs 2 km on the first day, what will be her total distance for 26 days of training? (Accurate to 2 decimal places.)

A. 21.67 km
B. 23.84 km
C. 196.69 km
D. 218.36 km

4. (sample02-13)

Evaluate: $\displaystyle\sum_{k=2}^{6} 2(3)^{k-2}$

A. 93
B. 186
C. 242
D. 728

5. (sample02-12)

A geometric sequence has a common ratio of 2 and the 12th term in the sequence is 16 384. Determine the first term.

A. 2
B. 4
C. 8
D. 16

6. (jan02-13)

Which term of the geometric sequence $5, 15, 45, \ldots$ is 885 735 ?

A. 10th
B. 11th
C. 12th
D. 13th

7. (specs-05)

Evaluate: $\displaystyle\sum_{k=3}^{5} \log_k k^2$

A. 1
B. 2
C. 6
D. 8

8. (specs-04)

Evaluate: $\displaystyle\sum_{n=1}^{\infty} \frac{1}{3^n}$

A. $\dfrac{1}{3}$

B. $\dfrac{1}{2}$

C. $\dfrac{2}{3}$

D. 1

9. (sample02-11)

Determine the common ratio of the geometric sequence: $3, \dfrac{2}{5}, \dfrac{4}{75}, \ldots$

A. $\dfrac{2}{15}$

B. $\dfrac{3}{10}$

C. $\dfrac{2}{5}$

D. $\dfrac{6}{5}$

10. (sample02-14)

In a geometric sequence $t_3 = 45$ and $t_6 = 1\,215$. Determine the first term.

A. $\dfrac{3}{5}$

B. $\dfrac{5}{3}$

C. 3

D. 5

11. (jan02-15)

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

12. (jan02-14)

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. $5^{n}-1$

13. (sample02-15)

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. $2\left(2^{n-1}-1\right)$

B. $2^{n}-1$

C. $2^{n+1}-1$

D. $2\left(2^{n}-1\right)$

14. (jan02-11)

Determine the common ratio of the geometric sequence 8, 12, 18, 27, ...

A. $\frac{2}{3}$

B. $\frac{4}{3}$

C. $\frac{3}{2}$

D. 4

15. (apr02-12)

Calculate the 9th term of the geometric sequence: 8 000, 4 000, 2 000, ...

A. 8

B. 15.625

C. 31.25

D. 2 048 000

16. (apr02-13)

If the sum of the first 5 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

17. (jan02-12)

An aquarium originally containing 30 litres of water loses 6% of its water to evaporation every day. Determine a geometric sequence which shows the number of litres of water 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. $30,\ \dfrac{30}{1.06},\ \dfrac{30}{(1.06)^2},\ \dfrac{30}{(1.06)^3},\ ...$

D. $30,\ \dfrac{30}{0.94},\ \dfrac{30}{(0.94)^2},\ \dfrac{30}{(0.94)^3},\ ...$

18. (apr02-11)

Determine the common ratio of the geometric series:

$$3-1+\frac{1}{3}-\frac{1}{9}+...+\frac{1}{243}$$

A. -3

B. $-\dfrac{2}{3}$

C. $-\dfrac{1}{3}$

D. $\dfrac{1}{3}$

19. (apr02-14)

Evaluate: $\displaystyle\sum_{k=1}^{\infty} 50\left(\frac{1}{4}\right)^k$

A. $\dfrac{75}{8}$

B. $\dfrac{50}{4}$

C. $\dfrac{50}{3}$

D. $\dfrac{200}{3}$

20. (apr02-15)

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

21. (apr02-22)

Determine an expression for: $\displaystyle\sum_{n=1}^{5} \log_a n$

A. $\log_a 5$
B. $\log_a 6$
C. $\log_a 15$
D. $\log_a 120$

22. (jun02-11)

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

23. (jun02-12)

Determine the first term in the expansion of $\displaystyle\sum_{k=2}^{8} 3(2^k)$.

A. 3
B. 6
C. 12
D. 36

24. (jun02-13)

Determine the number of terms in the geometric sequence: $\dfrac{1}{128},\ \dfrac{1}{32},\ \dfrac{1}{8},\ \ldots,\ 2\,048$

A. 8
B. 9
C. 10
D. 11

25. (aug02-12)

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

A. $156 621.10
B. $193 800.00
C. $197 753.53
D. $239 708.60

26. (jun02-15)

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 of medication taken? (Accurate to the nearest mg.)

A. 538
B. 539
C. 540
D. 541

27. (jun02-14)

Determine the sum of the infinite geometric series: $3 - 1 + \frac{1}{3} - \frac{1}{9} + \ldots$

A. $\frac{20}{9}$

B. $\frac{9}{4}$

C. $\frac{9}{2}$

D. no finite sum

28. (aug02-11)

Determine the common ratio of the geometric sequence: $-4, -1, -\frac{1}{4}, \ldots$

A. $\frac{1}{4}$

B. $-\frac{1}{4}$

C. 4

D. -4

29. (aug02-13)

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

A. 600
B. 635
C. 1 240
D. 1 270

30. (aug02-14)

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

A. 3

B. 27

C. $\frac{256}{3}$

D. 768

31. (aug02-15)

For what values of x will the following infinite geometric series have a finite sum?

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

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

32. (jan03-11)

Determine the common ratio of the geometric sequence: $-64, 48, -36$

A. $-\dfrac{4}{3}$

B. $-\dfrac{3}{4}$

C. $\dfrac{3}{4}$

D. $\dfrac{4}{3}$

33. (jan03-12)

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

A. 2
B. 4
C. 5
D. 6

34. (jan03-13)

In the geometric sequence $\dfrac{1}{8}, \dfrac{1}{2}, 2, \ldots$, which term is $524\,288$?

A. 11
B. 12
C. 13
D. 14

35. (jan03-14)

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

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

36. (jan03-15)

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

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

37. (apr03-11)

Calculate the 10th term of the geometric sequence: $2, 6, 18, 54, \ldots$

A. 1 536
B. 3 072
C. 39 366
D. 118 098

38. (apr03-12)

Evaluate: $\sum_{k=4}^{9} 5(2)^k$

A. 2 480
B. 2 555
C. 5 040
D. 5 110

39. (apr03-13)

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 $1 267.28. What was the original value of the bond? (Accurate to the nearest cent.)

A. $136.07
B. $170.09
C. $990.00
D. $1 014.75

40. (apr03-14)

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

41. (apr03-15)

Determine an expression for the sum of the infinite geometric series:

$$a - 1 + \frac{1}{a} - \frac{1}{a^2} + \dots, \quad \text{where } a > 1$$

A. $\dfrac{a^2}{a+1}$

B. $a+1$

C. $\dfrac{a^2}{a-1}$

D. $a-1$

42. (jun03-11)

Determine the common ratio of the geometric sequence $24, -36, 54, -81, \dots$

A. $-\dfrac{3}{2}$

B. $-\dfrac{2}{3}$

C. $\dfrac{2}{3}$

D. $\dfrac{3}{2}$

43. (jun03-12)

Calculate the 15th term of the geometric sequence 1.1, 1.32, 1.584, 1.9008, ...

A. 14.12
B. 16.95
C. 48.76
D. 64.36

44. (jun03-13)

Determine the sum of the first 10 terms of the geometric series $100 + 250 + 625 + ...$

A. 254 246.48
B. 381 469.73
C. 635 716.21
D. 953 674.32

45. (jun03-14)

Simplify: $\sum_{k=3}^{5} \log k$

A. $\log 12$
B. $\log 15$
C. $\log 60$
D. $\log 120$

46. (jun03-15)

A ball is dropped from a height of 10 m. After each bounce, the ball rises to 80% of its previous height. What is the total vertical distance that the ball travels before it comes to rest?

A. 22.5 m
B. 50 m
C. 90 m
D. 100 m

47. (aug03-11)

Determine the number of terms in the series defined by $\sum_{k=12}^{38} 3(2)^{k-1}$.

A. 26
B. 27
C. 37
D. 38

48. (aug03-12)

Determine the 11th term of the geometric sequence: $-2, 6, -18, ...$

A. −354 294
B. −118 098
C.   118 098
D.   354 294

49. (aug03-13)

The general term of a geometric sequence is $t_n = 5(2)^{n-1}$. Determine the sum of the first 15 terms.

   A.   81 915
   B.   81 920
   C.   163 835
   D.   163 840

50. (aug03-14)

The sum of an infinite geometric series is 9. If the common ratio is $-\dfrac{1}{3}$, determine the first term.

   A.   6

   B.   12

   C. $\dfrac{27}{4}$

   D. $\dfrac{27}{2}$

51. (aug03-15)

Determine the common ratio of the geometric sequence $\log x$, $\log x^2$, $\log x^4$, $\log x^8$, where $x > 0$.

   A. 2
   B. x
   C. $\log x$
   D. $\log x^2$

52. (jan04-10)

Determine the third term of the geometric sequence x, $3x$, ... , where $x \neq 0$.

   A. $5x$
   B. $6x$
   C. $9x$
   D. $3x^2$

53. (jan04-11)

How many terms are there in the series defined by $\displaystyle\sum_{k=4}^{31} 2(3)^{k-1}$?

   A. 27
   B. 28
   C. 30
   D. 31

54. (jan04-12)

Determine the sum of the first 10 terms of the geometric series defined by $\dfrac{2}{3} - 2 + 6 - 18 + \ldots$

   A. −9 841.33
   B. 3 280.67
   C. 9 841.67
   D. 19 682.67

55. (jan04-13)
In a geometric sequence, $t_2 = 480$ and $t_7 = -15$. Determine the common ratio, r.

A. -3

B. -2

C. $-\dfrac{1}{3}$

D. $-\dfrac{1}{2}$

56. (apr04-10)
Determine an expression for the number of terms in the series:

$$\sum_{k=a}^{b} 5(3)^{k-1}$$

A. b
B. $b-a$
C. $b-a+1$
D. $b-a-1$

57. (apr04-11)
Determine the sum of the first 12 terms of the geometric series: $-18+12-8+\ldots$

A. -941.37
B. -10.88
C. -10.72
D. 926.97

58. (apr04-12)
In a geometric sequence, $t_4 = -192$ and $t_7 = 12\,288$. Determine the first term.

A. -4
B. -3
C. 3
D. 4

59. (apr04-13)
A shoe store is closing and wants to sell all of its shoes. At the start of each week, the price of all shoes is reduced by 10% of the current price. If a pair of shoes costs $100 during the first week of the sale, determine the price of these shoes during the 6th week of the sale.

A. $50.00
B. $53.14
C. $59.05
D. $65.61

60. (jun04-10)
Determine the 9th term of the geometric sequence $\dfrac{1}{20}, \dfrac{1}{5}, \dfrac{4}{5}, \ldots$

A. $3\,276.80$
B. $13\,107.20$
C. $19\,531.25$
D. $97\,656.25$

61. (apr04-14)
Determine the common ratio of the infinite geometric sequence:

$$\log_3 a, \ \log_9 a, \ \log_{81} a, \ \dots, \quad \text{where } a > 0$$

A. $\dfrac{1}{3}$

B. $\dfrac{1}{2}$

C. 2

D. 3

62. (jun04-11)

Evaluate: $\displaystyle\sum_{k=1}^{8} 5(3)^k$

A.   5 465
B.   16 395
C.   16 400
D.   49 200

63. (jun04-12)
Which infinite geometric series has a finite sum?

A. $\dfrac{1}{2} - 1 + 2 - 4 + \dots$

B. $64 + 48 + 36 + 27 + \dots$

C. $\dfrac{1}{24} + \dfrac{1}{12} + \dfrac{1}{6} + \dfrac{1}{3} + \dots$

D. $16 - 20 + 25 - 31.25 + \dots$

64. (jun04-13)
Determine a value of k for the geometric sequence: $8, \ k, \ 20$

A. $\dfrac{\sqrt{10}}{2}$

B. $2\sqrt{10}$

C. $4\sqrt{5}$

D. $4\sqrt{10}$

65. (jun04-14)
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

66. (aug04-10)

Determine the number of terms in the geometric sequence: $\dfrac{1}{81}, \dfrac{1}{27}, \dfrac{1}{9}, \ldots , 531441$

A. 14
B. 15
C. 16
D. 17

67. (aug04-11)

Evaluate: $\displaystyle\sum_{k=3}^{13} 5(-2)^{k-1}$

A. 13660
B. 13655
C. −13651.67
D. −13646.67

68. (aug04-13)

Determine the sum of the infinite geometric series: $800 + 300 + \dfrac{225}{2} + \ldots$

A. 1280
B. 1212.5
C. 1254.69
D. no finite sum

69. (aug04-14)

The third term of a geometric sequence is 3 and the sixth term is $\dfrac{64}{9}$. Find the fifth term of this sequence.

A. $\dfrac{27}{16}$

B. $\dfrac{16}{3}$

C. $\dfrac{32}{3}$

D. $\dfrac{256}{27}$

Written Section

1. (specs-06)

A graduation class informs its members of changes in plans by telephone. The president of the class calls two members, each of whom in turn calls two other members, and so on, as shown in the diagram. By the 9th level, all members of the graduation class have been contacted. Determine how many students in total are in the graduation class.
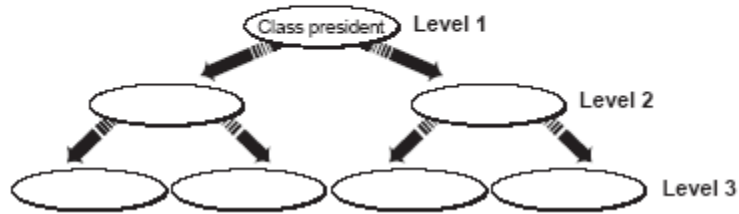
2. (specs-07)

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)?

3. (specs-08)

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.