Arithmetic and Geometric Series Tests … Set 1

Sequences and Series Test

Multiple Choice
Identify the choice that best completes the statement or answers the question.

Describe the pattern in the sequence. Find the next three terms.

_____ 1. 13, 15, 17, 19, ...
    a. Add 2; 23, 25, 27.
    b. Multiply by 2; 38, 76, 152.
    c. Add –2; 17, 15, 13.
    d. Add 2; 21, 23, 25.

_____ 2. 4, 8, 16, 32, ...
    a. Multiply by 2; 64, 128, 256.
    b. Multiply by –2; –64, 128, –256.
    c. Multiply by 2; 128, 256, 512.
    d. Add 2; 34, 36, 38.

_____ 3. Suppose you drop a tennis ball from a height of 15 feet. After the ball hits the floor, it rebounds to 85% of its previous height. How high will the ball rebound after its third bounce? Round to the nearest tenth.
    a. 9.2 feet   b. 10.8 feet   c. 7.8 feet   d. 1.9 feet

_____ 4. Write a recursive formula for the sequence 8, 10, 12, 14, 16, ... Then find the next term.
    a. $a_n = a_{n-1} + 2$, where $a_1 = 8$; 18
    b. $a_n = a_{n-1} + 2$, where $a_1 = 18$; 8
    c. $a_n = a_{n-1} - 2$, where $a_1 = 8$; 18
    d. $a_n = a_{n-1} - 2$, where $a_1 = 2$; –2

_____ 5. Write a recursive formula for the sequence 15, 26, 48, 92, 180, ... Then find the next term.
    a. $a_n = 2a_{n-1} - 4$, where $a_1 = 15$; 356
    b. $a_n = 2a_n - 4$, where $a_1 = 15$; 356
    c. $a_n = 4 + 11 \cdot 2^{n-1}$, where $a_1 = 15$; 356
    d. $a_n = 3a_{n-1} - 19$, where $a_1 = 15$; 356

_____ 6. Write an explicit formula for the sequence 7, 2, –3, –8, –13, ... Then find a_{14}.
    a. $a_n = -5n + 12$; –53   c. $a_n = -5n + 12$; –58
    b. $a_n = -5n + 7$; –58   d. $a_n = -5n + 7$; –63

Answers

MULTIPLE CHOICE

1. D

2. A

3. A

4. A

5. A

6. C

_____ 7. The table shows the predicted growth of a particular bacteria after various numbers of hours. Write an explicit formula for the sequence of the number of bacteria.

Hours (n)	1	2	3	4	5
Number of Bacteria	19	38	57	76	95

    a. $a_n = 19n + 19$ c. $a_n = \dfrac{1}{19}n$

    b. $a_n = n + 19$ d. $a_n = 19n$

_____ 8. Is the formula $a_n = -4n(n-1)$ is *explicit* or *recursive*? Find the first five terms of the sequence.
    a. recursive; 1, –4, 16, –64, 256   c. explicit; 1, –4, 16, –64, 256
    b. recursive; 0, –16, –24, –48, –80   d. explicit; 0, –8, –24, –48, –80

Is the sequence arithmetic? If so, identify the common difference.

_____ 9. 13, 20, 27, 34, …
    a. yes, 7   b. yes, –7   c. yes, 13   d. no

_____ 10. 14, 21, 42, 77, …
    a. yes, 7   b. yes, –7   c. yes, 14   d. no

_____ 11. Find the 50th term of the sequence 5, –2, –9, –16, …
    a. –352   b. –343   c. –338   d. –331

_____ 12. Find the missing term of the arithmetic sequence 22, ▨ , 34,…

    a. 46   b. 16   c. 28   d. 40

_____ 13. A grocery clerk sets up a display of 12-pack cartons of cola. There are 15 cartons at the base of the triangle and one at the top. How many cartons of cola are needed for the complete display?

    a. 180 cartons   c. 120 cartons
    b. 30 cartons   d. 15 cartons

Is the sequence geometric? If so, identify the common ratio.

_____ 14. 6, 12, 24, 48, …
    a. yes, 2   b. yes, –2   c. yes, 4   d. no

_____ 15. 2, –4, –16, –36, …
    a. yes, –2   b. yes, 2   c. yes, –3   d. no

Answers

MULTIPLE CHOICE

7. D
8. D
9. A
10. D
11. C
12. C
13. C
14. A
15. D

_____ 16. $\frac{1}{3}, \frac{2}{9}, \frac{4}{27}, \frac{8}{81}, \frac{16}{243}, \ldots$

    a.   yes, $\frac{2}{3}$ c.   yes, $\frac{1}{6}$

    b.   yes, $\frac{1}{9}$ d.   not geometric

Write the explicit formula for the sequence. Then find the fifth term in the sequence.

_____ 17. $a_1 = 3, r = -3$

    a. $a_n = 3 \cdot (-3)^{n-1}; 243$ c. $a_n = 3 \cdot (3)^n; 243$

    b. $a_n = -3 \cdot (3)^{n-1}; -243$ d. $a_n = 3 \cdot (-3)^n; -729$

_____ 18. $a_1 = 120, r = 0.3$

    a. $a_n = 120 \cdot (0.3)^n; 0.2916$ c. $a_n = 120 \cdot (0.3)^n; 0.972$

    b. $a_n = a_{n-1} \cdot 0.3; 0.2916$ d. $a_n = 120 \cdot (0.3)^{n-1}; 0.972$

_____ 19. A rope is swinging in such a way that the length of the arc is decreasing geometrically. If the first arc is 18 feet long and the third arc is 8 feet long, what is the length of the second arc?

    a.   12 feet   b.   10 feet   c.   5 feet   d.   72 feet

_____ 20. The sequence 15, 21, 27, 33, 39, ..., 75 has 11 terms. Evaluate the related series.

    a.   420   c.   210

    b.   495   d.   480

_____ 21. The sequence 2, 4, 6, 8, ..., 24 has 12 terms. Evaluate the related series.

    a.   288   b.   156   c.   144   d.   132

_____ 22. Use summation notation to write the series $49 + 54 + 59 + \ldots$ for 14 terms.

    a. $\displaystyle\sum_{n=1}^{14}(49 + 5n)$ c. $\displaystyle\sum_{n=1}^{14}(44 + 5n)$

    b. $\displaystyle\sum_{n=1}^{13}(44 + 5n)$ d. $\displaystyle\sum_{n=1}^{44}(49 + 5n)$

_____ 23. Use summation notation to write the series $2 + 4 + 6 + 8 + \ldots$ for 10 terms.

    a. $\displaystyle\sum_{n=1}^{10}2n$ b. $\displaystyle\sum_{n=1}^{10}(n + 2)$ c. $\displaystyle\sum_{n=1}^{10}n$ d. $\displaystyle\sum_{n=0}^{10}2n$

_____ 24. Use summation notation to write the series $6.6 + 15.4 + 24.2 + \ldots$ for 5 terms.

    a. $\displaystyle\sum_{n=1}^{5}(-2.2 + 8.8n)$ c. $\displaystyle\sum_{n=0}^{4}(-2.2 + 8.8n)$

    b. $\displaystyle\sum_{n=0}^{4}(8.8 + 6.6n)$ d. $\displaystyle\sum_{n=1}^{5}(8.8 + 6.6n)$

Answers

MULTIPLE CHOICE

16. A

17. A

18. D

19. A

20. B

21. B

22. C

23. A

24. A

_____ 25. For the series $\sum\limits_{n=1}^{8} 4n$, find the number of terms in the series.

     a.   7 terms   b.   16 terms   c.   8 terms   d.   9 terms

_____ 26. For the series $\sum\limits_{n=4}^{9} (n + 1)$, find the number of terms in the series.

     a.   4 terms   b.   13 terms   c.   6 terms   d.   5 terms

_____ 27. For the series $\sum\limits_{n=1}^{5} (n + 4)$, find the first and the last term.

     a.   5, 8   b.   −3, 1   c.   5, 9   d.   4, 20

_____ 28. For the series $\sum\limits_{n=4}^{7} -4n$, find the first and the last term.

     a.   −12, −32   b.   0, 3   c.   −8, −11   d.   −16, −28

_____ 29. Evaluate the series $\sum\limits_{n=1}^{4} (n + 4)$.

     a.   26   b.   10   c.   16   d.   −6

_____ 30. Evaluate the series $\sum\limits_{n=3}^{8} 5n$.

     a.   125   b.   38   c.   210   d.   165

_____ 31. Evaluate the series $6 - 24 + 96 - 384 + \ldots$ to S_7.

     a.   19,662   b.   −78,642   c.   −4914   d.   1230

_____ 32. Evaluate the series $1000 + 500 + 250 + \ldots$ to S_5.

     a.   968.75   b.   1062.5   c.   1937.5   d.   12,500

_____ 33. Justine earned \$17,000 during the first year of her job at city hall. After each year she received a 4% raise. Find her total earnings during the first five years on the job.

     a.   \$3,541.44   b.   \$72,189.89   c.   \$517,077.48   d.   \$92,077.48

_____ 34. A rubber ball dropped on a hard surface takes a sequence of bounces, each one $\frac{3}{5}$ as high as the preceding one. If this ball is dropped from a height of 10 feet, what is the total vertical distance it has traveled after it hits the surface the 5th time?

     a. $23\frac{7}{125}$ feet   b. $36\frac{14}{125}$ feet   c. $43\frac{111}{125}$ feet   d. $46\frac{14}{125}$ feet

_____ 35. Evaluate the series $1 + 2 + 4 + 8$ to S_{10}.

     a.   256.5   b.   511   c.   1023   d.   2047

Answers

MULTIPLE CHOICE

25. C

26. C

27. C

28. D

29. A

30. D

31. A

32. C

33. D

34. B

35. C

____ 36. In June, Cory begins to save money for a video game and a TV he wants to buy in December. He starts with $20. Each month he plans to save 10% more than the previous month. How much money will he have at the end of December?

a. $154.31   b. $251.59   c. $228.72   d. $189.74

Does the infinite geometric series diverge or converge? Explain.

____ 37. $\frac{1}{5} + \frac{1}{10} + \frac{1}{20} + \frac{1}{40} + \ldots$

a. It diverges; it has a sum.   c. It converges; it has a sum.
b. It diverges; it does not have a sum.   d. It converges; it does not have a sum.

____ 38. $3 + 9 + 27 + 81 + \ldots$

a. It converges; it does not have a sum.   c. It diverges; it does not have a sum.
b. It diverges; it has a sum.   d. It converges; it has a sum.

Evaluate the infinite geometric series. Round to the nearest hundredth if necessary.

____ 39. $8 + 4 + 2 + \ldots$

a. 16   b. 2   c. 16   d. 8

____ 40. $1 + 0.1 + 0.01 + \ldots$

a. 0.33   b. 1.11   c. 1.2   d. 2

Answers

MULTIPLE CHOICE

36. D

37. C

38. C

39. A

40. B