

Sequences and Series Test Review

Work below!

Multiple Choice - Identify the letter of the choice that best completes the statement or answers the question. Write letter answers in the blank.

Write an equation for the n th term of the given arithmetic sequence.

C

1. 6, 11, 16, 21, ...

A) $a_n = 5n - 1$

B) $a_n = 6n - 1$

C) $a_n = 5n + 1$

D) $a_n = 11n - 5$

A

2. -5, -12, -19, -26, ...

A) $a_n = -7n + 2$

B) $a_n = 7n - 12$

C) $a_n = -7n - 12$

D) $a_n = -5n + 1$

Find the indicated term of the given arithmetic sequence.

C

3. a_{14} for 360, 356, 352, ...

A) 412

B) 304

C) 308

D) 399

C

4. $a_1 = 95, d = -7, n = 12$

A) 172

B) 1038

C) 18

D) 11

B

5. Maria drops a stone from the top of a building. The stone falls 2.0 meters in the 1st second. If it has fallen 149 meters by the 50th second, how many meters would the stone have fallen after 10 seconds?

A) 21

B) 29

C) 32

D) 35

A

6. A ditch contains 10 centimeters of water. Rainwater accumulates in the ditch as follows: 10 centimeters of water in the 1st second, 15 centimeters in the 2nd second, 20 centimeters in the 3rd second, and so on. Assuming that the ditch has sufficient capacity for storage, how many centimeters of water will it have after 10 seconds?

A) 55

B) 65

C) 75

D) 110

A

7. A scientist drops two balls A and B from the same height. Ball A falls 4 meters in the 1st second, 9 meters in the 2nd second, 14 meters in the 3rd second, and so on. Ball B falls 3.5 meters in the 1st second, 6.5 meters in the 2nd second, 9.5 meters in the 3rd second, and so on. How many meters would each ball fall in 10 seconds?

A) A: 49; B: 30.5

B) A: 54; B: 33.5

C) A: 59; B: 36.5

D) A: 85; B: 72

- B 8. James covers a distance of 8 meters in the first second of a 100 meter race. Then, he sprints at a speed of 9 meters per second. How far is James from the finish line 9 seconds after the race has started?

A) 11 B) 20 C) 28 D) 80

Find the arithmetic means in the given sequence.

- A 9. 75, ?, ?, ?, 135

A) 90, 105, 120 B) 120, 105, 90 C) 85, 95, 105 D) 95, 115, 125

Find the sum of the given arithmetic series.

- B 10. $27 + 54 + 81 + 108 + \dots + 540$

A) 5940 B) 5670 C) 11340 D) 10773

- C 11. $\sum_{k=5}^{20} (7n + 25)$

A) 1856 B) 1600 C) 1800 D) 3600

- D 12. $a_1 = 16, d = -9, n = 18$

A) 1521 B) -2178 C) -1233 D) -1089

Write an equation for the nth term of the given geometric sequence.

- B 13. 2, 6, 18, ..., a_n

A) $2\left(\frac{1}{3}\right)^{n+1}$ B) $2(3)^{n-1}$ C) $2\left(\frac{1}{3}\right)^{n-1}$ D) $18(3)^{n-1}$

Find the indicated term of the given geometric sequence.

- B 14. $a_1 = -17, r = 5, n = 10$

A) 166015624 B) -33203125 C) -5019165 D) -1700000

- B 15. $a_1 = -15, r = 5, n = 10$

A) 146484374 B) -29296875 C) -1500000 D) -4428675

Find the geometric means in the following sequence.

C

16. $-14, \underline{\quad ? \quad}, \underline{\quad ? \quad}, \underline{\quad ? \quad}, \underline{\quad ? \quad}, -826686$

A) $-1134, -10206, -91854, -826701$

C) $-126, -1134, -10206, -91854$

B) $126, 1134, 10206, 91854$

D) $-2520, -3780, -5040, -6300$

Find the sum of the given infinite geometric series.

D

17. $a_1 = -20, a_5 = -1620, r = 3$

A) -800

B) -4100

C) -1220

D) -2420

D

18. $a_1 = 34, r = -0.01$

A) 34.34

B) 134

C) 34.1

D) 33.66

Find a_1 for the given geometric series.

A/C

19. $S_n = 46560, r = 4, n = 4$

A) 547.76

B) 905.84

C) 547.76

D) 11634.00

C

20. $S_n = 86185, r = 2, n = 10$

A) 8609.50

B) 252.25

C) 84.25

D) 7835.00

B

21. Write a recursive formula for the sequence $4, 9, 14, 19, 24, \dots$. Then find the next term.

A) $a_n = a_{n-1} - 5$, where $a_1 = 5; -21$

B) $a_n = a_{n-1} + 5$, where $a_1 = 4; 29$

C) $a_n = a_{n-1} - 5$, where $a_1 = 4; 29$

D) $a_n = a_{n-1} + 5$, where $a_1 = 29; 4$

D

22. Find the 112 term of the sequence $4, 7, 10, 13, \dots$

A) 124

B) 340

C) -329

D) 337

B

23. Find the 2nd and 3rd term of the sequence $-1, \underline{\quad}, \underline{\quad}, 56, 75, \dots$

A) $18, 35$

B) $18, 37$

C) $37, 18$

D) $16, 37$

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

C

24. $4, 12, 36, 108, \dots$

A) yes; 6

B) yes; -3

C) yes; 3

D) no

- D 25. 4, 16, 64, 144, ...
 A) yes; -4 B) yes; 4 C) yes; 3 D) no

What is a possible value for the missing term of the geometric sequence?

- B 26. 33, ____, 1188, ...
 A) 7128 B) 198 C) 39 D) 6

What is the sum of the finite arithmetic series?

- B 27. $15 + 19 + 23 + 27 + 31 + 35 + 39$
 A) 150
 B) 189
 C) 174
 D) -159

- A 28. $17 + 22 + 27 + 32 + 37 + \dots + 67$
A) 462 C) 445
 B) 395 D) 202

- C 29. Evaluate the series $\sum_{n=1}^6 (n - 3)$.
 A) -18 B) 39 C) 3 D) 21

- A 30. Evaluate the series $\sum_{n=3}^8 6n$.
A) 198 B) 150 C) 252 D) 39

- A 31. Evaluate the series $1 + 3 + 9 + 27 + 81 + 243$.
A) 364 B) 363 C) 1093 D) 121

- C 32. What is the sum of the geometric series $\sum_{x=1}^{10} 6(2)^x$?
 A) 15,658 B) 6,138 C) 12,276 D) 756

Does the infinite geometric series diverge or converge? Explain.

- C 33. $\frac{1}{3} + \frac{1}{6} + \frac{1}{12} + \frac{1}{24} + \dots$
 A) It diverges; it has a sum.
 B) It diverges; it does not have a sum.
C) It converges; it has a sum.
 D) It converges; it does not have a sum.
- D 34. $4 + 8 + 16 + 32 + \dots$
 A) It converges; it has a sum.
 B) It converges; it does not have a sum.
C) It diverges; it has a sum.
D) It diverges; it does not have a sum.

Formulas:

arithmetic sequence
 $a_n = a_1 + (n-1)d$

arithmetic series
 $S_n = \frac{n}{2}(a_1 + a_n)$

geometric sequence
 $a_n = a_1(r)^{n-1}$

finite geometric series
 $S_n = \frac{a_1(1-r^n)}{1-r}$

infinite geometric series

$$S_n = \frac{a_1}{1-r} \rightarrow |r| < 1$$

① $6, 11, 16, 21, \dots$
 $\begin{matrix} \curvearrowright \\ +5 \end{matrix}$
 $d = 5$

$$a_n = 6 + (n-1)5$$

$$a_n = 6 + 5n - 5$$

$$a_n = 5n + 1 \quad \text{(C)}$$

② $-5, -12, -19, -26, \dots$
 $\begin{matrix} \curvearrowright \\ -7 \end{matrix}$
 $d = -7$

$$a_n = -5 + (n-1)(-7)$$

$$a_n = -5 - 7n + 7$$

$$a_n = -7n + 2 \quad \text{(A)}$$

③ a_{14} for $360, 356, 352, \dots$

$$d = -4$$

$$a_{14} = 360 + (14-1)(-4)$$

$$a_{14} = 308 \quad \text{(C)}$$

④ $a_1 = 95$ $d = -7$ $n = 12$

$$a_{12} = 95 + (12-1)(-7)$$

$$a_{12} = 18 \quad \text{(C)}$$

⑤ find d. $149 = 2 + (50-1)d$
 $-2 \quad -2$
 $147 = \frac{49d}{49}$ (B)
 $3 = d$
 $a_1 = 2$
 $a_{50} = 149$
 $a_{10} = ?$
 $a_{10} = 2 + (10-1)(3)$
 $a_{10} = 29$

⑥ 10, 15, 20, ...
 $a_{10} = 10 + (10-1)(5)$ (A)
 $a_{10} = 55$

⑦ A 4, 9, 14, ... (A) $a_{10} = 4 + (10-1)(5)$
 49 (A)

B 3.5, 6.5, 9.5, ... (B) $a_{10} = 3.5 + (10-1)(3)$
 30.5

⑧ 8_1
 $+9$
 $a_9 = 8 + (9-1)(9)$
 $= 80$ meters (B)

BUT they asked how far James is from the finish line
 $100 - 80 = 20$

⑨ 75, $\frac{90}{2}$, $\frac{105}{3}$, $\frac{120}{4}$, 135
 $1 \quad 2 \quad 3 \quad 4 \quad 5$
 $a_n = a_1 + (n-1)d$
 $135 = 75 + (5-1)d$
 $-75 \quad -75$

 $60 = \frac{4d}{4}$
 $d = 15$

(10)

$$27 + 54 + 81 + 108 + \dots + 540$$

$$S_n = \frac{20}{2}(27 + 540)$$

$$S_n = 5670$$

(B)

$$a_n = a_1 + (n-1)d$$

$$540 = 27 + (n-1)(27)$$

$$\frac{513}{27} = \frac{27(n-1)}{27}$$

$$19 = n-1$$

$$+1 \quad +1$$

$$n = 20$$

(11)

$$\sum_{k=5}^{20} (7n+25)$$

$$n = 20 - 5 + 1 = 16$$

$$a_1 = 7(5) + 25 = 60$$

$$a_n = 7(20) + 25 = 165$$

$$S_n = \frac{16}{2}(60 + 165)$$

$$S_n = 1800$$

(C)

(12)

$$a_1 = 16$$

$$d = -9$$

$$n = 18$$

$$a_n = ?$$

$$a_n = a_1 + (n-1)d$$
$$= 16 + (18-1)(-9)$$
$$= -137$$

(D)

$$S_n = \frac{18}{2}(16 + -137)$$

$$S_n = 9(-121)$$

$$S_n = -1089$$

(13)

$$2, 6, 18, \dots, a_n$$

$$2(3)^{n-1}$$

(B)

(14)

$$a_1 = -17, r = 5, n = 10$$

$$-17(5)^{n-1} = -17(5)^{10-1} = -33203125$$

(15)

$$a_1 = -15, r = 5, n = 10$$

$$-15(5)^{n-1} \rightarrow -15(5)^{10-1} = -29296875$$

$$(16) \quad \overset{\times 9}{-14, -126, -1134, \dots, -826686}$$

$$\frac{-826686}{-14} = \frac{-14(r)^{6-1}}{-14}$$

(C)

$$\sqrt[5]{59049} = \sqrt[5]{r^5}$$

$$r = 9$$

$$(17) \quad a_1 = -20$$

$$a_5 = -1620$$

$$r = 3$$

not infinite!

$$S_n = \frac{-20(1-3^5)}{1-3}$$

(D)

$$= -2420$$

$$(18) \quad a_1 = 34$$

$$r = -0.01$$

$$S_n = \frac{34}{1-(-.01)} = 33.66$$

(D)

$$(19) \quad 46560 = \frac{a_1(1-4^4)}{1-4}$$

$$-3 \cdot 46560 = \frac{a_1(-255)}{-3} \cdot -3$$

$$\frac{-139680}{-255} = \frac{a_1(-255)}{-255}$$

$$a_1 = 547.76$$

(A/C)

$$(20) \quad 86185 = \frac{a_1(1-2^{10})}{1-2}$$

$$86185 = \frac{a_1(-1023)}{-1}$$

$$86185 = a_1(1023)$$

$$84.25 = a_1$$

(21) $4, 9, 14, 19, 24, \dots, 29$
 $\xrightarrow{+5} \xrightarrow{+5} \xrightarrow{+5}$

$a_1 = 4$
 $a_n = a_{n-1} + 5$

(B)

(22) $4, 7, 10, 13, \dots$ $a_{112} = 4 + (112-1)(3)$
 Arithmetic

$a_{112} = 337$

(23) $-1, -1, -1, 56, 75, \dots$
 $\xleftarrow{-19} \xleftarrow{-19}$
 $18, 37$

(24) $4, 12, 36, 108, \dots$
 $\xrightarrow{\times 3} \xrightarrow{\times 3} \xrightarrow{\times 3}$ yes, 3

(25) $4, 16, 64, 144, \dots$
 $\xrightarrow{\times 4} \xrightarrow{\times 4} \xrightarrow{\times 2.25}$
 NO!

(26) $33, \frac{1188}{2}, \frac{1188^3}{3}, \dots$
 $a_n = a_1(r)^{n-1}$ $33 \times 6 = 198$

$\frac{1188}{33} = \frac{33(r)^{2-1}}{33}$

$180 = \sqrt{r^2}$
 $r = 180$

(27) $15 + 19 + 23 + 27 + 31 + 35 + 39$

either add all terms OR $S_n = \frac{7}{2}(15 + 39)$

189 (B)

(28) $17 + 22 + 27 + 32 + 37 + \dots + 67$

$S_n = \frac{11}{2}(17 + 67)$

$S_n = 462$

$67 = 17 + (n-1)(5)$

$+17 \quad -17$

$\frac{50}{5} = \frac{(n-1)(5)}{5}$ (A)

$10 = n-1$
 $n = 11$

(29) $\sum_{n=1}^6 n-3$

$a_1 = 1-3 = -2$

$a_n = 6-3 = 3$

$n = 6-1+1 = 6$

$S_n = \frac{6}{2}(-2+3)$

$S_n = 3$ (C)

(30) $\sum_{n=3}^8 6n$

$a_1 = 6(3) = 18$

$a_n = 6(8) = 48$

$n = 8-3+1 = 6$

$S_n = \frac{6}{2}(18+48)$

$S_n = 198$ (A)

(31) $1 + 3 + 9 + 27 + 81 + 243$

add all up OR

$S_n = \frac{1(1-3^6)}{1-3} = 364$ (A)

(32) $\sum_{x=1}^{10} 4(2)^x$

$n = 10-1+1 = 10$

$r = 2$

$a_1 = 4(2)^1 = 8$

$S_n = \frac{12(1-2^{10})}{1-2} =$

$12,276$

33 $\frac{1}{3} + \frac{1}{6} + \frac{1}{12} + \frac{1}{24} + \dots$

$r = \frac{\frac{1}{6}}{\frac{1}{3}} = \frac{1}{2}$ $r < 1$
converges w/sum (C)

34 $4 + 8 + 16 + 32 + \dots$

$r = \frac{8}{4} = 2$ $r > 1$
diverges, no sum (D)

put a smiley face
on your test for a bonus
point!