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Online Homework

Focused Exercises for Math SAT

Skill Set 17: Sequences

Many of the problems in this exercise set came from The College Board, writers of the SAT exam.

1. 7, 15, 31, 63, ...

   The first term in the sequence above is 7, and each term after the first is determined by multiplying the preceding term by *m* and then adding *p*. What is the value of *m* ?

   (A) 1
   (B) 2
   (C) 3
   (D) 4
   (E) 9

2. 2, 6, 14, 30, ...

   In the sequence above, the first term is 2. Each number after the first is obtained by adding 1 to the preceding number and then doubling the result. What is the sixth number in the sequence?

   (A) 122
   (B) 123
   (C) 124
   (D) 125
   (E) 126

3. 150, 30, 6, ...

   In the sequence above, each term after the 1st term is $\frac{1}{5}$ of the term preceding it. What is the 5th term of this sequence?

4. The first term of a sequence is 20 and the second term is 8. The third term and each term thereafter is the average (arithmetic mean) of the two terms immediately preceding it. What is the value of the first term in the sequence that is <u>not</u> an integer?

   (A) 22.6
   (B) 1.23
   (C) 24.7
   (D) 12.5
   (E) 6.8

5. *a*, 3*a*, ...

The first term in the sequence above is *a*, and each term after the first is 3 times the preceding term. If the sum of the first 5 terms is 605, what is the value of *a* ?

6. 8, 17, 26, 35, 44, ...

The first 5 terms in a sequence are shown above. Each term after the first is found by adding 9 to the term immediately preceding it. Which term in this sequence is equal to $8 + (26 - 1)\,9$?

(A) The 8th
(B) The 9th
(C) The 25th
(D) The 26th
(E) The 27th

7. In the repeating decimal 0.1246812468... where the digits 12468 repeat, which digit is in the 4,000th place to the right of the decimal point?

(A) 1
(B) 2
(C) 4
(D) 6
(E) 8

8. The first term of a sequence of numbers is -3. Each term after the first is obtained by multiplying the preceding term by -1 and then subtracting 1. What is the 75th term of the sequence?

(A) -73
(B) -3
(C) 2
(D) 4
(E) 73

9. 3, 5, -5, ...

The first term in the sequence of numbers shown above is 3. Each even numbered term is 2 more than the previous term and each odd numbered term, after the first, is -1 times the previous term. For example, the second term is 3 + 2, and the third term is $(-1) \times 5$. What is the 55th term of the sequence?

(A) -5
(B) -3
(C) -1
(D) 3
(E) 5

10. The first two numbers of a sequence are 1 and 3, respectively. The third number is 4, and, in general, every number after the second is the sum of the two numbers immediately preceding it. How many of the first 1,000 numbers in this sequence are odd?

(A) 333
(B) 500
(C) 665
(D) 666
(E) 667

11. -1, 0, 1, 2

A sequence is formed by repeating the 4 numbers above in the same order indefinitely. What is the sum of the first 28 terms of the sequence?

12. 1, 2, 1, -1, -2, . . .

The first five terms of a sequence are shown above. After the second term, each term can be obtained by subtracting from the previous term the term before that. For example, the third term can be obtained by subtracting the first term from the second term. What is the sum of the first 36 terms of the sequence?

(A) 0
(B) 4
(C) 12
(D) 24
(E) 30

13. 5.101001000100001...

The decimal number above consists of only 1's and 0's to the right of the decimal point. The first 1 is followed by one 0, the second 1 is followed by two 0's, the third 1 is followed by three 0's, and so on. What is the total number of 0's between the 98th and the 101st 1 in this decimal number?

(A) 288
(B) 291
(C) 294
(D) 297
(E) 300

14. 1,234, ... 1,920,21 ... ,484,950

The integer above is formed by writing the integers from 1 to 50, in order, next to each other. If the integer is read from left to right, what is the 50th digit from the left?

(A) 0
(B) 1
(C) 2
(D) 3
(E) 9

15. 

The figure above shows the remaining pieces of a paper chain from which a section has been removed. The first link of the original chain was red and the colors of the links formed the repeating pattern of red (R), yellow (Y), green (G), white (W), and blue (B) from left to right. Which of the following could be the number of links in the section that was removed?

(A) 60
(B) 61
(C) 62
(D) 63
(E) 64

16. The first term of a sequence is -3 and every term after the first is 5 more than the term immediately preceding it. What is the value of the 101st term?

(A) 505
(B) 502
(C) 500
(D) 497
(E) 492

17. After the first term, each term in a sequence is 3 greater than $\frac{1}{3}$ of the preceding term. If t is the first term of the sequence and $t \neq 0$, what is the ratio of the second term to the first term?

(A) $\frac{t+9}{3}$

(B) $\frac{t+3}{3}$

(C) $\frac{t+9}{3t}$

(D) $\frac{t+3}{3t}$

(E) $\frac{9-2t}{3}$

18. 8, a, 14, b, 20, ...

The first term of the sequence above is 8. Which of the following could be the formula for finding the nth term of this sequence for any positive integer n ?

(A) $2n + 6$
(B) $3n + 5$
(C) $5n + 3$
(D) $6n + 2$
(E) $6n + 5$

19. 3, 6, 11, 18, ...

The first four terms of a sequence are shown above. Which of the following could be the formula that gives the *n*th term of this sequence for all positive integers *n* ?

(A) 2n
(B) 2n + 1
(C) 3n
(D) $n^2 + 1$
(E) $n^2 + 2$