

Determine the first 5 terms of the given sequences

1. $a_n = \frac{n}{n+1}$

2. $a_n = ne + n$

3. $a_{n+1} = 4a_n$ if $a_1 = 2$

4. $a_n = (-1)^{n-1}(2n)$

5. $a_n = -2a_{n+1} - 7$ if $a_1 = -2$

6. $a_n = \frac{n^2}{1+n}$

Determine an explicit formula that could be used to find the n th term of the pattern with the given conditions.

7. 1, -4, 9, -16, ...

8. -8, -5, -2, 1, 4, ...

9. 3, -6, 12, -24, ...

10. The 9th term of an arithmetic sequence is 18 and the 53rd term is 7.

11. The 10th term of an arithmetic sequence is -40 and the 82nd term is 176.

12. The 4th term of a geometric sequence is -20 and the 10th term is $-\frac{4}{3125}$.

13. The 3rd term of a geometric sequence is 81 and the 9th term is $\frac{1}{9}$.

Determine the sum of each sequence.

$$14. \sum_{k=1}^5 (10)$$

$$15. \sum_{m=2}^7 (2m + 4)$$

$$16. \sum_{i=-2}^3 (i^2 + i)$$

$$17. \sum_{n=0}^{\infty} \left[5 \left(\frac{2}{3} \right)^n \right]$$

$$18. \sum_{n=3}^{\infty} \left[4 \left(\frac{1}{3} \right)^n \right]$$

$$19. \sum_{i=1}^{\infty} (2 + i)$$

Express each series in summation notation

$$20. 1 + 4 + 7 + \cdots + 82$$

$$21. 23 + 17 + 11 + \cdots - 229$$

$$22. 5 + 15 + 45 + \cdots + 3645$$

$$23. 2 + \frac{1}{2} + \frac{1}{8} + \cdots + \frac{1}{2048}$$

$$24. 1 - 4 + 9 - 16 + 25 + \cdots + 121$$

Determine the number of terms in the sequence

$$25. S_n = 4047, a_1 = 15, d = 2$$

$$26. S_n = 315, a_1 = 315, d = -9$$

$$27. S_n = -32767, a_1 = -1, r = 2$$

$$28. S_n = 531440, a_1 = 2, r = 3$$

29. You visit the Grand Canyon and drop a penny off the edge of a cliff. The distance the penny will fall is 16 feet the first second, 48 feet the next second, 80 feet the third second, and so on. What is the total distance the object will fall after 6 seconds?

30. The sum of the interior angles of a triangle is 180° , of a quadrilateral is 360° and of a pentagon is 540° . Assuming this pattern continues, find the sum of the interior angles of a pentacontagon (50 sides).

31. A culture of bacteria increases by 6% every 2 hours. If there are 500 bacteria at the beginning, how many bacteria will there be after 24 hours?

32. You are promised \$2500 the first day of a job and each day after that you will receive 45% of the previous day's amount?

33. A one-ton ice sculpture is melting so that it loses one-fifth of its weight per hour. How much of the sculpture will be left after 5 hours in pounds?

34. Expand $(2x^3 - 3)^4$ completely

35. Expand $(3x^3 + 4)^6$ completely

36. Determine the coefficient of y^3 when the binomial $(y + 2)^9$ is fully expanded.

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38. Determine the 7th term when $(2a - 3b)^{10}$ is fully expanded?

39. Determine the 5th term when $(x^2 + 4y)^9$ is fully expanded?