

Write each series in summation notation.

1. $6 + 12 + 24 + 48 + 96$

$$\sum_{k=1}^5 3 \cdot 2^k$$

2. $\frac{3}{2} + \frac{3}{4} + \frac{1}{2} + \frac{3}{8} + \frac{3}{10} + \frac{1}{4} + \frac{3}{14}$

$$\sum_{k=1}^7 \frac{3}{2k}$$

3. $1 - 1 + 1 - 1 + 1 - 1 + 1$

$$\sum_{k=1}^7 (-1)^{k-1}$$

4. $10 + 1 + \frac{1}{10} + \frac{1}{100} + \frac{1}{1000}$

$$\sum_{k=1}^5 10 \left(\frac{1}{10}\right)^{k-1} \text{ or } \sum_{k=1}^5 \left(\frac{1}{10}\right)^{k-2} \leftarrow \text{better}$$

5. $-\frac{1}{4} + 2 + \frac{23}{4} + 11 + \frac{71}{4} + 26$

$$\sum_{k=1}^6 \frac{3k^2 - 4}{4} \text{ or } \sum_{k=1}^6 \frac{3k^2 - 1}{4}$$

6. $0 + 2 + 6 + 12 + 20 + 30$

$$\sum_{k=1}^6 (k^2 - k) \text{ or } \sum_{k=1}^6 k(k-1)$$

Find the geometric mean of each pair of numbers.

7. 9 and 25

15

8. 12 and 27

18

Find the 12th term of each arithmetic sequence.

9. $a_4 = 88$ and $a_8 = 29$

-30

10. $a_{10} = -17$ and $a_{22} = 13$

-12

11. $a_{20} = 1.4$ and $a_{30} = 7.2$

-3.24

12. $a_{42} = 52.2$ and $a_{51} = 50.4$

58.2

Find the indicated sum for each arithmetic series.

13. S_{12} for $101 + 95 + 89 + 83 + \dots$

816

14. S_{30} for $-4.2 + (-1) + 2.2 + 5.4 + \dots$

1266

Find the indicated sum for each geometric series.

15. S_{25} for $-1 + 2 - 4 + 8 - 16 + 32 - 64 + \dots$

-11, 184, 811

16. S_9 for $2500 + 1500 + 900 + 540 + \dots$

6187.01

17. Determine if the sequence is arithmetic. If it is, find the common difference, the 52nd term, and the explicit formula.

A) 34, 24, 14, 4, ... $d = -10$ $a_{52} = -476$ $a_n = 44 - 10n$

B) -34, -14, 6, 26, ... $d = 20$ $a_{52} = 986$ $a_n = 20n - 54$

C) 37, 46, 55, 64, ... $d = 9$ $a_{52} = 496$ $a_n = 9n + 28$

18. Given the first term and the common difference of an arithmetic sequence find the 52nd term and the explicit formula.

A) $a_1 = -10$, $d = -2$ -112 $a_n = -8 - 2n$

B) $a_1 = 2$, $d = 9$ 461 $a_n = 9n - 7$

C) $a_1 = -23$, $d = -6$ -329 $a_n = -6n - 17$

19. Given a term in an arithmetic sequence and the common difference find the 52nd term and the explicit formula.

- A) $a_{34} = -296, d = -10$ -476 $a_n = -10n + 44$
 B) $a_{25} = 445, d = 20$ 985 $a_n = 20n - 55$
 C) $a_{15} = -104, d = -9$ -437 $a_n = -9n + 31$

20. Given two terms in an arithmetic sequence find the 52nd term and the explicit formula.

- A) $a_{20} = -155$ and $a_{35} = -275$ -411 $a_n = -8n + 5$
 B) $a_{20} = -3815$ and $a_{34} = -6615$ $-10,215$ $a_n = -200n + 185$
 C) $a_{18} = 193$ and $a_{33} = 343$ 533 $a_n = 10n + 13$

21. Determine if the sequence is geometric. If it is, find the common ratio, the 8th term, and the explicit formula.

- A) $-3, -9, -27, -81, \dots$ $r = 3$ -6561 $a_n = -3 \cdot 3^{n-1}$
 B) $-2, 6, -18, 54, \dots$ $r = -3$ 4374 $a_n = -2(-3)^{n-1}$
 C) $-2, -4, -8, -16, \dots$ $r = 2$ -256 $a_n = -2(2)^{n-1}$

22. Given the first term and the common ratio of a geometric sequence find the 8th term and the explicit formula.

- A) $a_1 = 1, r = 2$ 128 $a_n = 2^{n-1}$
 B) $a_1 = -1, r = 6$ -279936 $a_n = -6^{n-1}$
 C) $a_1 = -3, r = -5$ 234375 $a_n = -3(-5)^{n-1}$

23. Given a term in a geometric sequence and the common ratio find the 8th term and the explicit formula.

- A) $a_5 = -324, r = -3$ 8748 $a_n = -4(-3)^{n-1}$
 B) $a_2 = 3, r = -3$ 2187 $a_n = -1(-3)^{n-1}$
 C) $a_5 = -768, r = -4$ 49152 $a_n = -3(-4)^{n-1}$

24. Given two terms in a geometric sequence find the 8th term and the explicit formula.

- A) $a_2 = 5$ and $a_6 = 3125$
 B) $a_3 = 100$ and $a_5 = 2500$ -312500 $a_n = 4 \cdot (-5)^{n-1}$
 C) $a_3 = -36$ and $a_4 = 216$ 279936 $a_n = -1(-6)^{n-1}$

25. Evaluate each arithmetic/ geometric series described.

A) $\sum_{k=1}^{15} (11 - 2k) = 75$

B) $\sum_{k=1}^7 (-3)^{k-1} = 547$

C) S_{15} for $8 + 10 + 12 + 14 \dots$ 33

D) S_{15} for $-4 - 8 - 16 - 32 \dots$ $-131,068$

E) S_{15} for $1 + 4 + 16 + 64 \dots$ $12,401$

26. Jacie is considering a job that offers a monthly starting salary of \$4000 and guarantees her a monthly raise of \$190 during her first year on the job. Find the general rule for this sequence and her monthly salary at the end of her first year. $a_n = 190n + 3810$, 46090

27. Find the sum of the first 20 terms of the arithmetic sequence: $-12, -6, 0, 6, \dots$ 900

28. Find the sum of the first 30 terms of the arithmetic sequence: $10, 5, 0, -5, \dots$ -1875

29. As part of her retirement savings plan, Patricia deposited \$250 in a bank account during her first year in the workforce. During each subsequent year, she deposited \$45 more than the previous year. Find how much she deposited during her twentieth year in the workforce. Find the total amount deposited in the twenty years. $\$1105, \$13,550$

MULTIPLE CHOICE

30. What is a formula for the n th term of sequence B shown below?

$B = 10, 12, 14, 16, \dots$

$b_n = 10 + (n-1)2$
 $8 + 2n$

1) $b_n = 8 + 2n$

2) $b_n = 10 + 2n$

3) $b_n = 10(2)^n$

4) $b_n = 10(2)^{n-1}$

31. What is the formula for the n th term of the sequence $54, 18, 6, \dots$?

1) $a_n = 6\left(\frac{1}{3}\right)^n$

2) $a_n = 6\left(\frac{1}{3}\right)^{n-1}$

3) $a_n = 54\left(\frac{1}{3}\right)^n$

4) $a_n = 54\left(\frac{1}{3}\right)^{n-1}$

$a_n = 54\left(\frac{1}{3}\right)^{n-1}$

32. What is the common difference of the arithmetic sequence $5, 8, 11, 14$?

1) $\frac{8}{5}$

2) -3

3) 3

4) 9

33. What is the common ratio of the geometric sequence whose first term is 27 and fourth term is 64?

1) $\frac{3}{4}$

2) $\frac{64}{81}$

3) $\frac{4}{3}$

4) $\frac{37}{3}$

$a_n = a_1 \cdot r^{n-1}$
 $\frac{64}{27} = \frac{27}{27} \cdot r^{4-1}$
 $\frac{64}{27} = \frac{27}{27} \cdot r^3$
 $r = \frac{4}{3}$

34. Find the 7th term of the geometric sequence for which $a_1 = 6$ and $r = -\frac{1}{2}$.

(1) 2

(2) $\frac{5}{2}$

(3) $-\frac{3}{64}$

(4) $\frac{3}{32}$

$a_n = b \left(-\frac{1}{2}\right)^{n-1}$
 $a_7 = 6 \left(-\frac{1}{2}\right)^6$

term 1 2 3 4 5

num: $n+1$
denom: $n+2$

$$\frac{2}{3} + \frac{3}{4} + \frac{4}{5} + \frac{5}{6} + \frac{6}{7}$$

35. Jonathan's teacher required him to express the sum $\frac{2}{3} + \frac{3}{4} + \frac{4}{5} + \frac{5}{6} + \frac{6}{7}$ using sigma notation. Jonathan proposed four possible answers. Which of these four answers is *not* correct?

1) $\sum_{k=3}^7 \frac{k-1}{k}$

2) $\sum_{k=1}^5 \frac{k}{k+1}$

3) $\sum_{k=1}^5 \frac{k+1}{k+2}$ ✓

4) $\sum_{k=2}^6 \frac{k}{k+1}$

36. Find the first three terms of the recursive sequence defined below.

$$a_1 = -3$$

$$a_n = a_{(n-1)} - n$$

-3, -5, -8

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