

SIGMA NOTATION

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Lesson Description

In this lesson we:

- Revise the use of sigma notation.
- Revise the use of sigma notation in the use of sequences and series.



Summary

Arithmetic	Geometric
Constant difference = d	Constant ratio = r
$d = T_2 - T_1$ OR $d = T_3 - T_2$	$r = \frac{T_2}{T_1}$ OR $r = \frac{T_3}{T_2}$
$T_n = a + (n - 1)d$	$T_n = ar^{n-1}$
$S_n = \frac{n}{2}[2a + (n - 1)d]$	$S_n = \frac{a(r^n - 1)}{r - 1}$ $S_n = \frac{a(1 - r^n)}{1 - r}$
	Convergence if $-1 < r < 1$
	$S_\infty = \frac{a}{1 - r}$

Sigma Notation

$$\sum_{k=1}^p \text{Formula}$$



Test Yourself

Question 1

Which one is the correct expansion of

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

- A. $3 + 4 + 5$
- B. $3 + 4 + 5 + 6 + 7$
- C. $3 + 6 + 9 + 12 + 15$
- D. $3 + 6 + 9 + 12 + 15 + 18 + \dots$

Question 2

$$\sum_{k=2}^4 2^k$$

Is equal to

- A. $2^1 + 2^2 + 2^3 + 2^4$
- B. $2^2 + 2^4$
- C. $2^2 + 3^3 + 4^4$
- D. $2^2 + 2^3 + 2^4$

Question 3

What is the difference between the sum of the series

$$\sum_{n=1}^5 (2n + 3)$$

and the sum of the series

$$\sum_{n=1}^5 2n + 3$$

- A. 3
- B. 12
- C. 15
- D. no difference they are the same.

Question 4

Use sigma notation to represent $3 + 6 + 9 + 12 + \dots$ for 28 terms.

- A. $\sum_{n=1}^{28} (n + 3)$
- B. $\sum_{n=1}^{29} (n + 3)$

notes for...

C.

$$\sum_{n=1}^{28} 3n$$

D.

$$\sum_{n=1}^{29} 3n$$

Question 5

Calculate

$$\sum_{k=1}^7 (1 - 2k)$$

- A. -14
- B. -49
- C. -11
- D. -48

Question 6What is 12th term

$$\sum_{k=3}^{16} (3k - 2)$$

- A. 34
- B. 37
- C. 40
- D. 43

Question 7

How many terms are there in the series

$$\sum_{k=5}^{46} (3 \cdot 2^{k-1})$$

- A. 46
- B. 44
- C. 42
- D. 40

Question 8

What is common ratio of the series

$$\sum_{k=1}^{15} (3 \cdot 2^{1-k})$$

- A. 6
- B. 2
- C. $\frac{1}{6}$
- D. $\frac{1}{2}$

Question 9

Calculate

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

- A. 3
- B. 15
- C. 25
- D. 81

Question 10

What is the answer of

$$\sum_{n=1}^{29} (n + 3) - \sum_{n=1}^{27} (n + 3)$$

- A. 32
- B. 44
- C. 56
- D. 60



Improve your Skills

Question 1

Calculate

$$\sum_{k=4}^6 3^{k-2}$$

Question 2

Calculate

$$\sum_{k=0}^{15} (10k + 3)$$

Question 3

Calculate

$$\sum_{k=2}^{\infty} 8 \cdot \left(\frac{1}{2}\right)^{k+1}$$

Question 4

Calculate n

$$\sum_{k=1}^n (6k - 1) = 320$$

Question 5

Given the geometric series: $2 \cdot (5)^5 + 2 \cdot (5)^4 + 2 \cdot (5)^3 + \dots$

- Show that the series converges.
- Calculate the sum to infinity of the series.
- Calculate the sum of the first 8 terms of the series, correct to two decimal places.
- Use your answers to b and c to determine

$$\sum_{k=9}^{\infty} 2 \cdot (5)^{6-n}$$

correct to two decimal places.

Question 6

Find p if

$$\sum_{k=1}^{\infty} 27p^k = \sum_{t=1}^{12} (24 - 3t)$$