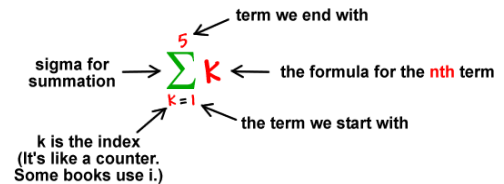


# PAP Algebra 2 Arithmetic Series

Series—the indicated sum of the terms of a sequence

➤ A partial sum or  $S_n$  is the sum of a specified number of terms of a sequence.

➤ Summation Notation:



arithmetic series

series

Gauss came up with a formula.

$$1 + 2 + 3 + \dots + 98 + 99 + 100$$

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

101  
50  
5050

**Partial Sum of an Arithmetic Series:**

$$a_1 + a_2 + a_3 + \dots + a_n$$

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

$$Sum_n = \frac{n}{2}(\text{first term} + \text{last term})$$

Find the indicated sum for each arithmetic series.

$S_{20}$  for  $2 + 5 + 8 + \dots$

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

$$S_{20} = \frac{20}{2}(2 + 59)$$

$$a_{20} = 2 + (20-1)(3)$$

$$= 2 + (19)(3)$$

$$= 2 + 57$$

$$= 59$$

$$S_{20} = 10(61) = 610$$

$$\sum_{k=1}^{15} (3 + 4k)$$

$$S_{15} = \frac{15}{2}(7 + 63)$$

$$= 7.5(70)$$

$$= 525$$

$$a_1 = 3 + 4(1) = 7$$

$$a_{15} = 3 + 4(15) = 63$$

examples

Find the sum of  $12 + 19 + 26 + \dots + 180$ .

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

$$= \frac{25}{2}(12 + 180)$$

$$= 12.5(192)$$

$$S_{25} = 2400$$

Step 1: Identify  $a_1$  and  $a_n$ .

Step 2: Find the common difference.

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

Step 3: Find  $n$ , the number of terms

$$180 = 12 + (n-1)(7)$$

$$180 = 12 + 7n - 7$$

$$180 = 7n + 5$$

$$175 = 7n$$

$$n = 25$$

Step 4: Use the formula to find  $S_n$ .

examples

Find the sum of  $3 + 6 + 9 + \dots + 210$ .

$$210 = 3 + (n-1)(3)$$

$$210 = 3 + 3n - 3$$

$$210 = 3n$$

$$70 = n$$

$$S_{70} = \frac{70}{2}(3 + 210)$$

$$= 35(213)$$

$$= 7455$$

examples

Find the first three terms of the arithmetic series in which  $a_1 = 7$ ,  $a_n = 79$ , and  $S_n = 430$ .

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

$$430 = \frac{n}{2}(7 + 79)$$

$$430 = \frac{n}{2}(86)$$

$$430 = 43n$$

$$10 = n$$

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

$$79 = 7 + (10-1)d$$

$$79 = 7 + 9d$$

$$72 = 9d$$

$$8 = d$$

$$7, 15, 23$$

examples

Find the first three terms of the arithmetic series in which  $a_n = 36$ ,  $n = 8$ , and  $S_n = 120$ .

### Conclusion

1. What is an arithmetic series?  
*+ or - terms in sequence*
2. How do you remember the formula?
3. Questions???? *yes*

examples

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### Assignment

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