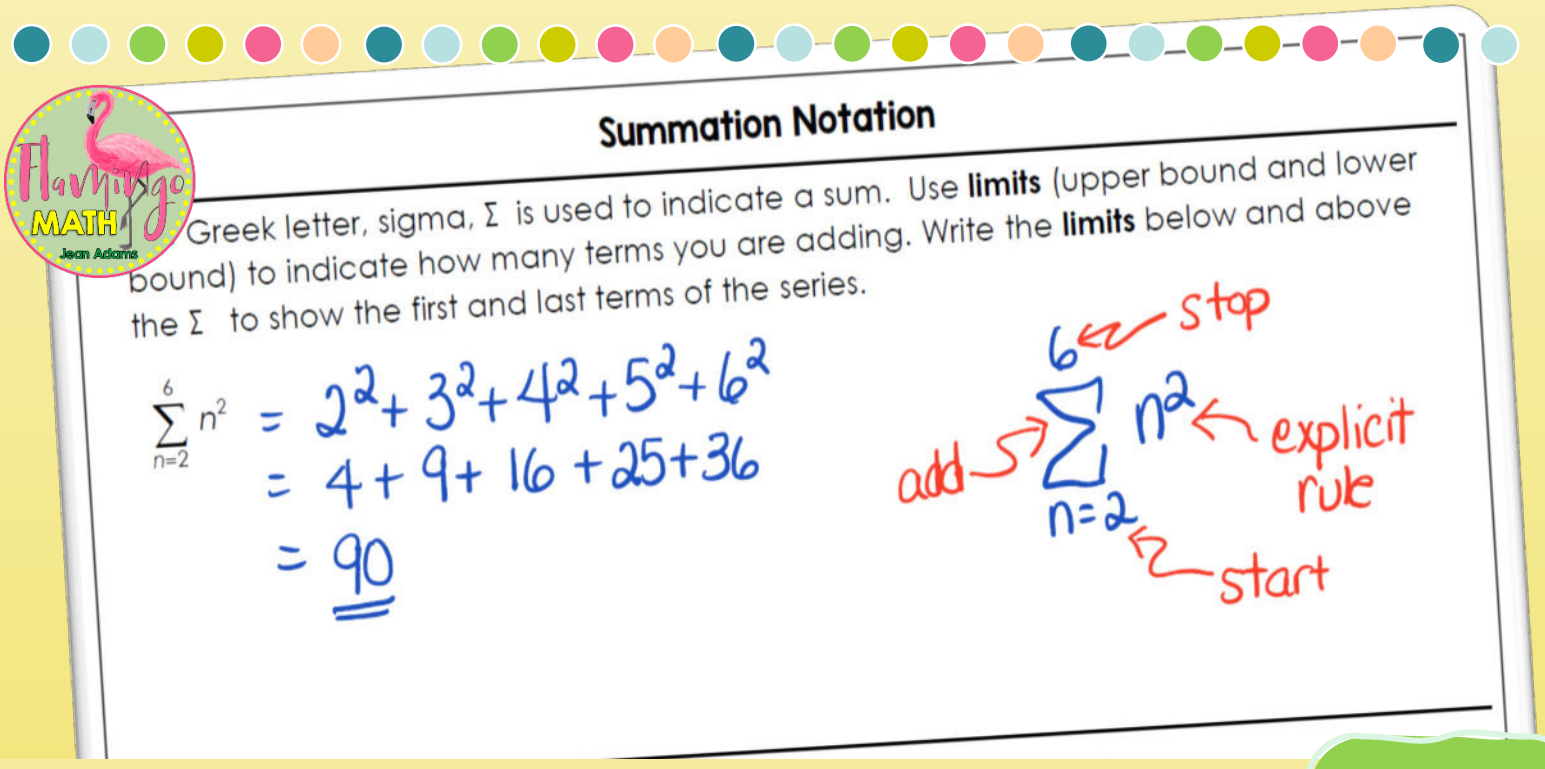
Algebra 2 Honors

Arithmetic Series



Completely Editable

9.3

Lesson 9.3: Arithmetic Series

Vocabulary	Example:
The sum of the terms of a sequence is called a _____.	The series 3 + 6 + 9 + 12 + 15 corresponds to the sequence 3, 6, 9, 12, 15. The sum of the series is _____.
An _____ series has infinitely many terms.	
Any series whose terms form an arithmetic sequence is known as an _____.	1 + 5 + 9 + 13 + 17 + 21 is an arithmetic series with _____ terms.
_____ Is the sum of the terms of the sequence denoted as $\sum_{k=1}^{n}(a_k)$, where _____ is the summation of notation	$\sum_{n=1}^{5}(3n-2)$
In summation notation, the least and greatest integer values of the index n are called _____.	$\sum_{n=1}^{5}(3n-2)$ In this example, the limits are _____ and _____ .

Sum of an Arithmetic Sequence Formula

When a_1 is the first term, a_n is the *n*th term, and n is the number of terms.

When the first and last terms are known:	$S_n = \frac{n}{2}(a_1 + a_n)$
When a_n is not known:	$S_n = \frac{n}{2}[2a_1 + (n-1)d]$

Summation Notation

The Greek letter, sigma, Σ is used to indicate a sum. Use **limits** (upper bound and lower bound) to indicate how many terms you are adding. Write the **limits** below and above the Σ to show the first and last terms of the series.

$\sum_{n=2}^{6} n^2$

Finding the Sum of a Finite Sequence

EX #1: Find the sum of the first 100 natural numbers.

EX #2: Find the sum of the first 15 terms of the arithmetic series $2+5+8+11+14+17+\ldots$

Finding the Sum of a Series

EX #3: Find the sum of the finite arithmetic series $4 + 9 + 14 + 19 + 24 + \ldots + 99$

EX #4: Find the sum of the series $\sum_{k=1}^{13}(4k+5)$

Writing Summation Notation

EX #5: Write Sigma Notation for the series:

A. $3 + 6 + 9 + 12 + 15$

B. $\frac{1}{2}+\frac{2}{3}+\frac{3}{4}+\frac{4}{5}+\frac{5}{6}+\frac{6}{7}$

Series and Summation

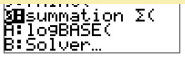
EX#6: If an arithmetic series has $a_1 = 2$, $d = 5$, and $n = 20$,

A. Write the summation notation for the series.

B. Find S_n of the series.

Using the Sum of a Finite Series

EX #7: How many logs will be in a pile of timbered trees if there are 30 logs in the bottom layer, 29 in the second, and so on until there is one in the top layer?



NOTES

Name _____ Date_____

9.3

Arithmetic Series Practice

Problems 1 – 4, for each sum, find the number of terms, the first term, and the last term. Then evaluate the series.

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

2. $\sum_{n=2}^{6}(2n-1)$

3. $\sum_{n=3}^{6}(3n+2)$

4. $\sum_{n=4}^{10}(n)$

Problems 5 – 8, write the related series for each finite sequence. Then evaluate each series.

5. 4,5,6,7, … 12

6. 4,7,10, … 31

7. 1,6,11,16, … 46

8. 3,6,9,12, … 42

Problems 9 – 12, use summation notation to write each arithmetic s
of terms.

9. $1+3+5+\cdots;\ n=7$

10. $4.3+4.6+$

11. $10+7+4+\cdots;\ n=8$

12. $(-3)+(-6$

Problems 13 – 16, tell whether each list is a *series* or a *sequence*. Then tell whether it is *finite* or *infinite*.

13. 5,9,13,17,21

14. $-\frac{1}{2}-\frac{1}{4}-\frac{1}{8}-\frac{1}{16}-\cdots$

15. $1.8+3.6+7.2+14.4$

16. 1,2,4,8,16,32, …

Problems 17 – 18, solve.

17. Isabella scored 76% on her first math test this quarter. Her next two scores were 80% and 84%. If she continues to improve at this rate,

A. What would be her score on the fifth (and final) test for the quarter?

B. Assuming each test is worth 100 points, what is Isabella's percentage for tests?

18. The school auditorium has 20 rows and two aisles. The two side sections have 6 seats in the first row and one more seat in each succeeding row. The middle section has 10 seats in the first row and one additional seat in each succeeding row.

A. Find the total seats in each section. Then find the total seating capacity of the auditorium.

B. Write an arithmetic series to represent each of the sections.

Practice Sets

Lesson Warm-Ups

3. Find the sum of the finite series.

$$\sum_{n=1}^{4}(n+2)$$

4. Use a calculator to evaluate.

$$\sum_{n=1}^{15}2n^2$$

© 2022 Jean Adams, All rights reserved.

Name _____ Date _____ Period _____

Lesson 9.3: Arithmetic Series **Warm-Up #2**

1. Find the sum of the finite arithmetic series
$2 + 6 + 10 + \ldots + 30$

2. Write the arithmetic series in summation notation.
$4 + 7 + 10 + \ldots + 22$

3. Find the sum of the finite series.

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

4. Use a calculator to evaluate.

$$\sum_{n=1}^{10}3n^2$$

© 2022 Jean Adams, All rights reserved.

Form A

od _____

2. Write the series in summation notation
$1 + 3 + 5 + \ldots + 13$

3. An arithmetic series has $a_1 = 2$, $d = 5$, and $n = 20$. Find S_n

Grade:

9.3 Arithmetic Series **Form B**

Name _____

Date _____ Period _____

1. Find the sum of the finite series.

$$\sum_{n=1}^{4}(4n-3)$$

2. Write the series in summation notation
$3 + 7 + 11 + \ldots + 31$

3. An arithmetic series has $a_1 = 3$, $d = 4$, and $n = 20$. Find S_n

Grade:

Daily Lesson Quiz