Sequence:_____

Terms of a Sequence:_____

Infinite Sequence:_____

Finite Sequence:_____

Definition of Arithmetic Sequence

Examples:

Formula for Finding *nth* term of an Arithmetic Sequence

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

Also known as **EXPLICIT FORMULA**

Examples:

1) Find a formula for the nth term of the arithmetic sequence whose common difference is 3 and whose first term is 2.

2) The 4^{th} term of an arithmetic sequence is 20 and the 13^{th} term is 65. Write the first 4 terms of the sequence.

3) Find the 7^{th} term of the arithmetic sequence whose first two terms are 2 and 9.

4) Find the explicit formula for a_n for the arithmetic sequence: $a_3 = 94$; $a_6 = 85$

5) Determine whether the following sequences are arithmetic. If yes, find the first three terms.

$a_n = 150 - 7n$

$a_n = 2^{n-1}$

$a_n = 8 + 13n$

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Arithmetic Sequence

Determine if the sequence is arithmetic. If it is, find the common difference.

1) −27, −24, −21, −18, ...

2) 17, 21, 25, 29, ...

3) 18, 23, 28, 33, ...

4) −19, −39, −59, −79, ...

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

5) −19, −39, −59, −79, ...

6) 25, 55, 85, 115, ...

7) 25, 125, 225, 325, ...

8) −12, −21, −30, −39, ...

Determine if the sequence is arithmetic. If it is, find the common difference, the term named in the problem, the explicit formula, and the three terms in the sequence after the last one given.

9) −11, −13, −15, −17, ...
Find a_{25}

10) 33, 30, 27, 24, ...
Find a_{32}

11) 33, 53, 73, 93, ...
Find a_{36}

12) −4, 196, 396, 596, ...
Find a_{40}

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

13) $a_{17} = -138,\ d = -8$

14) $a_{33} = 6366,\ d = 200$

15) $a_{21} = -5,\ d = -2$

16) $a_{30} = 892,\ d = 30$

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

17) $a_{18} = -1715$ and $a_{32} = -3115$

18) $a_{16} = 160$ and $a_{39} = 390$

19) $a_{19} = 1798$ and $a_{31} = 2998$

20) $a_{16} = -1527$ and $a_{38} = -3727$

Series: _____

Finite Series / Partial Sum: _____

Infinite Series: _____

Summation Notation

$$\sum_{i=1}^{n} a_i = a_1 + a_2 + a_3 + \ldots\ldots + a_n$$

Example:

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

$\sum_{k=3}^{6} (1 + k)$

Sum of a Finite Arithmetic Sequence

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

Examples:

1) Find the sum: $1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19$

2) Find the sum of the integers form 1 to 100

3) Find the 150^{th} partial sum of the arithmetic sequence: 5, 16, 27, 38, 49, …

4) An auditorium has 2o rows of seats. There are 20 seats in the first row, 21 seats in the second row , 22 seats in the third row, and so on. How many seats are there in all 20 rows?

5) A small business sells $10,000 worth of sports memorabilia during its first year. The owner of The business has set a goal of increasing annual sales by $7500 each year for 19 years. Assuming that this goal is met, find the total sales during the first 20 years this business is in operation.

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Arithmetic Series

Evaluate the related series of each sequence.

1) 35, 45, 55, 65

2) 1, 3, 5, 7

3) $-\frac{19}{4}, -\frac{25}{4}, -\frac{31}{4}, -\frac{37}{4}, -\frac{43}{4}, -\frac{49}{4}, -\frac{55}{4}$

4) $\frac{10}{3}, 4, \frac{14}{3}, \frac{16}{3}, 6, \frac{20}{3}, \frac{22}{3}$

Evaluate each arithmetic series described.

5) $\sum_{k=1}^{12}\left(-2+\frac{1}{2}k\right)$

6) $\sum_{n=1}^{10}(4n-13)$

7) $\sum_{n=1}^{8}(6n-15)$

8) $\sum_{n=1}^{40}(2.7n+0.6)$

9) $a_1 = 19,\ a_n = 117,\ n = 15$

10) $a_1 = 25,\ a_n = 77,\ n = 14$

11) $a_1 = 28,\ d = 10,\ n = 13$

12) $a_1 = 35,\ d = 9,\ n = 13$

13) $11 + 15 + 19 + 23..., \ n = 9$

14) $4 + 7 + 10 + 13..., \ n = 12$

Determine the number of terms *n* in each arithmetic series.

15) $a_1 = 9, \ a_n = 24, \ S_n = 99$

16) $a_1 = 19, \ a_n = 264, \ S_n = 7075$

17) $a_1 = 12, \ d = 8, \ S_n = 672$

18) $a_1 = -14, \ d = -8, \ S_n = -336$

19) $\sum_{i=1}^{n} (-4i - 3) = -133$

20) $\sum_{m=1}^{n} (1 - 6m) = -705$

HPC Name_____

Arithmetic Sequence & Series

Date_____

Determine if the sequence is arithmetic. If it is, find the common difference, the term named in the problem, and the explicit formula.

1) 37, 43, 49, 55, ...
Find a_{25}

2) 37, 44, 51, 58, ...
Find a_{30}

3) 0, 9, 18, 27, ...
Find a_{39}

4) $\frac{3}{10}, -\frac{1}{30}, -\frac{11}{30}, -\frac{7}{10}, \ldots$
Find a_{36}

Given two terms in an arithmetic sequence find the explicit formula.

5) $a_{13} = 7.1$ and $a_{36} = 20.9$

6) $a_{15} = \frac{71}{3}$ and $a_{39} = \frac{191}{3}$

Given two terms in an arithmetic sequence find the common difference, the term named in the problem, and the explicit formula.

7) $a_{20} = -\frac{93}{10}$ and $a_{36} = -\frac{173}{10}$

Find a_{31}

8) $a_{13} = -6$ and $a_{37} = -22$

Find a_{32}

Given two terms in an arithmetic sequence find the explicit formula.

9) $a_{19} = -\frac{19}{4}$ and $a_{37} = -\frac{43}{4}$

10) $a_{17} = \frac{77}{3}$ and $a_{30} = \frac{142}{3}$

Evaluate the related series of each sequence.

11) 13, 23, 33, 43

12) 0, –2, –4, –6, –8, –10, –12

Evaluate each arithmetic series described.

13) $\sum_{n=1}^{11}(4n-11)$

14) $\sum_{k=1}^{10}(10k-20)$

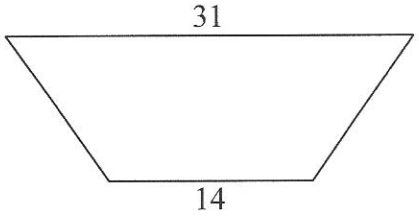
15) $\sum_{m=5}^{13}(10m-11)$

16) $\sum_{m=5}^{10}(2m+3)$

17) $9+13+17+21\ldots,\ n=17$

18) $12+15+18+21\ldots,\ n=16$

1) A brick patio has the approximate shape of a trapezoid. The patio has 18 rows of bricks. The first row has 14 bricks and the 18^{th} row has 31 bricks. How many bricks are in the patio?



2) Each row in a small auditorium has two more seats than the preceding row. Find the seating capacity if the front row seats 25 people and there are 15 rows of seats.

3) A small hardware store makes a profit of $20,000 during its first year. The store owner sets a goal of raising profits by $5000 each year for 4 years. Assuming that this goal is met, find the total profit during the first 5 years of business.

4) Consider a job offer with a starting salary of $32,500 with an annual raise of $1500.
   a) What is the salary in the 6^{th} year?

   b) What is the total compensation for the company through 6 full years of employment/?