Algebra 1
Arithmetic Sequences

Name: _____
Date: _____

A sequence can be *finite* or *infinite*:

1, 4, 7, 10, 13, . . . infinite 1, 4, 7, 10, 13 finite

Arithmetic Sequences: Determine if each is an arithmetic sequence. common difference → $a_2 - a_1$

	Arithmetic Sequence?	Common Difference?	Infinite or Finite?
1. 2, −3, −8, −13 (−5 −5 −5)	Yes	$d = -5$	Finite
2. 1, 4, 9, 16, ... (+3 +5 +7)	No	N/A	Infinite
3. −7, 1, 9, 17, ... (+8 +8 +8)	Yes	$d = 8$	Infinite
4. −2, 1, 5, 10 (+3 +4 +5)	No	N/A	Finite

Find the next three terms of the arithmetic sequence.

5. 1, 5, 9, 13, 17, 21, 25, ... (+4 +4 +4)
6. 7, 5, 3, 1, −1, −3, −5, ...
7. 39, 31, 23, 15, 7, −1, −9,
8. −16, −10, −4, 2, 8, 14, 20,

A recursive formula is used to find the next term of a sequence when the previous term is known.

Remember:
"term labels"
First term: a_1
Second term: a_2
"n^{th}" term: a_n

Recursive Formula: $a_1 =$ start; $a_n = a_{n-1} + d$

Write a function for each arithmetic sequence below in recursive form.

9. Sequence: 2, 8, 14, 20, 26
   Term Labels: a_1, a_2, a_3, a_4, a_5
   Common Difference: $d = 6$
   First Term:
   Recursive Formula: $a_1 = 2$ $a_n = a_{n-1} + 6$

   a_6? $n = 6$
   $a_6 = a_{6-1} + 6$
   $a_6 = a_5 + 6$
   $a_6 = 26 + 6 = 32$

10. Sequence: 34, 27, 20, 13, 6
    Term Labels: a_1, a_2, a_3, a_4, a_5
    Common Difference: $d = -7$
    First Term: 34
    Recursive Formula: $a_1 = 34$ $a_n = a_{n-1} - 7$

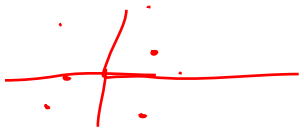
Given the following recursive formulas, fill in the tables. Also, determine the domain and range.

11. $a_1 = 12$; $a_n = a_{n-1} - 7$

Term Number (n)	1	2	3	4	5	6
Value (a_n)	12	5	-2	-9	-16	-23

Domain: {1, 2, 3, 4, 5, 6}

Range: {-23, -16, -9, -2, 5, 12}



12. $a_1 = -21$; $a_n = a_{n-1} + 9$

Term Number (n)	1	2	3	4	5	6
Value (a_n)	-21	-12	-3	6	15	24

Domain: {1, 2, 3, 4, 5, 6}

Range: {-21, -12, -3, 6, 15, 24}

Use the tables below to write each arithmetic sequence in recursive form.

13. $a_1 = -7$ $a_n = a_{n-1} + 5$

Term Number (n)	1	2	3	4
Value (a_n)	-7	-2	3	8

+5 +5

-2 + 5 = -7

14. $a_1 = -3$ $a_n = a_{n-1} - 4$

Term Number (n)	1	2	3	4
Value (a_n)	-3	-7	-11	-15

$a_1 = ?$

$a_n = a_{n-1} + d$

Given the following recursive formulas, find the next terms.

15. $a_5 = -28$; $a_n = a_{n-1} + 8$ $a_6 = -20$ $a_7 = -12$ $a_9 = -4$

16. $a_2 = 15$; $a_n = a_{n-1} - 2$ $a_4 = 11$ $a_6 = 7$ $a_{10} = -1$

15, 13, 11, 9, 7, 5, 3, 1, -1

3

17. Caroline's grandparents are going out of town and have asked her to water the flowers. Her grandmother has a green thumb and requires her plants to be watered every three days. Caroline will begin watering the plants on Saturday, November 2nd.

2, 5, 8, 11, 14, 17, 20, 23, 26, 29

$a_1 = 2$

$a_n = a_{n-1} + 3$

- What is the second date that Caroline will need to water the plants? Nov 5th
- What is the fifth date that Caroline will need to water the plants? Nov 14
- How many times will Caroline water the plants during November (30 days)? 10 times

The explicit formula is: $a_n = a_1 + d(n-1)$

a_1 : first term in the sequence d : common difference

n : term # a_n : nth term in the sequence/term you are trying to find

Use the explicit formula to find the given term for each sequence.

1. 13th term for 9, 12, 15,... 45

2. 75th term for 18, 2, -14,... _____

3. 1000th term for -77, -71, -65,... _____

① $a_n = 9 + 3(n-1)$

$a_{13} = 9 + 3(13-1)$

$a_{13} = 9 + 3(12)$

$a_{13} = 9 + 36$

$a_{13} = 45$

② $a_n = a_1 + d(n-1)$

$a_n = 18 + -16(n-1)$

$a_{75} = 18 - 16(75-1)$

$a_{75} = 18 - 16(74)$

$a_{75} = 18 - 1184$

$a_{75} = -1166$

③ $a_n = a_1 + d(n-1)$

$a_n = -77 + 6(n-1)$

$a_{1000} = -77 + 6(1000-1)$

$a_{1000} = 5917$

Recursive: $a_1 =$ ____ $a_n = a_{n-1} + d$ Explicit: $a_n = a_1 + d(n-1)$

GSE Algebra

Name: _____ Date: _____

Sequences Practice Worksheet

Arithmetic Sequences: A sequence of terms that have a common difference between them.

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

Formula: $a_n = d(n-1)$, where a_1 is the first number in the sequence and d is the common difference.

Recursive $a_1 =$ Formula $a_n = a_{n-1} + d$ where a_{n-1} = the previous number, d is the difference, a_1 = 1st number

Determine whether each sequence is an arithmetic sequence. If so, find the common difference and the next three terms.

1. 6, 12, 18, 24, ... d: 6 Next three terms: 30, 36, 42
2. 6, 11, 17, ... (+5, +6) d: ____ Next three terms: ____
3. 2, 14, 98, 686, ... d: ____ Next three terms: ____
4. 160, 80, 40, 20, ... d: ____ Next three terms: ____
5. -40, -25, -10, 5, ... d: +15 Next three terms: 20, 35, 50
6. 7, -21, 63, -189, ... d: ____ Next three terms: ____

For the following sequences, find a_1 and d and state the formula for the general term. Don't forget to simplify!

7. -10, -4, 2, 8, 14, ... $a_1 =$ -10 d = 6 Formula: Explicit $a_n = -10 + 6(n-1)$ Recursive $a_1 = -10$ $a_n = a_{n-1} + 6$
8. 10, 8, 6, 4, ... $a_1 =$ 10 d = -2 Formula: Explicit $a_n = 10 + -2(n-1)$ Recursive $a_1 = 10$ $a_n = a_{n-1} + -2$
9. 36, 31, 26, 21, ... $a_1 =$ 36 d = -5 Formula: Explicit $a_n = 36 + -5(n-1)$ Recursive $a_1 = 36$ $a_n = a_{n-1} - 5$

Find the indicated term of each arithmetic sequence.

10. 0, -0.25, -0.5, -0.75, ... $a_{17} =$ -4

$a_{51} = -228$

11. 51st term: $a_1 = 7$; d = -4.7

12. 2, 5/2, 3, 7/2, ... $a_{99} =$ 51

$a_{46} = 2116$

13. 46th term: $a_1 = 46$; d = 46

ARITHMETIC SEQUENCE

1) Identify as arithmetic or not arithmetic.

a) 4, 6, 8, 10, 12 _____

b) 5, 7, 10, 14, 19 _____

c) 3, 9, 27, 81,243 _____

2. Find the common difference. If there is no common difference, write "no common difference."

a) 2, -1, -4, -7, … _____

b) 4, 8, 16, 32 _____

c) 4, 8, 12, 16, … _____

d) -13, -7, -1, 5,… _____

e) -1, 2, -4, 8, … _____

f) -3, -11, -19, -27… _____

3. Write the explicit and recursive **formula for the following sequences. Remember to write the 1st term in the sequence.**

a) 12, 6, 0, -6 Explicit _____

Recursive _____

b) -7, -3, 1, 5, 9 Explicit _____

Recursive _____

c) -6, -3, 0, 3, 6, 9 Explicit _____

Recursive _____

d) 2, 6, 10, 14,... Explicit _____

Recursive _____

Name_____ Period _____ Date_____
Algebra I

Arithmetic Sequences Worksheet

Determine if the sequence is arithmetic. Write *yes* or *no*.

1. 5, 9, 14, 20, ...

2. 10, 22, 34, 46, ...

Find the common difference for each arithmetic sequence.

3. 12, 15, 18, 21, ...

4. 30, 24, 18, 12, ...

Find the common difference for each arithmetic sequence. Then find the next three terms.

5. 20, 10, 0, −10, ...

6. 100, 98, 96, 94, ...

Given the arithmetic sequence, find the recursive formula, explicit formula, and the indicated term.

7) 12, 7, 2, -3, . . .

Recursive Formula _____

Explicit Formula _____

20th term _____

8) 1, 4, 7, 10, . . .

Recursive Formula _____

Explicit Formula _____

32nd term _____