

Name: _____

Date: _____

13.1 NOTES: Recursive Formulas for Arithmetic Sequences

Algebra 1

I. Let's investigate the sequence: 5, 8, 11, 14, 17...

Do you notice any patterns? _____

As the sequence continues, the terms of the sequence _____ in regular intervals of _____.

Since the difference between successive terms is constant, this is called an _____.

The **difference, d** , between the terms is called the _____.

The terms of a sequence are sometimes referred to as $a_1, a_2, a_3, a_4, a_5, \dots$

So, in the sequence above: $a_1 = \underline{\quad}$ $a_4 = \underline{\quad}$ $a_7 = \underline{\quad}$

1. Find the *common difference, d* , in the following arithmetic sequences.

a. 3, 5, 7, 9, 11...

b. 33, 29, 25, 21, 17...

$d = \underline{\quad}$

$d = \underline{\quad}$

2. Write the sequence for which $a_2 = 5$ and the common difference is 3.

3. Determine whether or not each sequence is arithmetic.

a. -4, -2, 0, 2...

b. $\frac{1}{2}, \frac{5}{8}, \frac{3}{4}, \frac{13}{16}, \dots$

4. Find the next three terms of the arithmetic sequence.

15, 9, 3, -3, _____, _____, _____ ...

Recursive Form of Arithmetic Sequences

II. Consider the sequence: $a_1 = 5, a_2 = 8, a_3 = 11, a_4 = 14, a_5 = 17 \dots$

Suppose, for example, a_n is a_3 , what number represents a_{n+1} ? _____ a_{n-1} ? _____

$$\dots a_{n-2}, a_{n-1}, a_n, a_{n+1}, a_{n+2} \dots$$

Can you create a formula that relates a_n (any term) and a_{n-1} (the term before a_n) for the sequence above? _____. This is the *recursive form* of an arithmetic sequence. You also need to indicate the starting term _____.

So, in general... $a_n = a_{n-1} + d$ or $a_{n+1} = a_n + d$

1. Write 2 possible *recursive formulas* for the sequence 15, 9, 3, -3...
2. Write the sequence whose recursive formula is $a_n = a_{n-1} + 5$ and $a_1 = 3$.

III. Consider the following sequence in *Function Notation*:

$$f(1) = 3, \quad f(2) = 7, \quad f(3) = 11, \quad f(4) = 15$$

1. What would this sequence look like?
2. Is it arithmetic? Why or Why not?
3. What is the common difference?
4. What is $f(7)$?
5. Write 2 possible recursive formulas for the sequence.

IV. An arithmetic sequence is defined by the recursive formula:

$$A(n) = A(n - 1) - 5 \text{ for } n \geq 2 \text{ and } A(1) = 7$$

1. What does $A(6)$ represent?
2. Find the fourth term of the sequence.
3. Write another recursive formula to represent the sequence above.

V. For each of the following situations, find the common difference (d), write a recursive formula, and identify a_6 .

1. $-2, -7, -12, -17 \dots$

2. $\frac{2}{3}, \frac{5}{6}, 1 \dots$

3. Dan has started an exercise program. The first day he worked out for 30 minutes. Each day for the next six days, he increased his time by 5 minutes.
4. Julie is trying to lose weight. She now weighs 180 pounds. Every week for eight weeks, she is able to lose 2 pounds.

VI. For each of the following recursive formulas, list the first four terms of the sequence:

1. $a_{n+1} = a_n + 2$ and $a_1 = 7$

2. $F(n) = F(n - 1) - 6$ and $F(2) = 10$

3. $B(n + 1) = B(n) + 4$ and $B(1) = 5$

VII. Write the first four terms of the sequence where $a_7 = 24$ and $d = -5$. Write a recursive formula to represent the sequence.

Name: _____

Date: _____

13.1 HW: Recursive Formulas for Arithmetic Sequences

Algebra 1

1. For each of the following situations, find: the common difference, a recursive formula, and a_5 :

a. -1, -8, -15...

b. $\frac{1}{2}, \frac{2}{3}, \frac{5}{6} \dots$

- c. Sherri wants to increase her vocabulary. On Monday she learned the meaning of four new words. Each other day that week, she increased the number of new words that she learned by two.

2. For each of the following recursive rules, list the first four terms of the sequence:

a. $a_{n+1} = a_n - 3$ and $a_1 = 2$

b. $F(n) = F(n - 1) + 5$ and $F(2) = 17$

c. $C(n + 1) = C(n) + 3$ and $C(1) = 6$

3. Write the first four terms of the sequence with $a_8 = 15$ and $d = -3$. Write a recursive formula to represent the sequence.