Do Now:

a. Is the following sequence arithmetic or geometric?

$$7, 14, 21, 28...$$
 $d = 14-7=7$

b. Write an explicit formula for the above sequence.

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

 $a_n = 7 + (n-1)(7)$
 $a_n = 7 + 7n-7$

c. Using the formula, find the 8th term of the sequence.

$$a_8 = 7(8)$$

$$a_8 = 56$$

AIM: RECURSIVE FORMULA

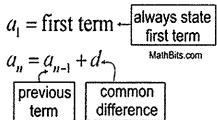
1. Could you state the term values for terms five through eight without using the formula? 7, 14, 21, 28.....

$$0.=7$$
 $0.=35$
 $0.=14$
 $0.=35$
 $0.=14$
 $0.=35$
 $0.=42$
 $0.=42$
 $0.=42$
 $0.=42$
 $0.=42$
 $0.=42$

Recursive Formula

- Dependent on the previous term to develop a pattern.
- Gives you the n^{th} term of a sequence using the term before, n-1.
- To find a term using a recursive formula you need the previous term to find the next one.

 a_1 = the first term in the sequence a_n = the n^{th} term in the sequence a_{n-1} = the term before the n^{th} term n = the term number d = the common difference.



$$a_{i}=7$$
 $a_{n}=a_{n-1}+d$
 $a_{i}=7$, $a_{n}=a_{n-1}+7$

2. Use the following to find the *first 4 terms* of the sequence:

$$a_1 = -2$$
 $a_n = a_{n-1} + 3$
 $0 = -3$
 $0 = -3 + 3 = 1$

Previous
 $0 = -3 + 3 = 1$
 $0 = -3 + 3 = 1$
 $0 = -3 + 3 = 1$
 $0 = -3 + 3 = 1$
 $0 = -3 + 3 = 1$
 $0 = -3 + 3 = 1$
 $0 = -3 + 3 = 1$
 $0 = -3 + 3 = 1$

$$[-2, 1, 4, 7]$$

3. Write the first 5 terms of the recursive sequence:

$$a_1 = -4$$

 $a_n = a_{n-1} + 5$
 $a_2 = 4 + 5 = 9$
 $a_3 = 9 + 5 = 14$
 $a_4 = 14 + 5 = 19$
 $a_5 = 19 + 5 = 24$

4. Write the first 4 terms of the recursive sequence:

$$a_1 = 12$$

$$a_{n+1} = a_n + 2$$

$$a_1 = 12$$
 $a_2 = 12 + 2 = 14$
 $a_3 = 14 + 2 = 16$
 $a_4 = 16 + 2 = 18$

To summarize the process of writing a recursive formula for an arithmetic sequence:

- **1.** Determine if the sequence is arithmetic (*Do you add or subtract the same amount from one term to the next?*)
- **2.** Find the common difference. (*The number you add or subtract*.)
- 3. Create a recursive formula by stating the first term, and then stating the formula to be the previous term plus the common difference.
- 5. State recursive formula for this sequence: 7, 11, 15, 19, 23, ...

$$Q_{n} = Q_{n-1} + Q_{n-1}$$

$$Q_{n} = Q_{n-1} + Q_{n-1}$$

$$Q_n = Q_{n-1} + d$$

$$d = Q_a - Q_a$$

6. State recursive formula for this sequence: 3, 5, 7, 9, 11, ...
$$Q_1 = 3$$

$$Q_1 = 3$$

$$Q_1 = 3$$

7. State *recursive formula* for this sequence: 32, 38, 44, 50, ...

- 8. Consider the sequence following: 35, 30, 25, 20, 15, 10, ...
- a) Write a recursive formula for the sequence.

$$a_1 = 35$$

 $a_1 = a_{n-1} - 5$

$$d = 30 - 35 = -5$$

b) Write an explicit formula for the sequence.

$$Q_n = Q_1 + (n-1)d$$

 $Q_n = 35 + (n-1)(-5)$
 $Q_n = 35 - 5n + 5$

$$\frac{Q_{18} = 40 - 5(18)}{Q_{18} = -50}$$

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