What is an arithmetic sequence?

- An ordered pattern where each subsequent value increases or decreases by a specific constant.
- Each subsequent term in an arithmetic sequence is obtained by <u>adding the common difference</u>, 'd', (the difference between one term and its previous term) to the previous term.

Example 1: Find the common difference for each arithmetic sequence.

a) 4, 9, 14, 19, …	b) 12, 5, -2, -9, …	c) 19, 13, 7, 2, …

Once we know the common difference, we can find the value of any term in any arithmetic sequence.

Example 2: Determine the <u>value</u> of the nth term for the following sequences.

a) 2, 9, 16,…, <u>8th</u>	b) -2, -5, -8,…, <u>10th</u>	c) 12, 25, 38,…, <u>30th</u>

Example 3: Find 3 terms between 43 & 77 to create an arithmetic sequence and determine the value of the 61st term.

The last 2 questions seem a bit unfair because it'll take some time to find the answers. So let's find a <u>faster way</u> to obtain the answers by <u>looking at patterns</u>.

Start with a number for any arithmetic sequence and call it 'a'. To get the number in the next term, add the common difference, 'd' (any +/- number), then continue the <u>same pattern for every subsequent term</u>.

Term value _____, _____, _____, _____, _____, . . . , _____

Term #   1st 2nd 3rd 4th 5th n^{th}

Using the following variables and any pattern you see, can you develop a general formula to determine the value of any term in any arithmetic sequence?

$'a'$ = value of 1st term in sequence	$'n'$ = number of terms in sequence
$'d'$ = common difference	$'t_n'$ = value of nth term in sequence

Example 4: Apply the general formula to answer the following questions.

a) Determine the 78th term given the sequence 5, 13, 21, ..., t_{78}	b) Which term is -523 given the sequence -11, -19, -27, ... , -523?

Example 5: In an arithmetic sequence, the 4th term is 73 and the 10th term is 121.

a) What are the first 3 terms?

b) What is the general term for the sequence?

c) How many terms are less than 200?

Example 6: A pile of bricks is arranged in rows. The number of bricks in each row forms the arithmetic sequence 65, 59, 53, . . .

a) One row contains 17 bricks. Which row is this?

b) How many rows of bricks are there? What are you assuming when answering this question?

Homework: