**Arithmetic Sequences and Series**

A sequence or series is Arithmetic if all of its successive terms have the same *common difference*.

**Example #1**

–3 + 2 + 7 + 12 + 17 + ….

What is the common difference between each of the terms? \_\_\_\_\_\_\_\_\_\_\_\_\_\_

If it helps, draw arrows between each of the terms.

(Answer: 5)

**Practice Problem #1**

Is the following sequence arithmetic? If so, find the common difference.

–4, –12, –24, –40, –60, …

Is the sequence arithmetic? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Why? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Finding the nth Term of an Arithmetic Sequence**

What if I asked you to find the 100th term of a sequence? That would take forever and you would not like it. Thankfully for you we have a general formula that will give us any nth term we want.

 where  is the first term and *d* is the common difference.

**Example #1**

Find the 11th term of the arithmetic sequence –3, –5, –7, –9, …

*Step 1:* What is the common difference? \_\_\_\_\_\_\_\_\_\_\_\_\_\_

*Step 2:* Plug what you know into the formula and solve.

Answer = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Finding the Sum of an Arithmetic Series**

Similar to finding a specific term of a sequence, you will also be asked to find the sum of series up to a certain point. This would also become very difficult if you were asked to find the sum of many consecutive numbers.

Just as before we will have a general formula that will help us solve these types of problems.

 where  and  are the first and last terms.

**Example #1**

Find S16 for the arithmetic series 12 + 7 + 2 + (–3) + …

*Step 1:* Find the common difference.

We can’t use our formula quite yet because we don’t know what the final term is. In order to find this we have to use the first formula we learned about to find a16 .

To start we need to know what the common difference is. Answer = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*Step 2:* Find the last term of the series.

Use the common difference and the formula  to find the last term of the series.

What is the last term? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*Step 3:* Plug what you know into the formula and solve.

Answer = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Practice Problem #1**

Find the indicated sum for the arithmetic series 

Even though it doesn’t look like it, this one is actually a little bit simpler. In order to find the sum we need to find both a1 and a12 . Once we have those we can find the sum.

Use the formula  to find both answers.

What is a1? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What is a12? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Now plug all the parts you know into the formula to find the sum.

S12 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Come show your answer to me so I know you’re on the right track!!

**Finding Missing Terms**

Example #1 Find the missing terms in the arithmetic sequence 11, \_\_\_ , \_\_\_ , \_\_\_ , –17

*(Start with the formula*  *and plug in the parts you know.)*

**Finding nth Term Given Two Terms**

Example #1 Find the 6th term of the arithmetic sequence with a9 = 120 and a14 = 195.

*(Start with the formula*  *and plug in the parts you know.)*

You should now be able to say the following:

* I can recognize whether a series (or sequence) is arithmetic (**C1**)
* I can use the formula to find the nth term of an arithmetic sequence (**C2**)
* I can use the formula to find the sum of the first “n” terms of an arithmetic series (**C3**)

**Assignment: pg 884 #1-20**