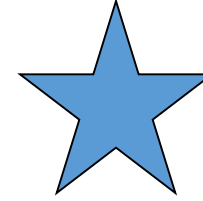
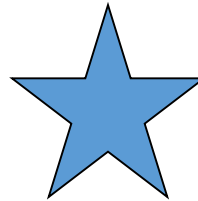
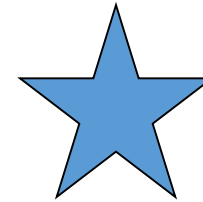




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# Arithmetic Sequences and Partial Sums



**A sequence is arithmetic if the differences between consecutive terms are the same.**

The **common difference** is called  $d$ .

**For Ex.**      $7, 11, 15, 19, \dots, 4n + 3$     or  
                  $2, -3, -8, -13, \dots, 7 - 5n$     are arith. seq.'s

**What is  $d$ , the common difference? What is  $a_1$ ?**

$$a_1 = 7$$

$$a_2 = 7 + 4 = 11$$

$$a_3 = 7 + 2(4) = 15$$

$$a_4 = 7 + 3(4) = 19$$

**Do you see a pattern? What is  $a_5$ ?**

**What is  $a_n$ ?**

**What is the 35th term?**



**Can you come up with an equation that will give you the  $n$ th term of any arithmetic sequence?**

$$\mathbf{a_n = a_1 + (n - 1)d}$$

Find a formula for the  $n$ th term of the arithmetic sequence whose common difference is 5 and whose 2nd term is 12.  
What is the 18th term of the sequence?

**Use the given information:**  $d = 5$  and  $a_2 = 12$

$$\mathbf{a_2 = a_1 + (2-1)d \text{ or } a_1 + d}$$
 **Substitute in for  $a_2$  and  $d$  and solve for  $a_1$**

$$\mathbf{12 = a_1 + 5 \text{ and } a_1 = 7}$$
 Find the 18th term?

$$\mathbf{a_{18} = a_1 + 17d = 7 + 17(5) = 92}$$



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Find the ninth term of the arithmetic sequence whose first two terms are 2 and 9.

**The common difference,  $d$ ?       $d = 7$**

Use the given info to find the 9th term because we know  $a_1$  and  $d$ .

Find  $a_9$ .

$$a_9 = 2 + 8(7) = 58$$



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The fourth term of an arithmetic sequence is 20, and the 13th is 65. Write the first 4 terms of this sequence.

Write the equations of any 4th and 13th terms of any arithmetic sequence.

$$a_4 = a_1 + 3d$$

$$a_{13} = a_1 + 12d$$

Now fill in what we know and use elimination to find  $a_1$  and  $d$ .

So the first four terms are: **5, 10, 15, 20**



## The sum of a finite arithmetic sequence

$$S = \frac{n}{2} (a_1 + a_n)$$

**Ex. Add the numbers from 1 to 100.**

$$S = \frac{100}{2} (1 + 100) = 5050$$



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**Find the sum.**

$$\sum_{n=1}^{150} (11n - 6) =$$

**Use the given formula to solve.**

**First, we have to find  $a_1$  and  $a_{150}$ .**

$$a_1 =$$

$$a_{150} =$$

**Now substitute those into the formula.**

$$S = \frac{150}{2} (5 + 1644) = 123,675$$



**Insert 3 arithmetic means between 4 and 15.**

$$4 \quad \underline{\quad} \quad \underline{\quad} \quad \underline{\quad} \quad 15$$

**Find the common difference.**

**Write the equation for  $a_5$ .**

$$a_5 = a_1 + 4d$$

$$15 = 4 + 4d$$

$$d = \frac{11}{4}$$

**So the sequence is?**

$$4, \frac{27}{4}, \frac{38}{4}, \frac{49}{4}, 15$$