

Review Exercise Set 15

Exercise 1: Find the common difference of the arithmetic sequence.

$$2, 5, 8, 11, \dots$$

Exercise 2: Find the first four terms of the arithmetic sequence.

$$a_n = 2n - 7$$

Exercise 3: Find the n^{th} term of the arithmetic sequence with the given 1^{st} term and common difference.

$$a_1 = \frac{1}{8} \quad d = \frac{3}{4}$$

Exercise 4: Find the 24th term of the arithmetic sequence.

$$1.2, 3.5, 5.8, 8.1, \dots$$

Exercise 5: Find a_1 , d , and the n^{th} term for the arithmetic sequence.

$$a_7 = 11 \quad a_{15} = 43$$

Exercise 6: Find the sum of the first 15 terms of the arithmetic sequence.

$$4, 9, 14, 19, \dots$$

Review Exercise Set 15 Answer Key

Exercise 1: Find the common difference of the arithmetic sequence.

$$2, 5, 8, 11, \dots$$

Take the difference between the terms to see if there is a common difference

$$5 - 2 = 3$$

$$8 - 5 = 3$$

$$11 - 8 = 3$$

The difference between the terms is equal to 3.

Exercise 2: Find the first four terms of the arithmetic sequence.

$$a_n = 2n - 7$$

$$n = 1$$

$$n = 2$$

$$n = 3$$

$$n = 4$$

$$\begin{array}{llll} a_1 = 2(1) - 7 & a_2 = 2(2) - 7 & a_3 = 2(3) - 7 & a_4 = 2(4) - 7 \\ = 2 - 7 & = 4 - 7 & = 6 - 7 & = 8 - 7 \\ = -5 & = -3 & = -1 & = 1 \end{array}$$

The first four terms are -5, -3, -1, and 1.

Exercise 3: Find the n^{th} term of the arithmetic sequence with the given 1^{st} term and common difference.

$$a_1 = \frac{1}{8} \quad d = \frac{3}{4}$$

Substitute the known values into the formula for the n^{th} term

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

$$a_n = \frac{1}{8} + (n - 1) \frac{3}{4}$$

$$a_n = \frac{1}{8} + \frac{3}{4}n - \frac{3}{4}$$

$$a_n = \frac{3}{4}n - \frac{1}{8}$$

Exercise 4: Find the 24th term of the arithmetic sequence.

$$1.2, 3.5, 5.8, 8.1, \dots$$

We know the first term is 1.2, so we now need to determine the common difference.

$$d = 3.5 - 1.2 = 2.3$$

Now substitute our given value for n and the known values for a_1 and d.

$$n = 24; a_1 = 1.2; d = 2.3$$

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

$$a_{24} = 1.2 + (24 - 1)(2.3)$$

$$a_{24} = 1.2 + (23)(2.3)$$

$$a_{24} = 1.2 + 52.9$$

$$\mathbf{a_{24} = 54.1}$$

Exercise 5: Find a_1 , d, and the n^{th} term for the arithmetic sequence.

$$a_7 = 11 \quad a_{15} = 43$$

First, we will find the common difference for the sequence by using the two given terms. Since we do not know the first term of the sequence yet, we can rewrite the general formula of $a_n = a_1 + (n - 1)d$ by replacing 1 with another variable.

$$a_n = a_m + (n - m)d$$

Let $n = 15$ and $m = 7$

$$a_{15} = a_7 + (15 - 7)d$$

$$43 = 11 + 8d$$

$$32 = 8d$$

$$\mathbf{4 = d}$$

Next, we can find the first term of the sequence by using the common difference and one of the two given terms.

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

$$a_7 = a_1 + (7 - 1)(4)$$

$$11 = a_1 + 24$$

$$\mathbf{-13 = a_1}$$

Exercise 5 (Continued):

Finally, we can determine the equation for the n^{th} term by substituting in the values for the first term and the common difference.

$$\begin{aligned}a_n &= a_1 + (n - 1)d \\a_n &= -13 + (n - 1)(4) \\a_n &= -13 + 4n - 4 \\ \mathbf{a_n} &= \mathbf{4n - 17}\end{aligned}$$

Exercise 6: Find the sum of the first 15 terms of the arithmetic sequence.

$$4, 9, 14, 19, \dots$$

First, determine the common difference for the arithmetic sequence

$$\begin{aligned}d &= 9 - 4 \\d &= 5\end{aligned}$$

Now, substitute our known values into the formula for the partial sum of an arithmetic sequence.

$$n = 15; a_1 = 4; d = 5$$

$$\begin{aligned}S_n &= \frac{n}{2} [2a_1 + (n - 1)d] \\S_{15} &= \frac{15}{2} [2(4) + (15 - 1)(5)] \\S_{15} &= \frac{15}{2} [8 + 70] \\S_{15} &= \frac{15}{2} [78] \\ \mathbf{S_{15}} &= \mathbf{585}\end{aligned}$$