

Example 2 - Averaging a set of numbers

Average the following set of numbers:

19, 14, 9, 18, 10, 6

Step 1 in the problem solving sequence states:

“Understand the problem statement”

The purpose of the algorithm is to average the above six numbers.

Step 2 in the problem solving sequence states:

“Develop an algorithm to solve the problem”

To average a set of numbers, the numbers must be added together and then the sum must be divided by the total number of numbers.

The **inputs** to the system are the numbers: 19, 14, 9, 18, 10, and 6.

These inputs can be represented by the symbols:

n_1 :	19
n_2 :	14
n_3 :	9
n_4 :	18
n_5 :	10
n_6 :	6

The **output** of the system is the calculated average of the input numbers.

$$\text{average} = (19 + 14 + 9 + 18 + 10 + 6) / 6$$

Solution steps:

1. $\text{sum} = 0$
2. $i = 0$
3. $i = i + 1$
4. $\text{sum} = \text{sum} + n_i$
5. repeat steps 3 and 4 until $i = 6$
6. $\text{average} = \text{sum} / 6$

Following the above steps will produce the average of the six given numbers. Notice that the first five steps are almost identical to the steps developed for adding a series of numbers (makes sense). The difference is that now we have six numbers instead of the previous set of five numbers. Once the sum is calculated, it must be divided by the total number of numbers which is six in this case.

Recap:

Looking back to the previous description of an algorithm:

The inputs to the algorithm are the actual numbers n_1 through n_6 found in the data set. The output of the algorithm is the calculated sum of the numbers divided by the number of numbers in the data set. The steps necessary to solve this algorithm are stated precisely (steps 1 through 6). Each step in the algorithm produces a unique value. The algorithm works for the given set of numbers (finite, ends after six numbers). The algorithm is also general in nature, meaning that the steps will work for any set of numbers.

Expanding the Concepts:

What change(s) would have to be made to the algorithm to handle a data set of 15 numbers?