

## Programming and Problem Solving through Python Language O Level / A Level

### Chapter -2 : Algorithms for Problem Solving

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**Algorithm** can be defined as: “A sequence of activities to be processed for getting desired output from a given input.”

Before writing an algorithm for a problem, one should find out what is/are the inputs to the algorithm and what is/are expected output after running the algorithm.

While writing algorithms we will use following symbol for different operations:

‘+’ for Addition

‘-’ for Subtraction

‘\*’ for Multiplication

‘/’ for Division and

‘= ’ for assignment. For example  $A = X * 3$  means A will have a value of  $X * 3$ .

#### Example of Algorithm

**Problem 1:** Find the area of a Circle of radius r.

Inputs to the algorithm:

Radius r of the Circle.

Expected output:

Area of the Circle

Algorithm:

Step1: Read\input the Radius r of the Circle

Step2:  $Area = PI * r * r$  // calculation of area

Step3: Print Area

**Problem 2:** Write an algorithm to read two numbers and find their sum.

Inputs to the algorithm: First num1. Second num2.

Expected output: Sum of the two numbers.

**Algorithm:**

Step1: Start

Step2: Read\input the first num1.

Step3: Read\input the second num2.

Step4: Sum= num1+num2 // calculation of sum

Step5: Print Sum

Step6: End

**Problem 3:** Convert temperature Fahrenheit to Celsius

Inputs to the algorithm:

Temperature in Fahrenheit

Expected output:

Temperature in Celsius

**Algorithm:**

Step1: Start

Step 2: Read Temperature in Fahrenheit F

Step 3:  $C = \frac{5}{9} * (F - 32)$

Step 4: Print Temperature in Celsius: C

Step5: End

### Problem 3 : Exchanging Values of Two Variables

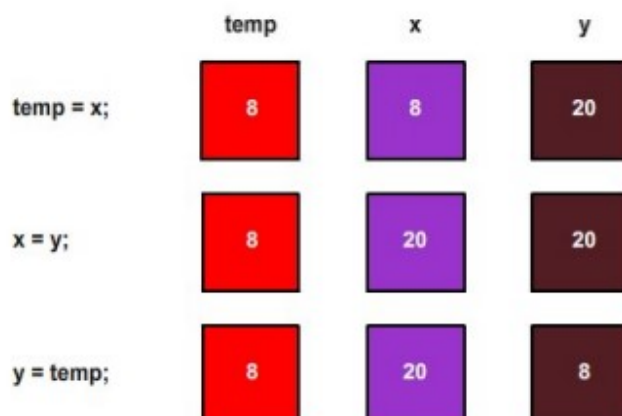
- Problem definition: Exchanging values of two variables.
- Analysis: Two variables x and y contains two different values.
- Swap the values of x and y such that x has y's value and y has x's value.
- Solving by example: Let us consider two variables x and y, containing values 8 and 20 respectively.
- The original values of x and y are:



- The requirement is once the algorithm is performed, the results should be



- If you think by just saying,  
➤ `x=y;    y=x;`
- The value gets swapped, then you are mistaken.
- These instruction are atomic in nature and hence `x = y` means that the value of 'x' is lost.
- So, we have to use a temporary variable, temp to store the value of 'x'.



- The value of 'x' and 'y' is swapped.

#### Algorithm Definition

Step 1: Start.

Step 2: Get the values of x and y.

Step 3: Store x's value to temp. (temp: = x)

Step 4: Store y's value to x. So, x has y's value now (x: = y)

Step 5: Store temp's value (the value of the old 'x') in y.

Step 6: Stop.