ALGORITHM & FLOW CHART

- Can you think of a day in your life which goes without problem solving?

- Answer to this question is of course, No. In our life we are bound to solve problems. In our day to day activity such as purchasing something from a general store and making payments, depositing fee in school, or withdrawing money from bank account.

- All these activities involve some kind of problem solving.

- If you can solve a given problem then you can also write an algorithm for it. In next section we will learn what is an **algorithm**.

ALGORITHM

- An algorithm as: “A formula or set of steps for solving a particular problem”.

- 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

Problem2: 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

Type of Algorithms

The algorithm and flowchart, classification to the **three types of control structures.** They are:
1. Sequence
2. Branching (Selection)
3. Loop (Repetition)

These three control structures are sufficient for all purposes.

- Example for Sequence type algorithm

Problem : 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 ⟵ 5/9*(F32)
Step 4: Print Temperature in Celsius: C
Step5: End

- Example for Selection type algorithm.

Problem : write algorithm to find the greater number between two numbers

Step1: Start

Step2: Read/input A and B

Step3: If A greater than B then C=A

Step4: if B greater than A then C=B

Step5: Print C

Step6: End

- Example for Repetition type algorithm.

The loop allows a statement or a sequence of statements to be repeatedly executed based on some loop condition.

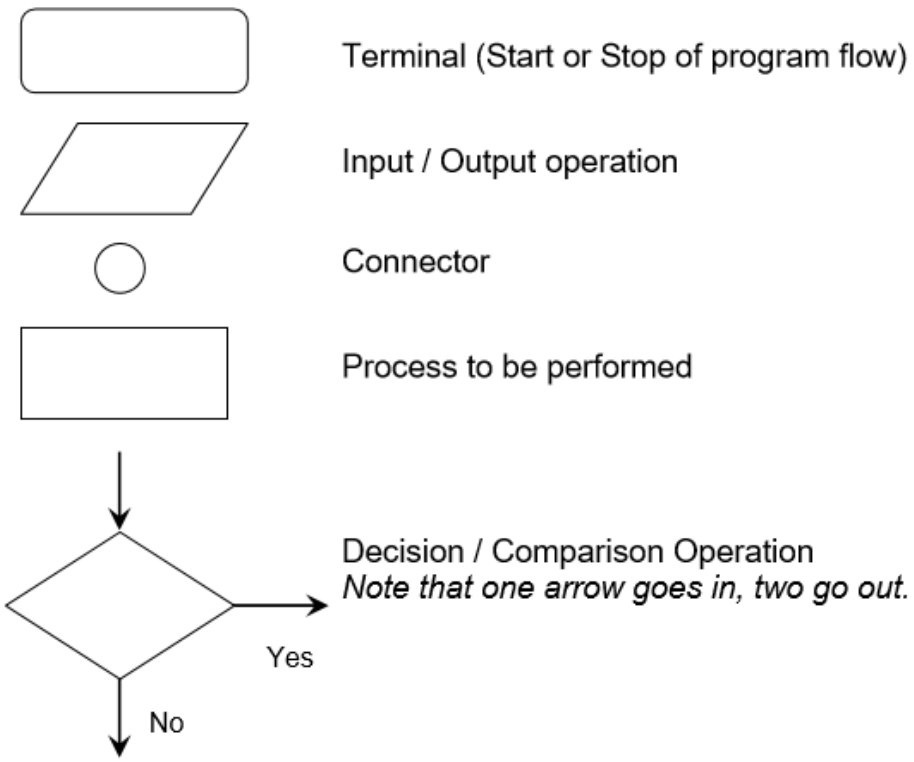
Problem : An algorithm to calculate even numbers between 0 and 99

1. Start
2. I ← 0
3. Write I in standard output
4. I ← I+2
5. If (I <=98) then go to line 3
6. End

FLOW CHART

- A flowchart is a graphical representation of the operations involved in a data processing system.
- Symbols are used to represent particular operations or data.
- Flow lines indicate the sequence of operations (Top to down sequence).

Flowchart Symbols

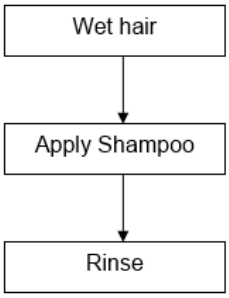


Sequential Structure

A series of processes that follow in order.

For example, to wash your hair;

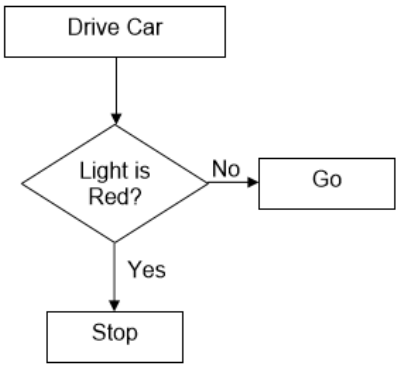
1. Wet hair
2. Apply shampoo
3. Rinse



Decision Making Structure

A condition exists that may change the order or types of processes to be followed.

For example, IF the light is red THEN I will stop OTHERWISE I will go.

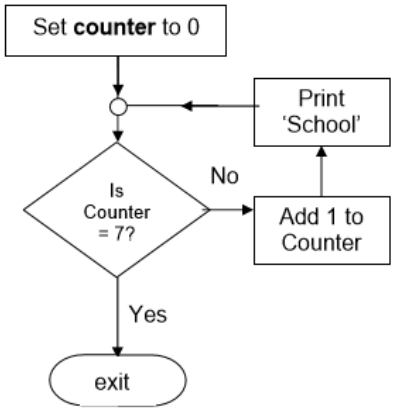


Looping Structure

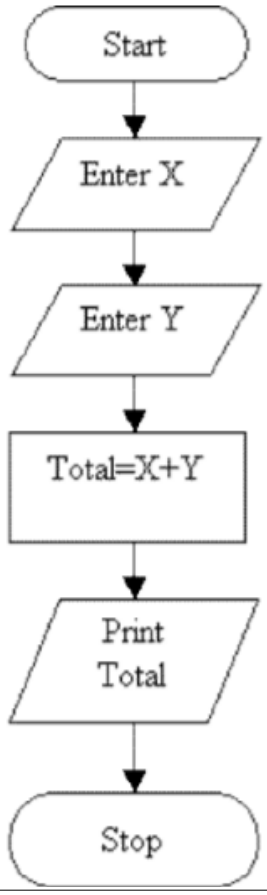
Often, we might wish to perform the same set of processes a number of times, we can perform a loop and do the same set of actions over and over until a STOPPING condition occurs.

Failure to provide a STOP condition will cause the process to go into an INFINITE LOOP

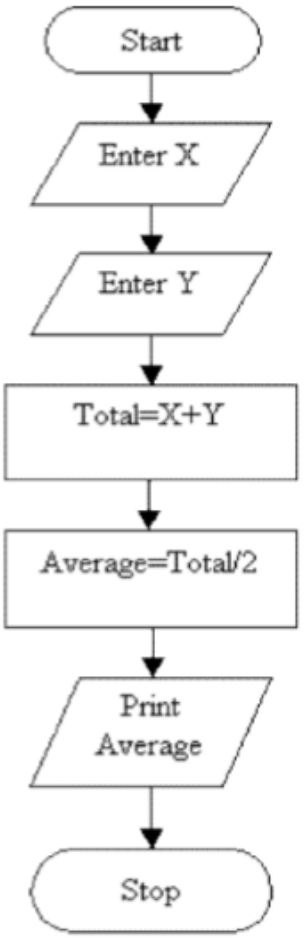
An example of a LOOP could be to display the word 'SCHOOL' on the screen 7 times.



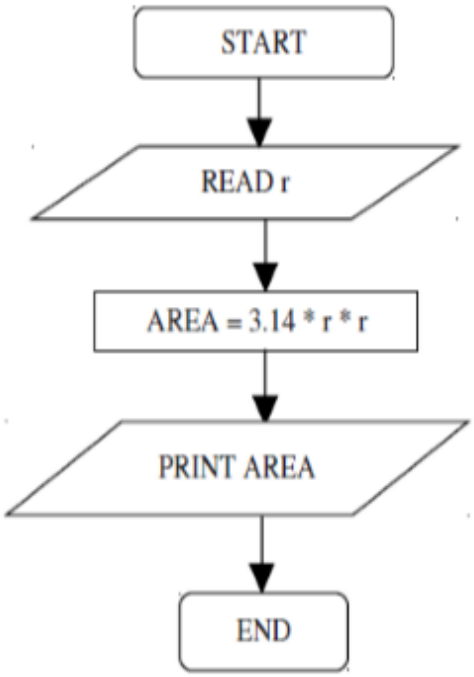
Problem: Find the total of two numbers.



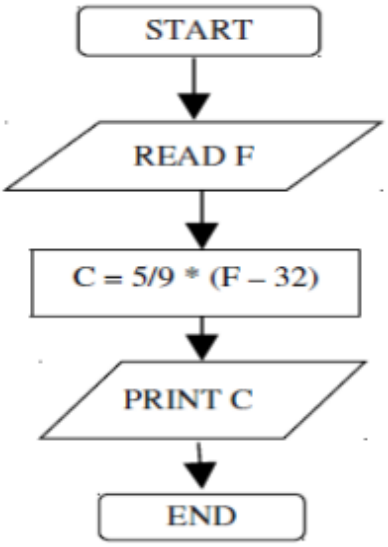
Problem: Find the average of two numbers.



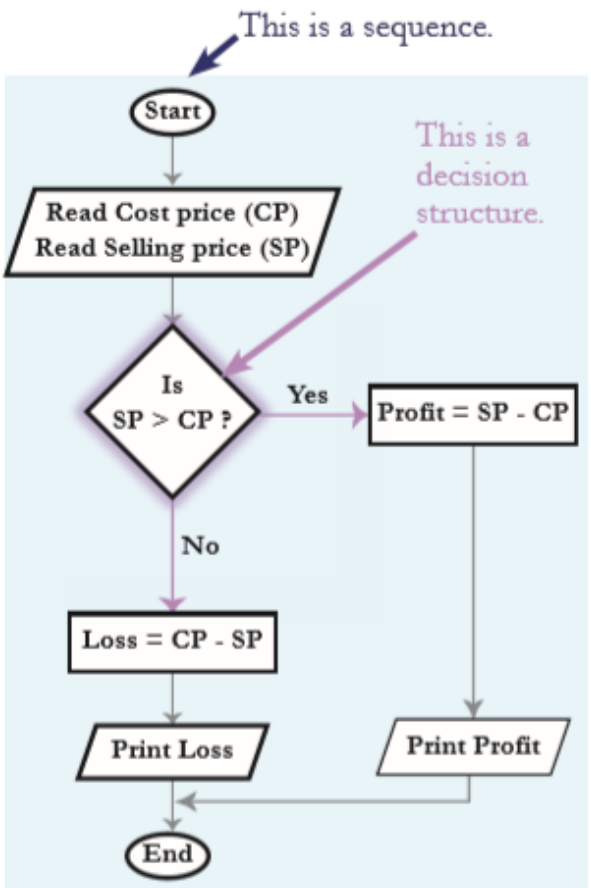
Problem 1: Find the area of a circle of radius r.



Problem 2: Convert temperature Fahrenheit to Celsius.



Flowchart - How to find profit or loss.



Finding profit or loss when CP = 325 and SP = 458

Start

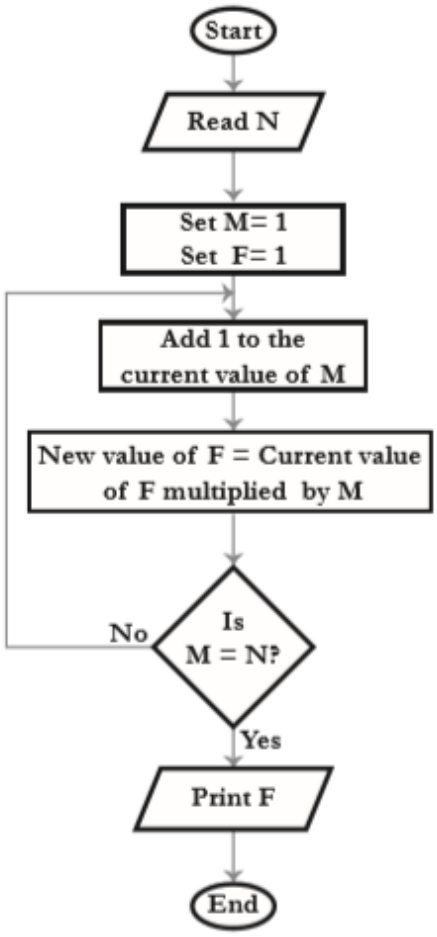
Read CP=325
Read SP= 458

Condition:
Is 458 > 325? — Profit= 458-325

Profit= Rs. 133

End

Find factorial of a given number N



Finding factorial of 10

Start

N = 10

M = 1
F = 1

F = 1 * 1 = 1; M < 10; M = 1 +1 = 2
F = 1 * 2 = 2; M < 10; M = 2 +1 = 3
F = 2 * 3 = 6; M<10; M = 3 + 1 = 4
F = 6 * 4 = 24; M<10; M = 4 +1 = 5

.....

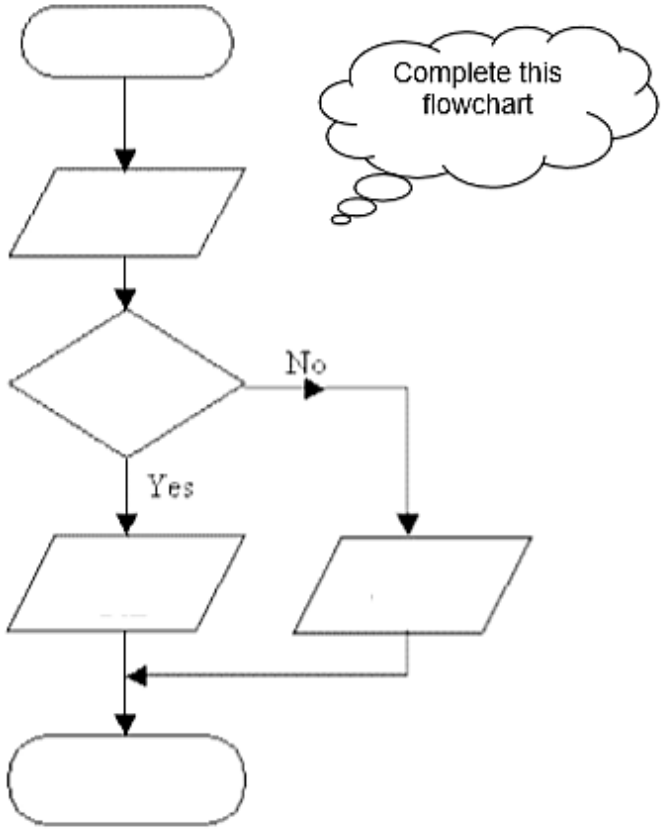
M<10; M = 9 + 1 = 10
F = 362880 * 10 = 3628800; M = 10

Factorial of 10 = 3628800

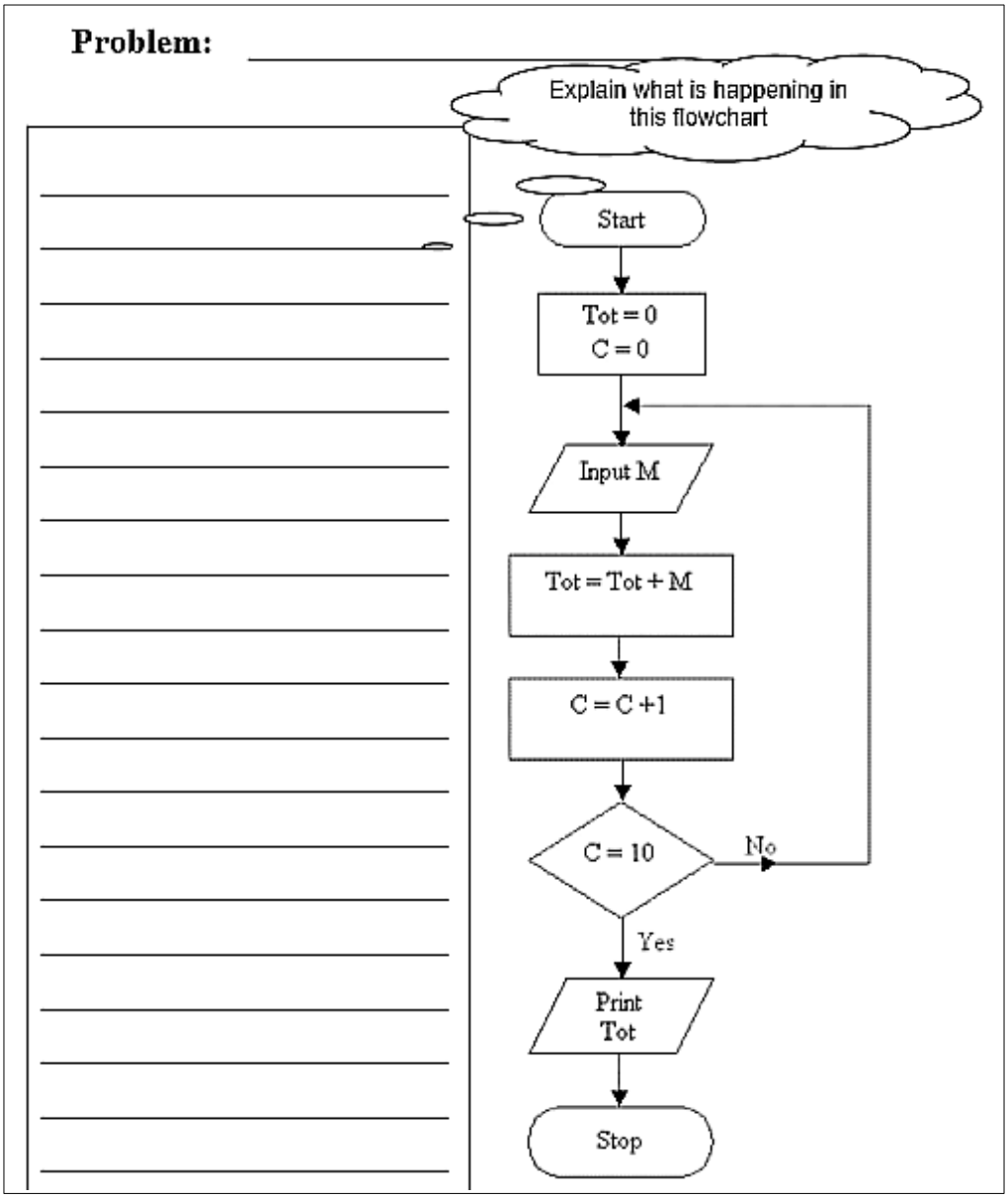
End

ACTIVITY – 01

Problem: Input a mark. Print 'Fail' if it is less than 50, otherwise print 'Pass'.



ACTIVITY – 02


Problem:
Explain what is happening in this flowchart
Start
Tot = 0
C = 0
Input M
Tot = Tot + M
C = C +1
C = 10
No
Yes
Print Tot
Stop