Flow Charts

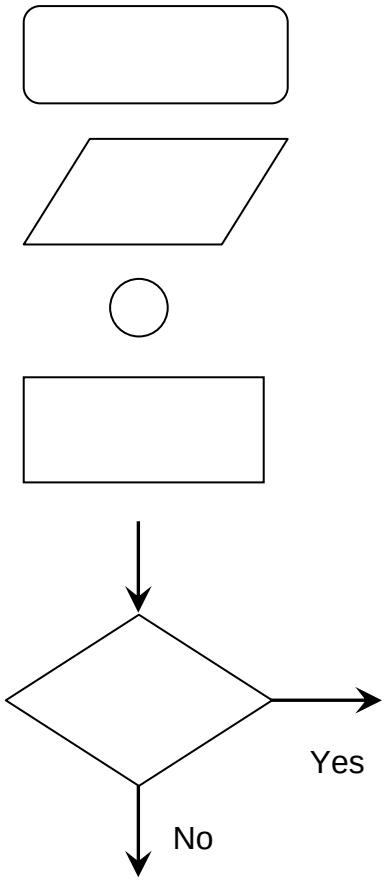
Why flowcharting?

Often the best way to understand a problem is to draw pictures. Pictures often provide us with a more complete idea of the situation than a series of short word or phrases can. However, pictures combined with text provide an extremely powerful tool for communication and problem solving. Algorithms can be developed more quickly when a flow chart is built to represent such an algorithm. Flowcharts need less effort to understand then an algorithm.

What is a flowchart?

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).



Terminal (Start or Stop of program flow)

Input / Output operation

Connector

Process to be performed

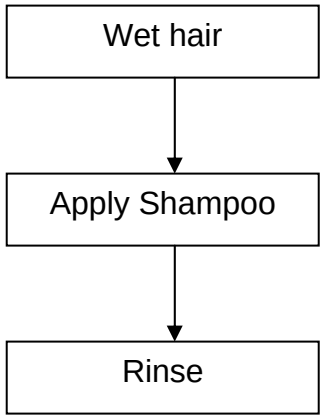
Decision / Comparison Operation
Note that one arrow goes in, two go out.

Sequential Structure

A series of processes that follow in order.

For example, to wash your hair;

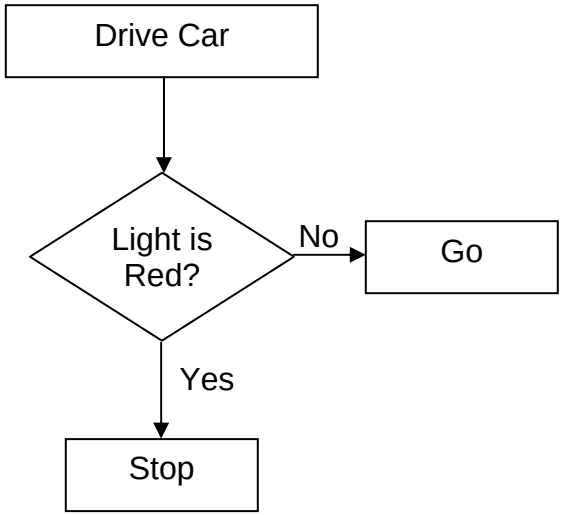
1. Wet hair
2. Apply shampoo
3. Rinse



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.

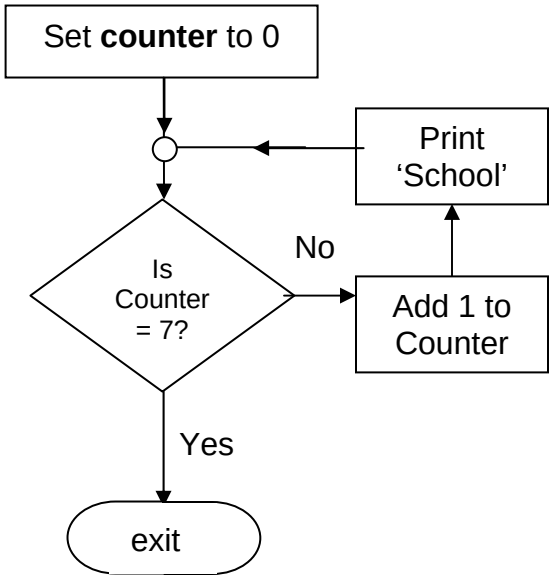


Looping Structure

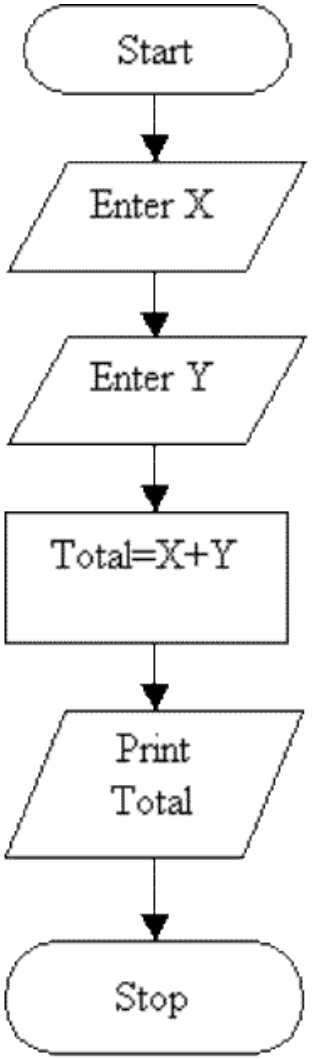
Often, we might wish to perform the same set of processes a number of times, we can perform a loop and do the same set of actions over and over until a STOPPING condition occurs.

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

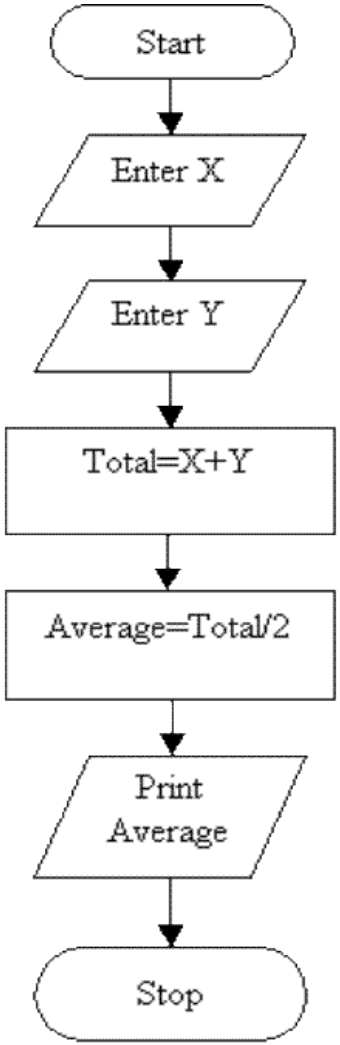
An example of a LOOP could be to display the word 'SCHOOL' on the screen 7 times.



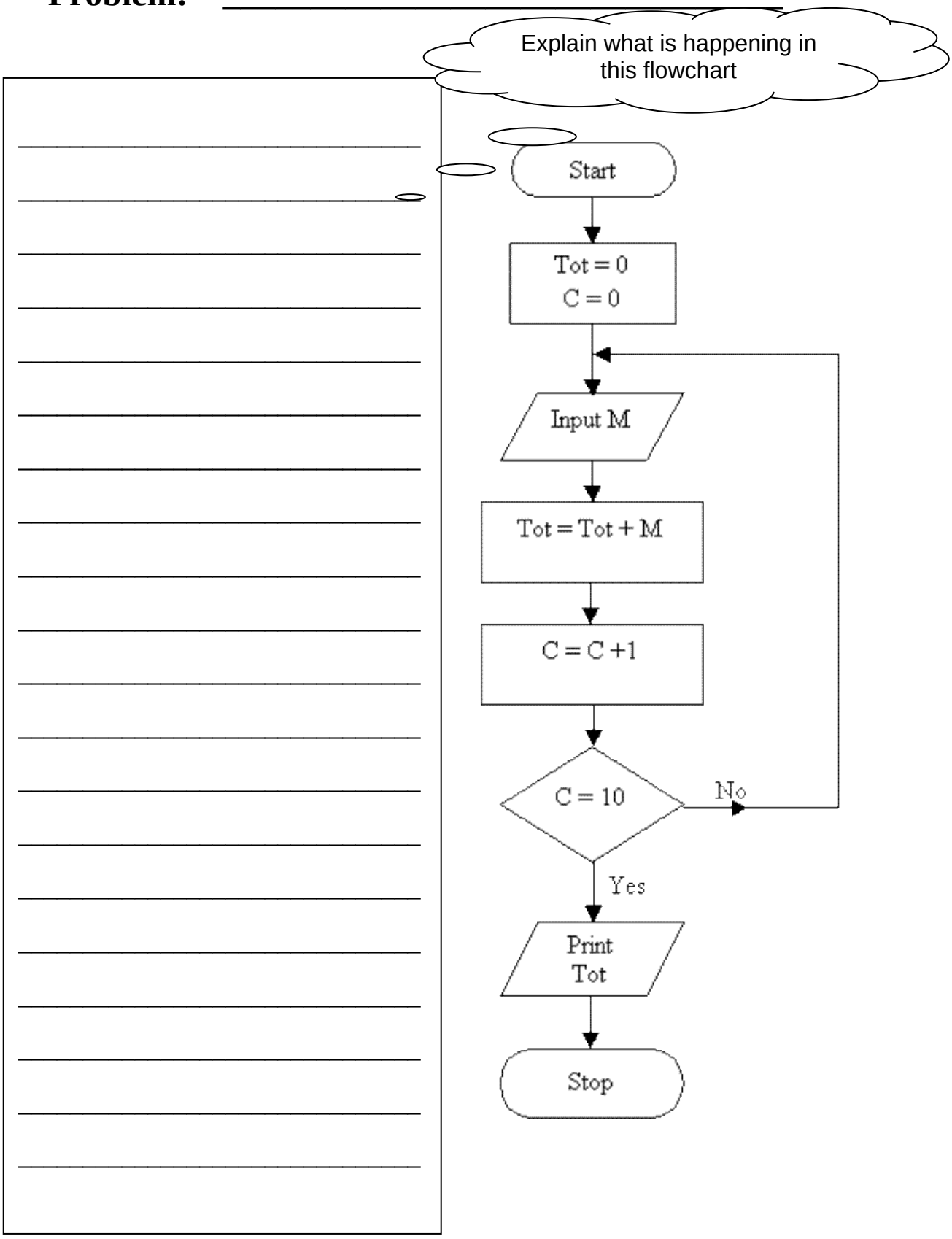
Problem: Find the total of two numbers.



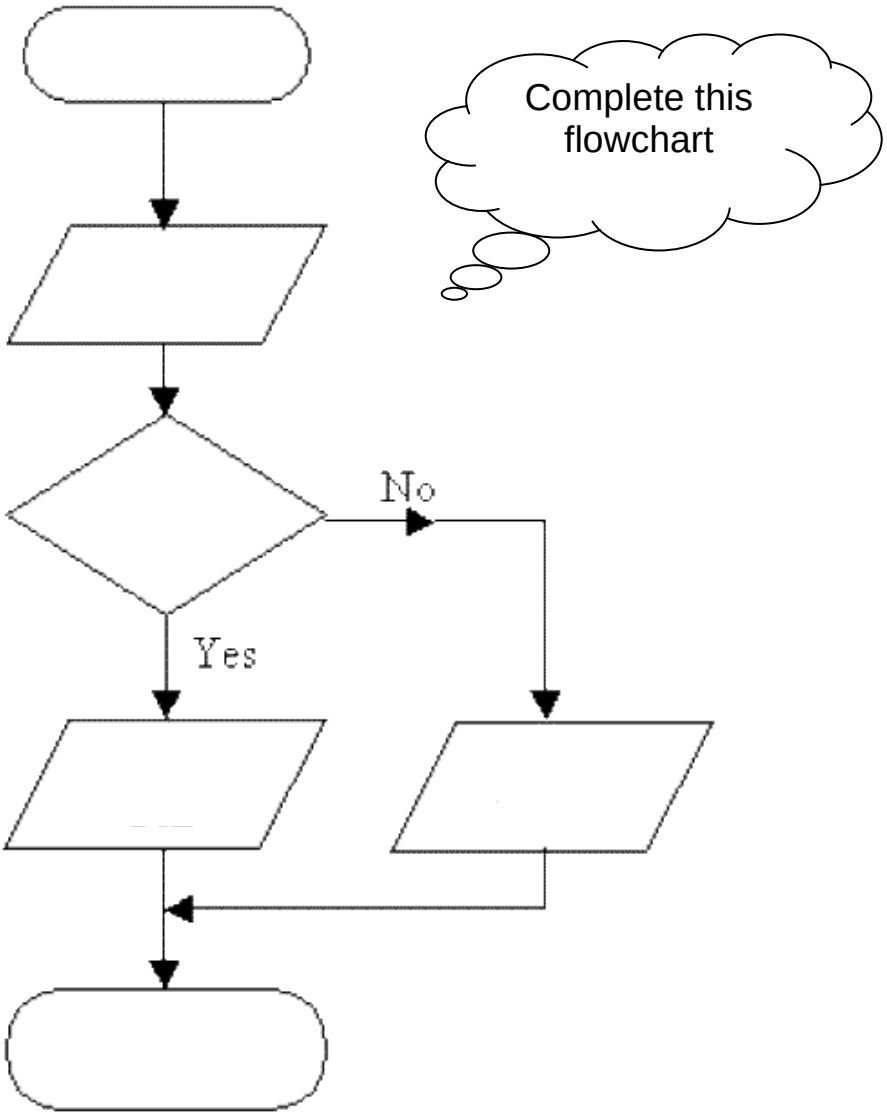
Problem: Find the average of two numbers.



Problem: _____


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

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



Exercise:

For each of the problems below, draw a flow chart;

1. Input the length L and the breadth B, calculate and output the area of a rectangle.
2. User inputs radius and flowchart calculates and shows the area of a circle
3. Print the number from 1 to 100 (Hint: use a counter & loop)
4. Enter 20 marks and print their average.
5. Ask a person for a number between 1 and 100, ask again if they give you a number outside that range
6. Input 40 marks. Count and print how many marks are below 50.
7. Input M and print the square of M if it is between 1 and 10.
8. Input a mark. Calculate and output a student's grade;

$$80 < A <= 100$$

$$60 < B <= 80$$

$$40 < C <= 60$$

$$0 <= U <= 40$$