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Identification and solving of simple real life or scientific or technical problems, and developing flow charts for the same.

Aim:

The aim of this exercise is to identify and solve simple real life or scientific or technical problems, and developing flow charts for the same.

Problems Given:

1. Electricity Billing
2. Retail Shop Billing
3. Sin Series
4. Weight of a Motorbike
5. Weight of a steel bar
6. Compute Electrical Current in Three Phase AC Circuit.

Concepts Involved

Algorithm

- Algorithm is a step by step description for solving a problem.
- It is a well defined computational procedure consisting of a set of instructions that takes some value or set of values as input and produces some value or set of values as output.
- There is a time and space complexity associated with each algorithm. The time complexity specifies the amount of time required to perform a specific task. Space complexity specifies the size of memory required by the algorithm.

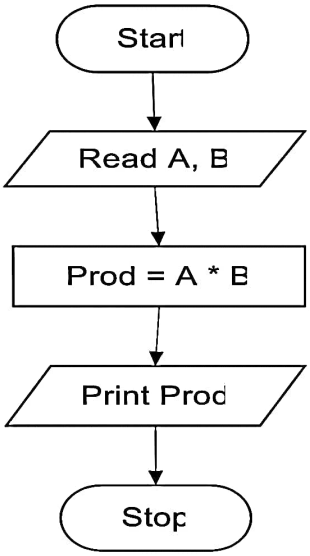
Example: An algorithm to add two numbers entered by user:

Step 1: Start
Step 2: Declare variables a,b and c
Step 3: Read values of a and b
Step 4: Add a and b and assigns the result to c
    c=a+b
Step 5: Display c
Step 6: Stop

Flow Chart

- A flowchart is a graphical or symbolic representation of a process. Each step in the process is represented by a different symbol and contains a short description of the process step.

Example: Draw a flowchart to find product of two numbers A and B



Algorithm

1. Electricity Billing

Step 0: Start

Step 1: Declare variables unit and usage

Step 2: Read the input variable "unit"

Step 3: Process the following

When the unit is less than or equal to 100 units, calculate usage=uni*5

When the unit is between 100 to 200 units, calculate usage=(100*5)+((unit-100)*7)

When the unit is between 200 to 300 units, calculate usage=(100*5)+(100*7)+((unit-200)*10)

When the unit is above 300 units, calculate usage=(100*5)+(100*7)+(100*!0)+((unit-300)*15)

For further, no additional charge will be calculated.

Step 4: Display the amount "usage" to the user.

Step 5: Stop

2. Retail Shop Billing

Step 0: Start

Step 1: Declare the variables like item1, item2, item3, a1, a2, a3, and amount.

Step 2: Assign the values for a1, a2 and a3; a1=15, a2=120, a3=85.

Step 3: Read the values of item1, item2, and item3.

Step 4: Process the following

amount=(item1*a1) + (item2*a2) + (item3*a3)

Step 5: Display the value of "amount".

Step 6: Stop.

3. Sin Series

The formula for the 'sin x' is represented as

sin x= $x-x^3/3!+x^5/5!-x^7/7!+x^9/9!-$ ..... (where x is in radians)

Step 0: Start.

Step 1: Declare the variables which are required to process.

Step 2: Read the input like the value of x in radians and n where n is a number up to which we want to print the sum of series.

Step 3: For first term,

sum=x;

p=1 (variable p is used for denominator)

num=x (variable num is used for numerator)

power=1

Step 4: For next term,

num=num* (-x2);

power=power+2;

p=p*(power-1)*power

next=num/p;

Step 5: then sum=sum+next.

Step 6: Repeat the step 4 and step 5, looping 'n-1' times to get the sum of first 'n' terms of the series.

Step 7: Display the value of sum.

Step 8: Stop.

4. Weight of a Motorbike

- **Motorcycle maximum load is the total weight the bike can carry including the rider, passenger and any cargo.**
- **Gross Vehicle Weight (GVW) of your motorcycle is the weight of the motorcycle itself plus all engine fluids and full fuel, plus the maximum allowable weight of the rider and passenger.**
- **Motorcycle curb weight, or wet weight, is the weight of the motorcycle itself plus all engine oils and full fuel.**

Step 0: Start

Step 1: Declare variables weightmotor, pr, eoff and weight.

Step 2: Read the values of weightmotot, pr, and eoff.

Step 3: Process the following

weight=weightmotor+pr+eoff.

Step 4: Display "Motorbike Weight Result is weight".

Step 5: Stop.

5. Weight of a steel bar

Weight of steel bar = $(d^2 /162)$*length (Where d value in mm and length value in m)

Step 0: Start.

Step 1: Declare the variables d, length and weight.

Step 2: Read the value of d and length.

Step 3: Process the following

weight=$(d^2 /162)$*length

Step 4: Display the value of weight.

Step 5: Stop.

6. Compute Electrical Current in Three Phase AC Circuit

Perform a three phase power calculation using the following formula:

$P=\sqrt{3}$ X pf X I X V

Where pf - power factor, I - current, V - voltage and P – power

Step 0: Start

Step 1: Declare variables pf, I, V and P.

Step 2: Read the values of pf, I and V.

Step 3: Process the following:

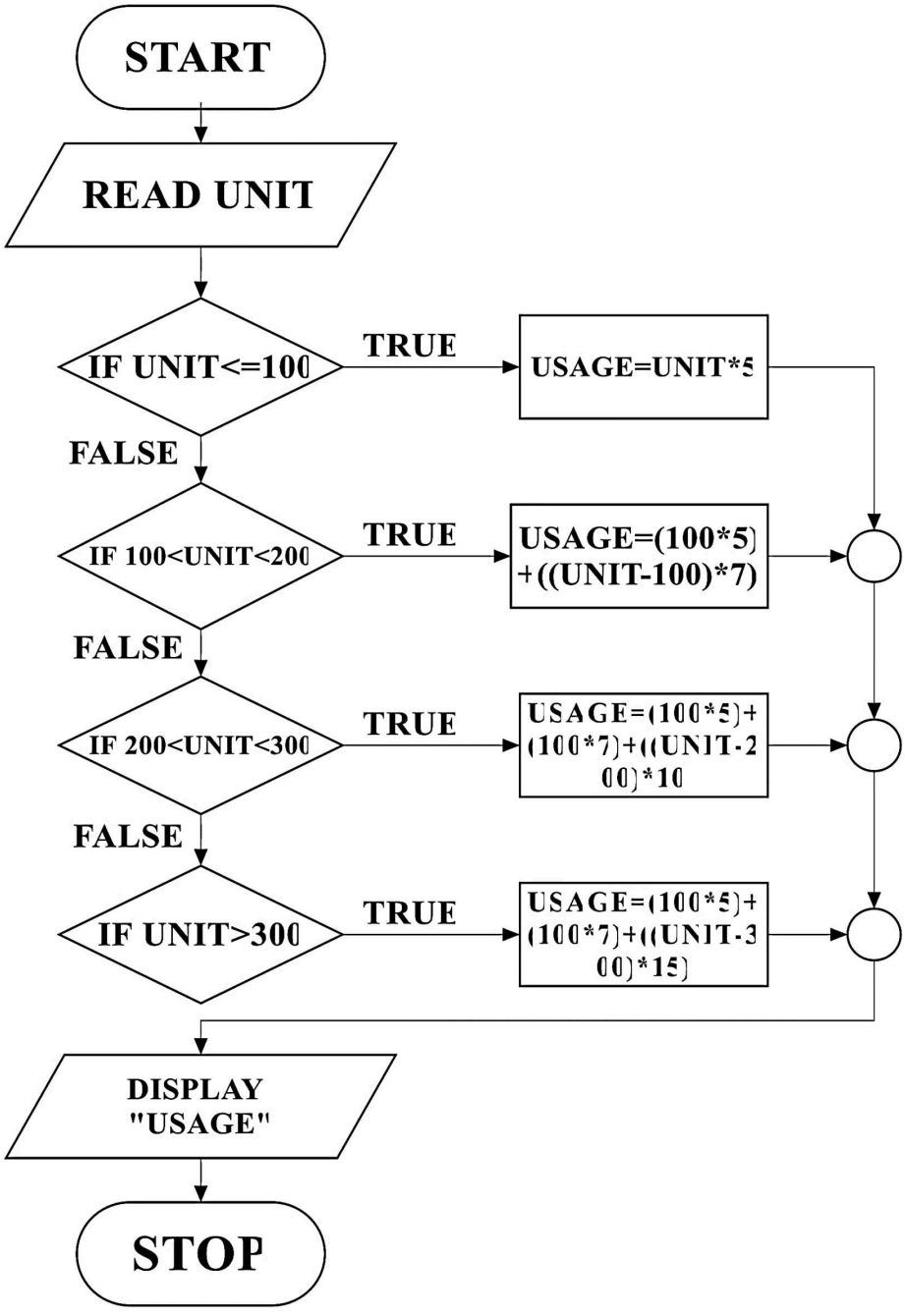
$P=\sqrt{3}$ X pf X I X V

Step 4: Display "The result is P".

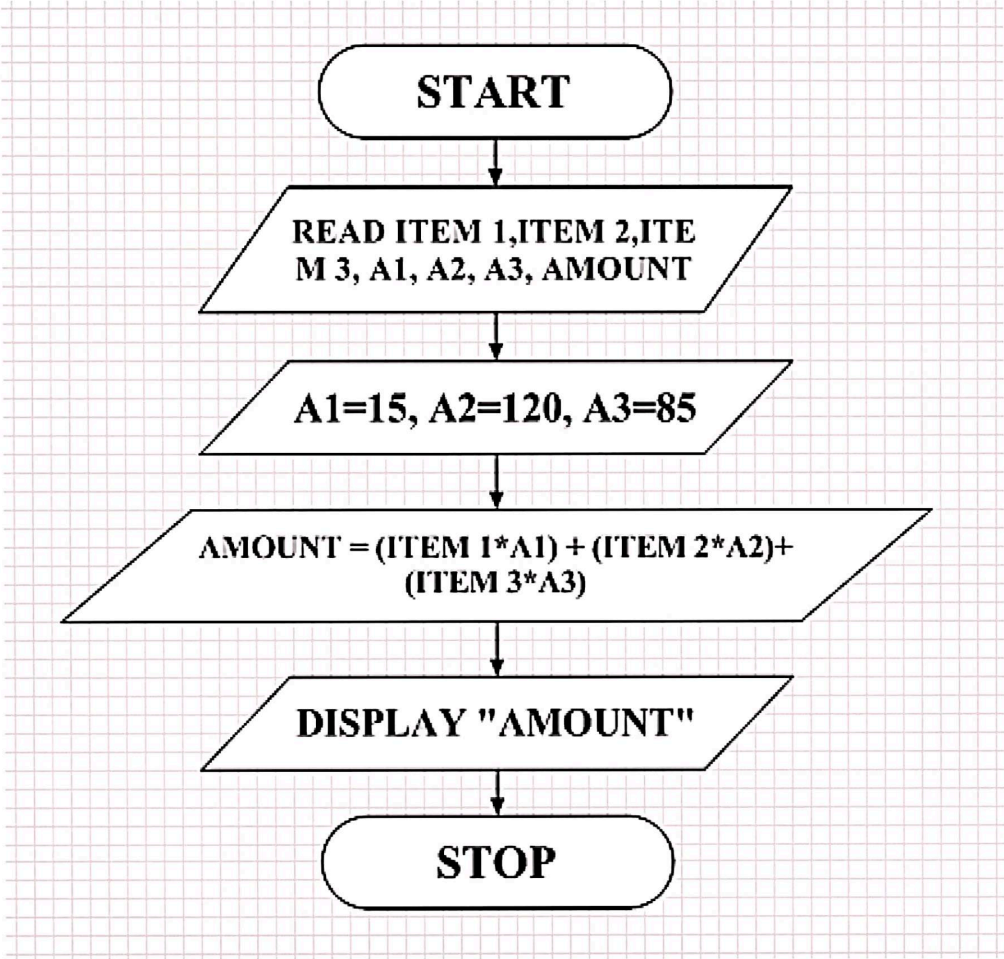
Step 5: Stop

Flowchart

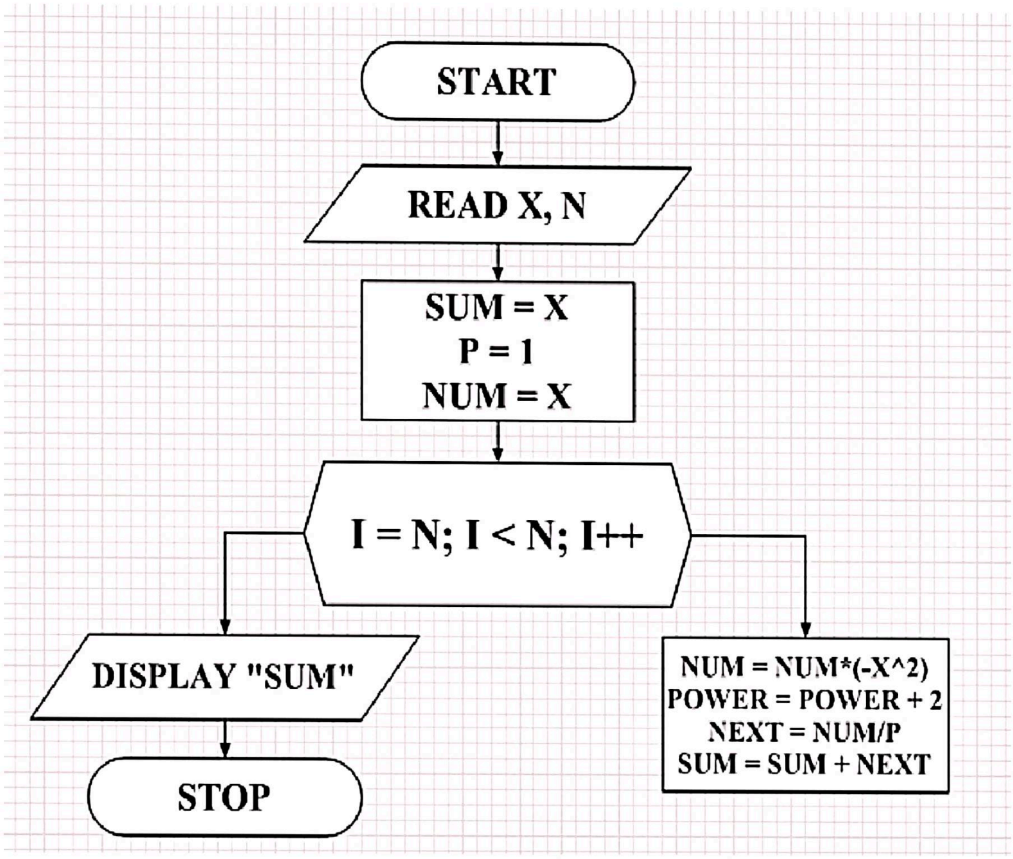
1. **Electricity Billing**



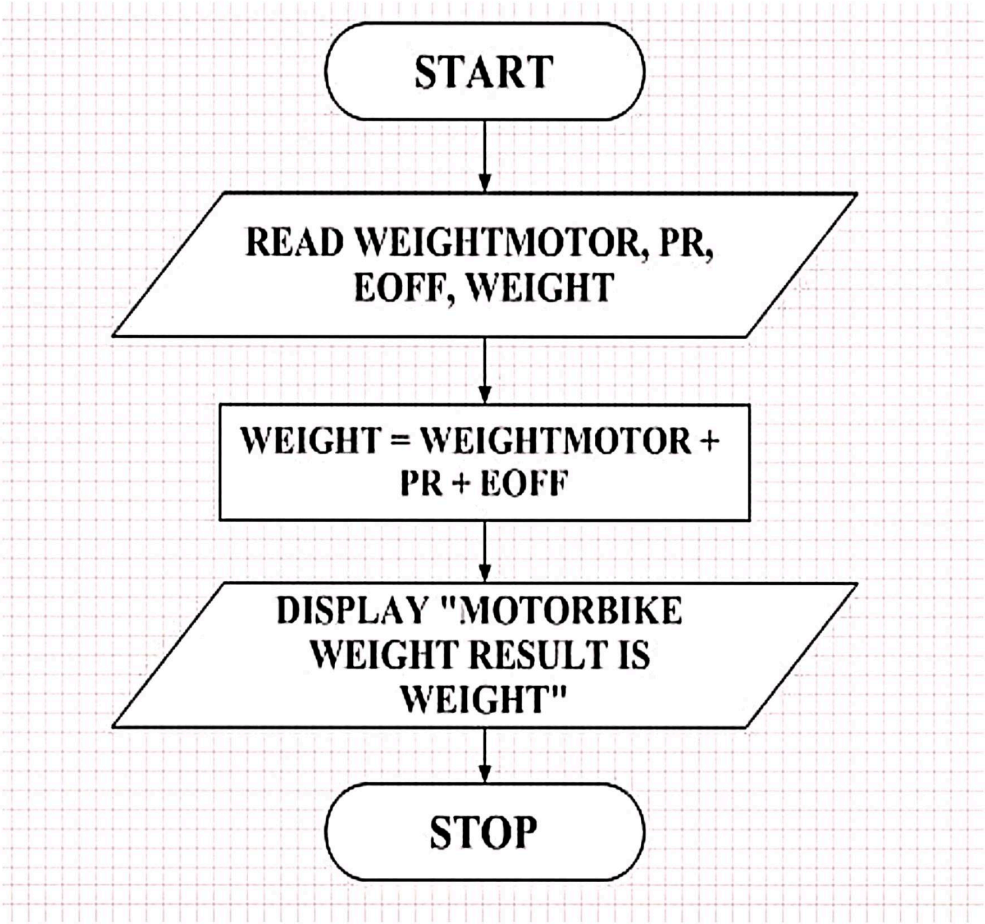
2. **Retail Shop Billing**



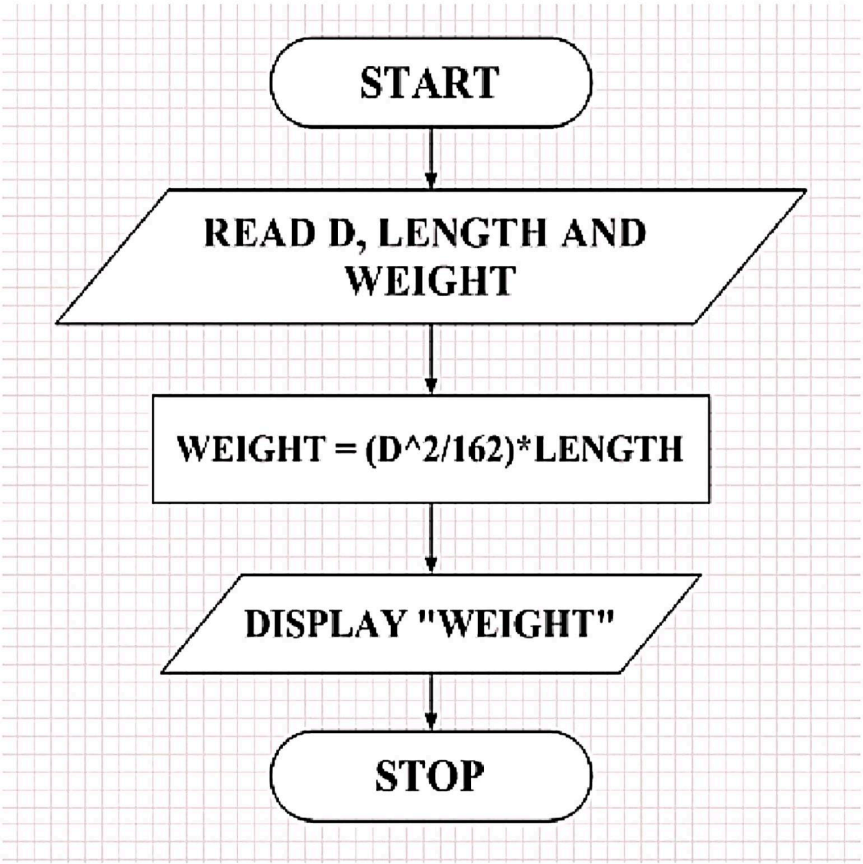
3. **Sin Series**


START
READ X, N
SUM = X
P = 1
NUM = X
I = N; I < N; I++
DISPLAY "SUM"
STOP
NUM = NUM*(-X^2)
POWER = POWER + 2
NEXT = NUM/P
SUM = SUM + NEXT

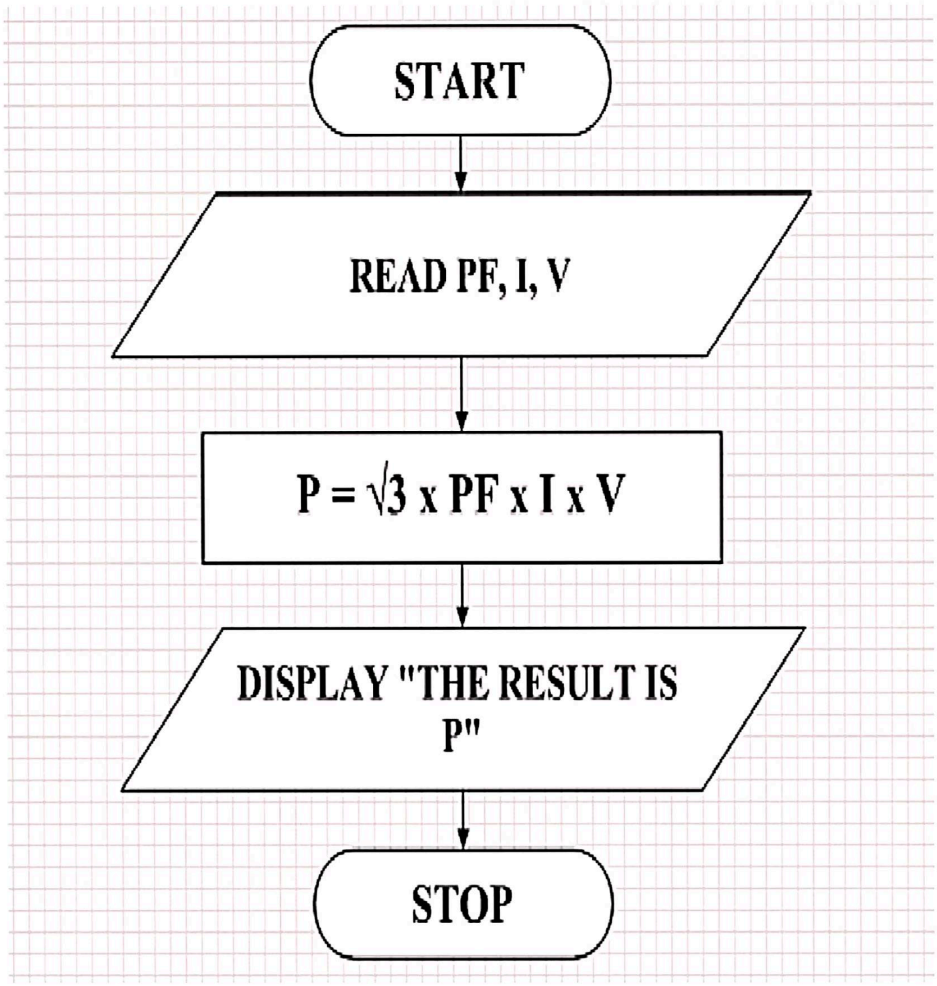
4. Weight of a Motorbike



5. Weight of a steel bar



6. Compute Electrical Current in Three Phase AC Circuit



Result:

In this exercise, I have implemented the given problem by developing algorithm and flowcharts & the output was verified successfully.