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Concept: Input function, output function, variable, datatype

Lab 2: Write a C program to accept electricity bill details from the user such as name, address, customer ID, pin code, bill amount and month of bill and display the same.

Code: Screenshot of code with Output

```c
1   /*Write a C program to accept electricity bill details from the user such as name,
2    address, customer ID, pin code, bill amount and month of bill and display the same. */
3
4   #include<stdio.h>
5
6   int main()
7   {
8       char name[10];
9       char address[50];
10      char month[10];
11      int ID,pin_code,amount;
12
13      printf("Please enter your electricity bill details-\n");
14      printf("Enter your name:\n");
15      scanf("%s",&name);
16
17      printf("Enter your address:\n");
18      scanf("%s",&address);
19
20      printf("Enter your customer ID:\n");
21      scanf("%d",&ID);
22
23      printf("Enter your pin code:\n");
24      scanf("%d",&pin_code);
25
26      printf("Enter the bill amount:\n");
27      scanf("%d",&amount);
28
29      printf("Enter the month of the bill:\n");
30      scanf("%s",&month);
31
32      printf("The name of customer is: %s\n",name);
33      printf("The address of customer is: %s\n",address);
34      printf("The Customer ID is: %d\n",ID);
35      printf("Pincode of the place is: %d\n",pin_code);
36      printf("The amount to be paid is: %d\n", amount);
37      printf("The bill amount is for the month: %s\n",month);
38
39      return 0;
40      }
41
```

PROBLEMS   OUTPUT   DEBUG CONSOLE   TERMINAL

```
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PS E:\sare programs> cd "e:\sare programs\Assignments\" ; if ($?) { gcc Ass1_2213047.c -o Ass1_2213047 } ; if ($?) { .\Ass1_2213047 }
Please enter your electricity bill details-
Enter your name:
Sourav
Enter your address:
Kedgaon
Enter your customer ID:
123456
Enter your pin code:
414005
Enter the bill amount:
1500
Enter the month of the bill:
November
The name of customer is: Sourav
The address of customer is: Kedgaon
The Customer ID is: 123456
Pincode of the place is: 414005
The amount to be paid is: 1500
The bill amount is for the month: November
PS E:\sare programs\Assignments> []
```
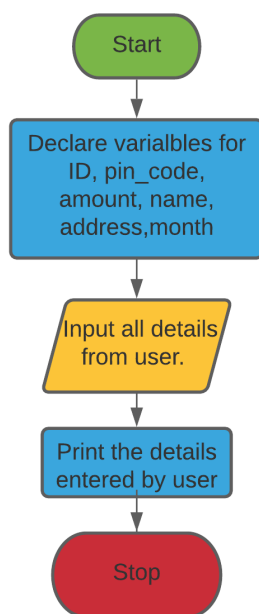
Algorithm:

```
Step 0: Start
Step 1: Declare 3 character variables name, address, month.
Step 2: Declare 3 integer variables ID, pin code, amount.
Step 3: Take input from the user for all variables.
Step 4: Print the details of user.
Step 5: Stop.
```

Flowchart:

FAQs:

Q1. Which of the following statement is true about character constants? Justify your answer.

a. The statement printf("%c", 97); will print the letter a.

b. Each character constant represents an integer value

c. It is possible to perform arithmetic operations on character constant

d. All the above

Answer: D. All the above.

Justification: Because ASCII no. for 'a'(lower case A) is 97.

Each character constant represents a integer value called ASCII value.

It is possible to compare the strings, so there is possible to do that.

Q2. What are the basic data types associated with C?

Answer:
- Int – Represent the number(Integer)
- Float – Represent the number with decimal or fraction.
- Char – Single character
- Double – Double-precision floating-point value.

Concept related problem statement: On day one of college, two students were interacting with each other. Write a program to display the communication between them.
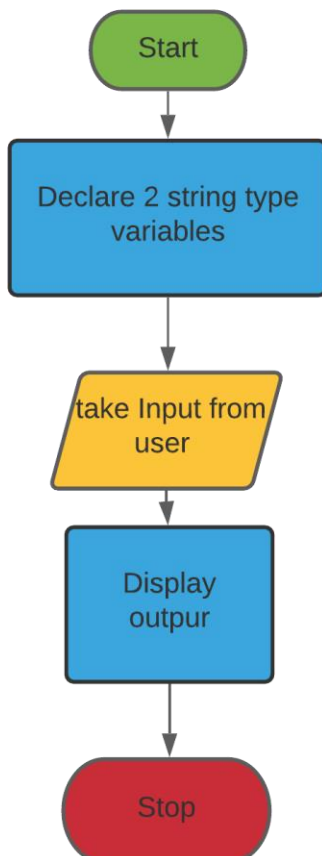
Algorithm:

Step 0: Start
Step 1: Declare 2 string type variables
Step 2: take input from the users for conversation
Step 3: print output
Step 4: Stop

Flowchart:

Start

Declare 2 string type variables

take Input from user

Display outpur

Stop

Code:

```c
1  # include<stdio.h>
2  # include<math.h>
3  int main()
4  {
5      char stud_1[100];
6      char stud_2[100];
7
8      printf("Student 1 to student 2:\n");
9      scanf("%s", stud_1);
10     printf("Student 2 to student 1:\n");
11     scanf("%s", stud_2);
12
13     printf("CONVERSATION\n");
14     printf("Student 1: %s\n",stud_1);
15     printf("Student 2: %s\n",stud_2);
16
17     return 0;
18 }
```

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```
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PS E:\sare programs> cd "e:\sare programs\.vscode\" ; if ($?) { gcc practice.c -o practice } ; if ($?) { .\practice }
Student 1 to student 2:
hey
Student 2 to student 1:
hello
CONVERSATION
Student 1: hey
Student 2: hello
PS E:\sare programs\.vscode> ▌
```

Concept: Variable, data types & operators

Lab 3. Riya wants to learn basic calculation, help her for following operations by program:
Addition of 2 numbers
1. Subtraction of 2 numbers
2. Division operation of 2 numbers
3. Multiplication of 2 numbers
4. Find the remainder
5. Calculation of percentage

Code: Screenshot of code with Output

```c
1    /*Riya wants to learn basic calculation, help her for following operations by program:
2    1.Addition of 2 numbers
3    2. Subtraction of 2 numbers
4    3. Division operation of 2 numbers
5    4. Multiplication of 2 numbers
6    5. Find the remainder
7    6. Calculation of percentage
8    */
9
10   #include<stdio.h>
11   #include<math.h>
12
13   int main()
14   {
15       float num1,num2,rem,sum,sub,mul,div,percentage;
16
17       printf("Enter any two numbers for which you have to perform operations:\n");
18       scanf("%f %f", &num1, &num2);
19
20       sum= num1+num2;
21       sub= num1-num2;
22       mul= num1*num2;
23       div= num1/num2;
24       rem=(int)num1%(int)num2;
25       percentage= num1/num2*100;
26
27       printf("The addition of two number is: %f\n",sum);
28       printf("The subtraction of two number is: %f\n",sub);
29       printf("The multiplication of two number is: %f\n",mul);
30       printf("The division of two number is: %f\n",div);
31       printf("The reminder of two number is: %f\n",rem);
32       printf("The percentage of two number is: %f / %f x 100 =%f\n",num1,num2,percentage);
33
34       return 0;
35   }
```

```
PROBLEMS    OUTPUT    DEBUG CONSOLE    TERMINAL

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PS E:\sare programs> cd "e:\sare programs\Assignments\" ; if ($?) { gcc Ass2_2213047.c -o Ass2_2213047 } ; if ($?) { .\Ass2_2213047 }
Enter any two numbers for which you have to perform operations:
2.2
3.3
The addition of two number is: 5.500000
The subtraction of two number is: -1.100000
The multiplication of two number is: 7.260000
The division of two number is: 0.666667
The reminder of two number is: 2.000000
The percentage of two number is: 2.200000 / 3.300000 x 100 =66.666672
PS E:\sare programs\Assignments>
```

Algorithm:

Step 0: Start
Step 1: Declare 3 float variables num1, num2, rem.
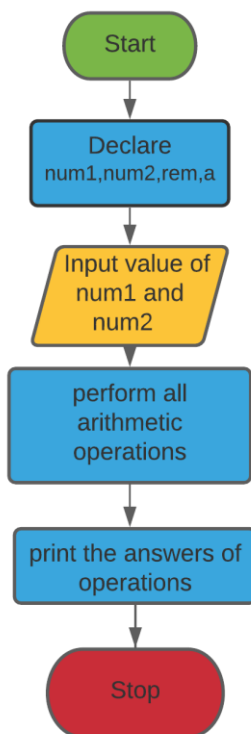Step 2: Declare 1 integer a=100.
Step 3: Take input from the user for float variables.
Step 4: Compute all the arithmetic operations for num1 and num2.
Step 5: Print the output of operations.
Step 6: Stop.

Flowchart:

FAQs:

Q1. What is the difference between assignment operator and comparison operator? Illustrate with an example.

Answer: Assignment (=) operator is used to assign the value whereas comparison (==) is used to compare to values.
For example: int a;
        a=7;
        here 7 is assign to int a with use of assignment operator.
        int b=7;
        a==b is compared using comparison operator.

Q2. Apply the concept of ternary operator to check whether a number is even or odd.

Answer:

```
1    # include<stdio.h>
2    int main()
3    {
4        int n;
5        printf("Enter a positive integer:\n");
6        scanf("%d",&n);
7
8        (n % 2 == 0)?
9
10       (printf("%d is an even number\n",n)):
11       (printf("%d is an odd number\n",n));
12
13       return 0;
14   }
```

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PS E:\sare programs> cd "e:\sare programs\.vscode\" ; if ($?) { gcc practice.c -o practice } ; if ($?) { .\practice }
Enter a positive integer:
24
24 is an even number
PS E:\sare programs\.vscode> []

Concept related problem statement: Ramesh's basic salary is input through the keyboard. His dearness allowance is 40% of basic salary, and house rent allowance is 20% of basic salary. Write a program to calculate his gross salary.

Algorithm:

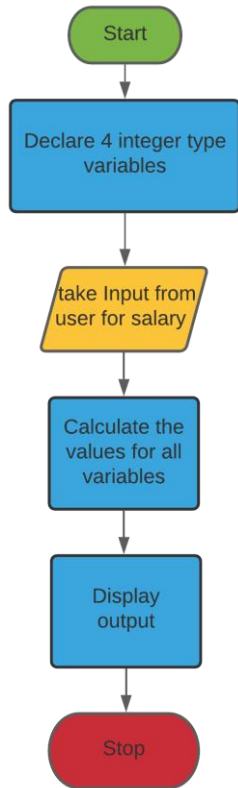Step 0: Start
Step 1: Declare 4 integer type variables
Step 2: Take salary input from the user
Step 3: Calculate dearness allowance, rent allowance and gross salary
Step 4: print the calculated gross salary
Step 5: Stop

Flowchart:

Code:

```c
1    # include<stdio.h>
2    int main()
3    {
4        int basic_salary,dearness_allowance,rent_allowance,gross_salary;
5
6        printf("Enter the salary of Ramesh:\n");
7        scanf("%d",&basic_salary);
8
9        dearness_allowance= 0.4*basic_salary;
10       rent_allowance=0.2*basic_salary;
11       gross_salary=basic_salary-dearness_allowance-rent_allowance;
12       printf("SALARY DISTRIBUTION OF RAMESH:\n");
13       printf("Dearness allowence:%d\n",dearness_allowance);
14       printf("Rent allowance:%d\n",rent_allowance);
15       printf("Gross salary:%d",gross_salary);
16
17       return 0;
18   }
```

```
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PS E:\sare programs> cd "e:\sare programs\.vscode\" ; if ($?) { gcc practice.c -o practice } ; if ($?) { .\practice }
Enter the salary of Ramesh:
100000
SALARY DISTRIBUTION OF RAMESH:
Dearness allowence:40000
Rent allowance:20000
Gross salary:40000
PS E:\sare programs\.vscode> 
```

Concept: Branching and logical expressions

Lab 4: Time Calculator: Design a program that asks the user to enter a number of seconds, and works as follows:

1. There are 60 seconds in a minute. If the number of seconds entered by the user is greater than or equal to 60, the program should display the number of minutes in that many seconds.

2. There are 3,600 seconds in an hour. If the number of seconds entered by the user is greater than or equal to 3,600, the program should display the number of hours in that many seconds.

3. There are 86,400 seconds in a day. If the number of seconds entered by the user is greater than or equal to 86,400, the program should display the number of days in that many seconds.

Code: Screenshot of code with Output

sare programs > Assignments > **C** Ass3_2213047.c > ...

```c
1    /*Time Calculator: Design a program that asks the user to enter a number of seconds, and works as follows:
2    1. There are 60 seconds in a minute. If the number of seconds entered by the user is greater than or equal to 60, the program should display the number of minutes in that many seconds.
3    2. There are 3,600 seconds in an hour. If the number of seconds entered by the user is greater than or equal to 3,600, the program should display the number of hours in that many seconds.
4    3. There are 86,400 seconds in a day. If the number of seconds entered by the user is greater than or equal to 86,400, the program should display the number of days in that many seconds.
5    */
6
7    #include<stdio.h>
8    #include<math.h>
9
10   int main()
11   {
12       int sec,min,hr,day,rem;
13
14       printf("Enter time in seconds:\n");
15       scanf("%d",&sec);
16
17       if (sec>=60)
18       {
19           if (sec>=86400)
20           {
21               day=sec/86400;
22               hr=(int)(sec-(day*86400))/3600;
23               min=(int)(sec-day*86400-hr*3600)/60;
24               rem=(int)(sec-day*86400-hr*3600-min*60);
25               printf("Time in days is %d, hours is %d, minuntes is %d and seconds is %d\n",day,hr,min,rem);
26           }
27           else if (sec>=3600 && sec<86400)
28           {
29               hr=sec/3600;
30               min=(int)(sec-hr*3600)/60;
31               rem=(int)(sec-hr*3600-min*60);
32               printf("Time in hours is %d, minuntes is %d and seconds is %d\n",hr,min,rem);
33           }
34           else if(sec>=60 && sec<3600)
35           {
36               min=sec/60;
37               rem=(int)(sec-min*60);
38               printf("Time in minuntes is %d and seconds is %d\n",min,rem);
39           }
40       else
41       {
42           printf("Number of sec are: %d\n",sec);
43       }
44
45       }
46       return 0;
47   }
```

PROBLEMS   OUTPUT   DEBUG CONSOLE   TERMINAL

```
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PS E:\sare programs> cd "e:\sare programs\Assignments\" ; if ($?) { gcc Ass3_2213047.c -o Ass3_2213047 } ; if ($?) { .\Ass3_2213047 }
Enter time in seconds:
95432
Time in days is 1, hours is 2, minuntes is 30 and seconds is 32
PS E:\sare programs\Assignments> 
```

Algorithm:

Step 0: Start
Step 1: Declare 5 integer variables sec, min, hr, day, rem.
Step 2: Take input from the user for sec variables.
Step 3: Check for the condition where input is greater than equal to 60 and if less.
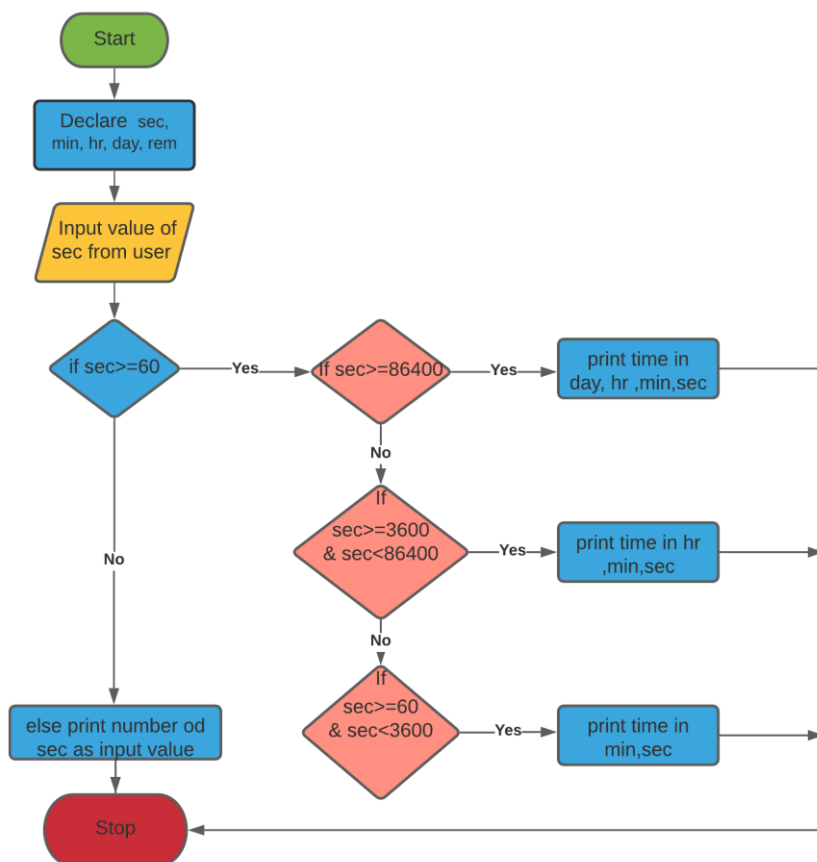Step 4: If input is greater than equal to 86400, then output in day, hr, min, sec.
Step 5: If input is greater than equal to 3600 and less than 84600, then output in hr, min, sec.
Step 6: If input is greater than equal to 60 and less than 3600, then output in min, sec.
Step 7: Step 6: If input is less than 60, then output in sec.
Step 8: Stop.

Flowchart:

FAQs:

Q1. If the following pseudo code were an actual program, What would be the output?

```
If „a" < „z"
        Display "a is less than z."
Else
        Display "a is not less than z."
End if.
```

Answer:
Enter the value of a and z respectively:
1, 3

a is less than z

Q2. Give the output of following code with justification

```c
void main()
{
    int ch=2;
    switch(ch)
    {

        case 1:printf("Hi ");
            break;
        case 1+1:printf(" There ");
            break;
        case 2:printf(" !");
            break;
        default:printf(" **** ");

    }
}
```

Answer: error: duplicate case value.

Reason: case 2 is mentioned twice.

Concept related problem statement: Serendipity Booksellers has a book club that awards points to its customers based on the number of books purchased each month. The points are awarded as follows:

- If a customer purchases 0 books, he or she earns 0 points.
- If a customer purchases 1 book, he or she earns 5 points.
- If a customer purchases 2 books, he or she earns 15 points.
- If a customer purchases 3 books, he or she earns 30 points.
- If a customer purchases 4 or more books, he or she earns 60 points.

Design a program that asks the user to enter the number of books that he or she has purchased this month and displays the number of points awarded.

Algorithm:

Step 0: Start
Step 1: Declare a integer type variable
Step 2: Take number of books bought input from the user
Step 3: If number of books bought is equal to 0, print you earned 0 points
Step 4: If number of books bought is equal to 1, print you earned 5 points
Step 5: If number of books bought is equal to 2, print you earned 15 points
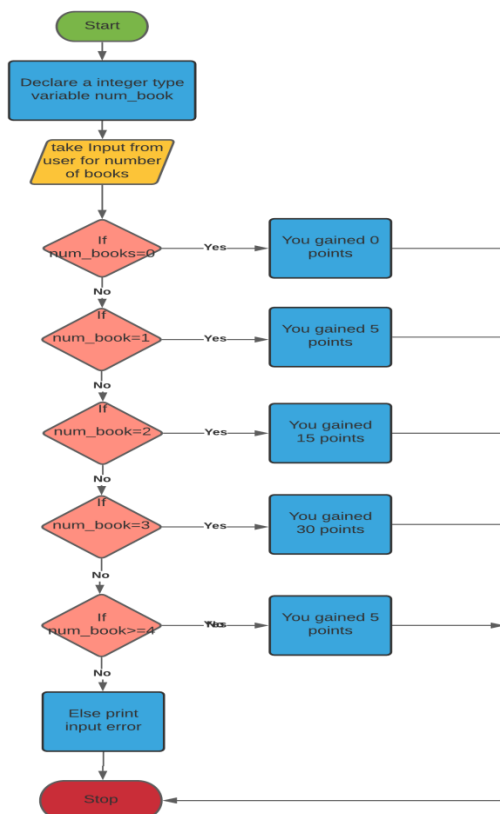Step 6: If number of books bought is equal to 3, print you earned 30 points
Step 7: If number of books bought is more than equal to 4, print you earned 60 points
Step 8: Else print input error
Step 9: Stop

Flowchart:

Code:

```c
# include<stdio.h>
int main()
{
    int num_book;

    printf("Enter the number of books you bought in this month:\n");
    scanf("%d",&num_book);

    if (num_book==0)
    {
        printf("You have earned 0 points\n");
    }
    else if (num_book==1)
    {
        printf("You have earned 5 points\n");
    }
    else if (num_book==2)
    {
        printf("You have earned 15 points\n");
    }
    else if (num_book==3)
    {
        printf("You have earned 30 points\n");
    }
    else if (num_book>=4)
    {
        printf("You have earned 60 points\n");
    }
    else
    {
        printf("INPUT ERROR\n");
    }

    return 0;
}
```

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```
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PS E:\sare programs> cd "e:\sare programs\.vscode\" ; if ($?) { gcc practice.c -o practice } ; if ($?) { .\practice }
Enter the number of books you bought in this month:
0
You have earned 0 points
PS E:\sare programs\.vscode>
Enter the number of books you bought in this month:
1
You have earned 5 points
PS E:\sare programs\.vscode>
Enter the number of books you bought in this month:
2
You have earned 15 points
PS E:\sare programs\.vscode>
Enter the number of books you bought in this month:
3
You have earned 30 points
PS E:\sare programs\.vscode>
Enter the number of books you bought in this month:
4
You have earned 60 points
PS E:\sare programs\.vscode>
Enter the number of books you bought in this month:
5
You have earned 60 points
PS E:\sare programs\.vscode>
Enter the number of books you bought in this month:
-1
INPUT ERROR
PS E:\sare programs\.vscode>
```

Concept: Loops: While, do-while & for loops:

Lab 5: Calculating the Factorial of a Number In mathematics, the notation $n!$ represents the factorial of the non-negative integer n. The factorial of n is the product of all the non-negative integers from 1 up through n. For example:

$$7! = 1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 = 5{,}040 \text{ and}$$
$$4! = 1 \times 2 \times 3 \times 4 = 24$$

Design a program that asks the user to enter a non-negative integer and then displays the factorial of that number.

Code: Screenshot of code with Output

```c
1    /*Calculating the Factorial of a Number In mathematics, the notation n! represents the factorial of the non-negative integer n.
2    The factorial of n is the product of all the non-negative integers from 1 up through n. For example:
3    7! = 1 x 2 x 3 x 4 x 5 x 6 x 7 = 5,040 and
4    4! = 1 x 2 x 3 x 4 = 24
5    Design a program that asks the user to enter a non-negative integer and then displays the factorial of that number.
6    */
7    #include<stdio.h>
8    #include<stdlib.h>
9
10   int main()
11   {
12       int i,num,j=1;
13
14       printf("Enter the number:\n");
15       scanf("%d",&num);
16
17       if (num<0)
18       {
19           printf("Error: Enter non-negative number\n");
20       }
21       else if (num==0)
22       {
23           printf("Factorial of %d is: 1",num);
24       }
25
26       else
27       {
28           for ( i = 1; i <= num; i++)
29           {
30               j=j*i;
31           }
32           printf("Factorial of %d is: %d",num,j);
33       }
34       return 0;
35   }
```

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```
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PS E:\sare programs> cd "e:\sare programs\textbook\onlyPRACTICE\" ; if ($?) { gcc Ass4_2213047.c -o Ass4_2213047 } ; if ($?) { .\Ass4_2213047 }
Enter the number:
5
Factorial of 5 is: 120
PS E:\sare programs\textbook\onlyPRACTICE>
```

Algorithm:

Step 0: Start
Step 1: Declare 3 integer variables i, num, j.
Step 2: Take input from the user for num variables.
Step 3: The variable count for i is set to 1 and then it has been tested for the condition.
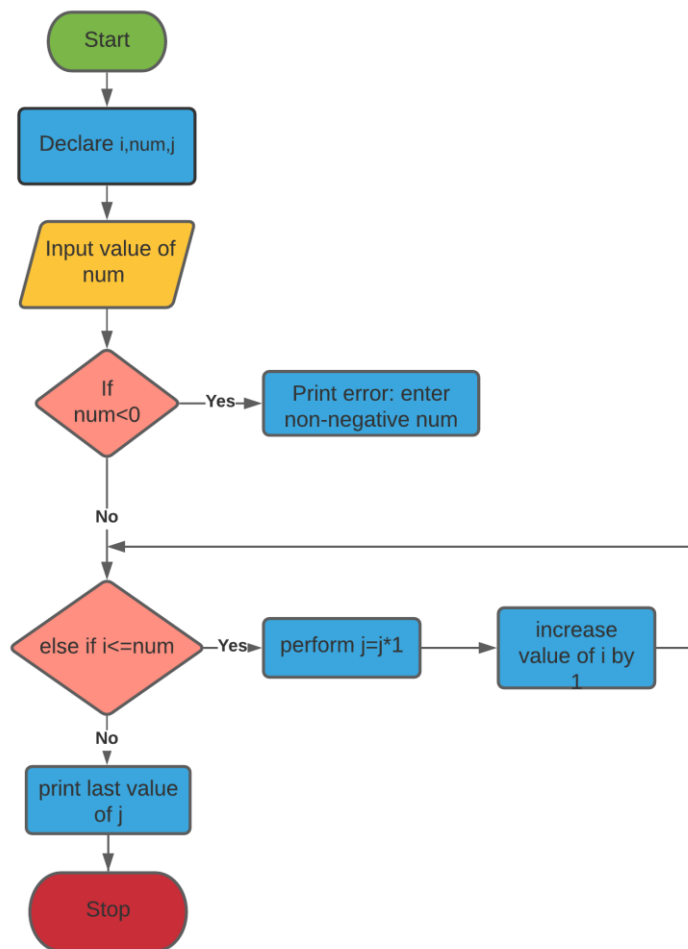Step 4: If the condition returns true the statement under the loop are executed else the loop ends.
Step 5: The value of i is incremented using i++ operator then it has been tested again for the loop condition.
Step 6: Print the factorial of variable num.
Step 7: Stop.

Flowchart:

```
                    ┌─────────┐
                    │  Start  │
                    └────┬────┘
                         │
                ┌────────┴────────┐
                │ Declare i,num,j │
                └────────┬────────┘
                         │
                ┌────────┴────────┐
                │ Input value of  │
                │      num        │
                └────────┬────────┘
                         │
                    ╱────┴────╲
                   ╱    If     ╲ ──Yes──► ┌──────────────────┐
                   ╲  num<0    ╱          │ Print error: enter│
                    ╲────┬────╱           │ non-negative num  │
                         │                └──────────────────┘
                        No
                         │
                    ╱────┴────╲
                   ╱ else if   ╲ ──Yes──► ┌──────────────┐    ┌──────────────┐
                   ╲ i<=num    ╱          │ perform j=j*1│───►│   increase   │
                    ╲────┬────╱           └──────────────┘    │ value of i by│
                         │                                    │      1       │
                        No                                    └──────────────┘
                         │
                ┌────────┴────────┐
                │ print last value│
                │      of j       │
                └────────┬────────┘
                         │
                    ┌────┴────┐
                    │  Stop   │
                    └─────────┘
```

FAQs:

Q1. Will the statement given below execute? Justify.
        for (int i = 1 , j = 1 ; j <= 5 ; j++)
            printf("\n Hello");

           Answer: Yes, Hello will be printed 5 times in 5 lines.

Q2. Convert following pseudo code into while loop structure

Declare integer counter
Constant integer max_value = 5
for counter = 1 To max_value
        Display "Hello World"
End for.

Answer: int i=1;
        While (i<=5)
        {
   printf("Hello World\n");
          i++;
        }

Concept related problem statement: Running on a particular treadmill you burn 3.9 calories per minute. Design a program that uses a loop to display the number of calories burned after 10,15,20,25,30 minutes.

Algorithm:

Step 0: Start
Step 1: Declare a integer and 2 float type variable
Step 2: For i=2 to i=6 execute the loop
Step 3: declare j with respect to i
Step 4: calculate the value of calorie burnt for the respective given time.
Step 5: print the value of calorie burnt
Step 6: Stop

Flowchart:
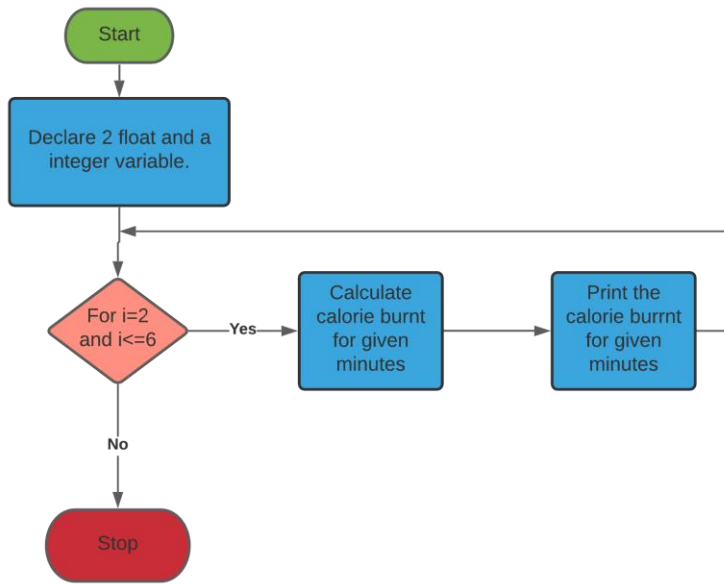
Code:

```c
1    # include<stdio.h>
2    int main()
3    {
4        float calorie_burned=3.9, j;
5
6        for (int i = 2; i <= 6; i++)
7        {
8            j= 5*calorie_burned*i;
9            printf("The calorie burned after %d min: %f\n",5*i,j);
10       }
11
12       return 0;
13   }
```

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PS E:\sare programs> cd "e:\sare programs\.vscode\" ; if ($?) { gcc practice.c -o practice } ; if ($?) { .\practice }
The calorie burned after 10 min: 39.000000
The calorie burned after 15 min: 58.500000
The calorie burned after 20 min: 78.000000
The calorie burned after 25 min: 97.500000
The calorie burned after 30 min: 117.000000
PS E:\sare programs\.vscode>

Concept: Loops: Nested loops:

Lab 6: Average rainfall

Design a program that uses nested loops to collect data and calculate the average rainfall over a period of years. The program should first ask for the number of years. The outer loop will iterate once for each year. The inner loop will iterate twelve times, once for each month. Each iteration of the inner loop will ask the user for the inches of rainfall for that month. After all iterations, the program should display the number of months, the total inches of rainfall, and the average rainfall per month for the entire period.

Code: Screenshot of code with Output

```c
1    /*Design a program that uses nested loops to collect data and calculate the average rainfall
2    over a period of years. The program should first ask for the number of years. The outer loop
3    will iterate once for each year. The inner loop will iterate twelve times, once for each month.
4    Each iteration of the inner loop will ask the user for the inches of rainfall for that month.
5    After all iterations, the program should display the number of months, the total inches of
6    rainfall, and the average rainfall per month for the entire period.*/
7    # include<stdio.h>
8    # include<math.h>
9    int main()
10   {
11       int num_years,month,i;
12       float rainfall,avg_rainfall,total_rainfall;
13
14       printf("Please enter number of years:\n");
15       scanf("%d",&num_years);
16
17       if (num_years<1)
18       {
19           printf("Error:Number of years must greater than equal to 1. Please re-enter:\n");
20           scanf("%d",&num_years);
21       }
22       else
23       {
24       for ( i = 1; i <= num_years; i++)
25        {
26          for ( month = 1; month <= 12; month++)
27          {
28              printf("Enter the rainfall for month %d:\n",month);
29              scanf("%f", &rainfall);
30
31              if (rainfall<0)
32              {
33                  printf("Error: Amount of rainfall must be greater than 0. Please re-enter:\n");
34                  scanf("%f",&rainfall);
35              }
36          total_rainfall += rainfall;
37          }
38        }
39        }
40       printf("Number of months: %d\n",num_years*12);
41       printf("Total rainfall:%f inches\n", total_rainfall);
42       month= num_years*12;
43       avg_rainfall = total_rainfall/(float) month;
44       printf("Average rainfall:%f inches\n",avg_rainfall);
45       return 0;
46   }
```

```
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PS E:\sare programs> cd "e:\sare programs\Assignments\" ; if ($?) { gcc Ass5_2213047.c -o Ass5_2213047 } ; if ($?) { .\Ass5_2213047 }
Please enter number of years:
1
Enter the rainfall for month 1:
1
Enter the rainfall for month 2:
1
Enter the rainfall for month 3:
1
Enter the rainfall for month 4:
1
Enter the rainfall for month 5:
1
Enter the rainfall for month 6:
1
Enter the rainfall for month 7:
1
Enter the rainfall for month 8:
1
Enter the rainfall for month 9:
1
Enter the rainfall for month 10:
1
Enter the rainfall for month 11:
1
Enter the rainfall for month 12:
1
Number of months: 12
Total rainfall:12.000000 inches
Average rainfall:1.000000 inches
PS E:\sare programs\Assignments>
```

Algorithm:

Step 0: Start

Step 1: Declare 3 integer variables num_years, month, i and 3 float variables rainfall, avg_rainfall, total_rainfall.

Step 2: Take input value for num_years from user.

Step 3: If num_years is less than 1, print error: number of years must be greater than equal to 1.

Step 4: Else, the variable count for i is set to 1 and it is less than num_years and then it has been tested for the condition. If the condition returns true the statement under the loop are executed else the loop ends. The value of i is incremented using i++ operator then it has been tested again for the loop condition.

Step 5: The variable count for month is set to 1 and it is less than equal to 12 and then it has been tested for the condition. If the condition returns true the statement under the loop are executed else the loop ends. The value of month is incremented using month++ operator then it has been tested again for the loop condition.

Step 6: Take input for rainfall in every month for user.

Step 7: Find total rainfall by adding rainfall for every month.

Step 8: Print the value of number of months, total_rainfall and avg_rainfall.

Step 9: Stop.

Flowchart:
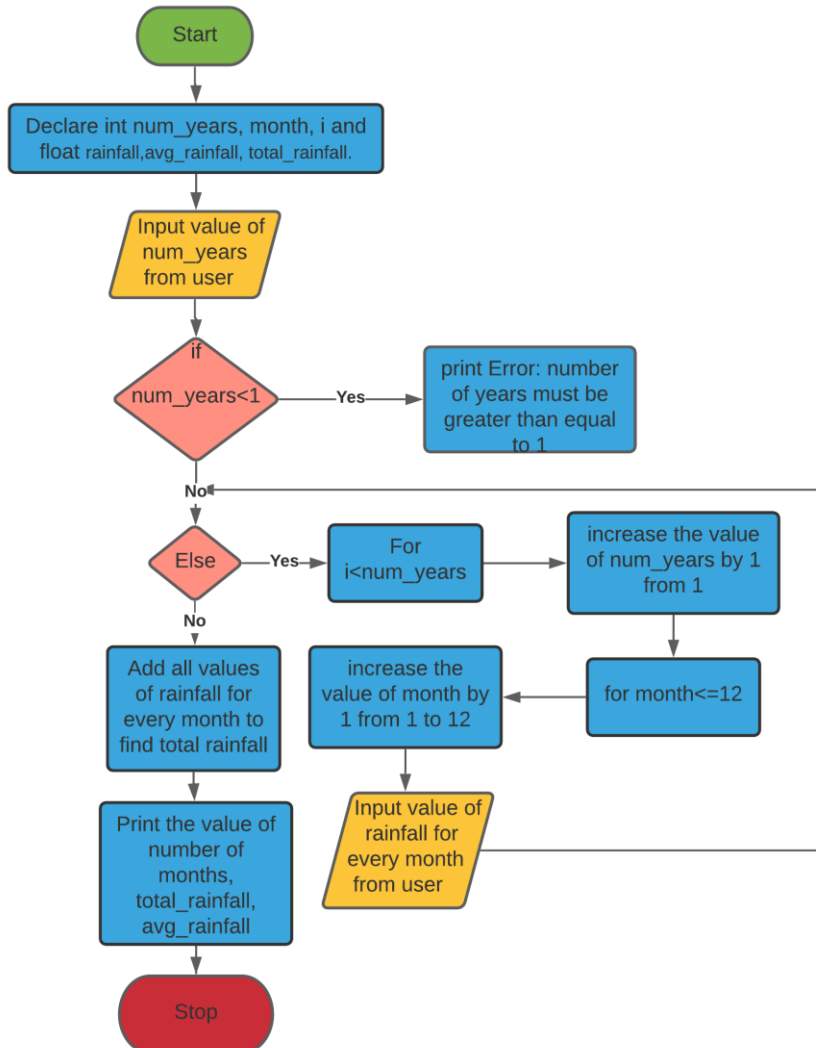
FAQs:

Q1. What is the output of the given below program?
```c
#include<stdio.h>
int main()
{
  int i;
  for (i=0; i<3; i++);
  {
    printf("%d", i);
  }
  return 0;
}
```
Ans: 3

Q2. Difference between while and do-while loop. Give programming examples.

Ans:

- While loop checks the condition first and then executes the statement(s), whereas do while loop will execute the statement(s) at least once, then the condition is checked.
- While loop is entry controlled loop whereas do while is exit controlled loop.
- In the while loop, we do not need to add a semicolon at the end of a while condition but we need to add a semicolon at the end of the while condition in the do while loop.

Example:

While

```
1    # include<stdio.h>
2    # include<math.h>
3
4    int main()
5    {
6        int num=1;
7
8        while (num <= 10)
9        {
10          printf("%d\n",num);
11          num++;
12        }
13        return 0;
14   }
```

Do while

```
1    # include<stdio.h>
2    # include<math.h>
3
4    int main()
5    {
6        int num=1;
7
8        do
9        {
10          printf("%d\n",num);
11          num++;
12        } while (num<=10);
13
14        return 0;
15   }
```

Concept related problem statement: If a five-digit number is input through the keyboard, write a program to print a new number by adding one to each of its digits. For example, if the number that is input is 12391 then the output should be displayed as 23502.

Algorithm:

Step 0: START.
Step 1: Declare 6 integer type variables.
Step 2: Take input from the user for number.
Step 3: If the condition is true divide the number by 10 and increase the count.
Step 4: Display the output.
Step 5: STOP.

Flowchart:

START

Declare 6 integer type variables.

Take input from the user for number.

Is number no equal to 0? —Yes→ Divide number by 10 and increase count by 1.

No↓

Is i less than count? —Yes→ n=n*10 n=n+1

No↓

Calculate and output sum.

STOP
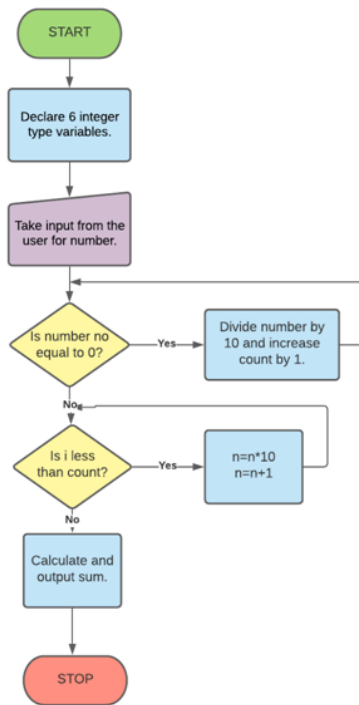
Code:

```c
#include<stdio.h>
int main()
{
    int num, sum, i, number, count=0, n=1;

    printf("Enter N Digit's Number: ");
    scanf("%d", &num);

    number = num;

    while(number!=0)
    {
        number = number/10;
        count = count + 1;
    }

    for(i=1;i<count;i++)
    {
        n = n * 10;
        n = n + 1;
    }

    sum = num + n;
    printf("Output: %d", sum);
}
```

PROBLEMS   OUTPUT   DEBUG CONSOLE   TERMINAL

```
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PS E:\sare programs> cd "e:\sare programs\.vscode\" ; if ($?) { gcc p2.c -o p2 } ; if ($?) { .\p2 }
Enter N Digit's Number: 12391
Output: 23502
PS E:\sare programs\.vscode>
```

Concept: Loops: 1D Array:

Lab 7:

Watson Elementary School contains 10 classrooms numbered 1 through 10. Each classroom can contain any number of students up to 12. Each student takes an achievement test at the end of the school year and receives a score from 0 through 100. Write a program that accepts data for each student in the school—student ID, classroom number, and score on the achievement test. Design a program that lists the total points scored for each of the 10 classrooms.

Code: Screenshot of code with Output

```c
1   /* Watson Elementary School contains 10 classrooms numbered 1 to 10. Each classroom can contain any number of
2   students up to 12. Each student takes an achievement test at the end of the school year and receives a score
3   from 0 through 100. Write a program that accepts data for each student in the school such as student ID,
4   classroom number, and score on the achievement test. Design a program that lists the total points scored
5   for each of the 10 classrooms.*/
6   # include<stdio.h>
7   int main()
8   {
9       int stud_ID[12], mark_scored[12], total=0;
10      int student, classroom, i, j;
11
12      printf("Enter the number of classroom:\n");
13      scanf("%d", &classroom);
14
15   if (classroom > 10 || classroom<1)
16   {
17       printf("Error: The number of classroom must be between 1 to 10");
18   }
19   else
20   {
21       printf("Enter the number of students in classroom:\n");
22       scanf("%d", &student);
23
24       if (student > 12 || student<1)
25       {
26           printf("Error: The number of student must be between 1 to 12");
27       }
28       else
29       {
30       for ( i = 1; i <= classroom ; i++)
31       {
32         for ( j = 1; j <= student; j++)
33         {
34             printf("Enter the student ID for student number%d:\n",j);
35             scanf("%d",&stud_ID[j]);
36             printf("Enter the marks for student with student ID %d:\n",j);
37             scanf("%d",&mark_scored[j]);
38             total = total+ mark_scored[j];
39         }
40         printf("Total points scored by classroom number %d = %d\n",i,total);
41         total=0;
42       }
43
44       }
45
46   }
47       return 0;
48   }
```

Algorithm:

Step 0: Start.
Step 1: Declare integer variables stud_ID, mark_scored, total, classroom, student, i, j.
Step 2: Input value of classroom from user.
Step 3: If classroom are greater than 10 or less than 1. Print error: The number of classroom must be between 0 to 10.
Step 4: Else take input value of student per classroom.
Step 5: If student are greater than 12 and less than 1. Print error: The number of student must be between 0 to 12.
Step 6: Else, the variable count for i is set to 1 and it is less than equal to classroom and then it has been tested for the condition. If the condition returns true the statement under the loop are executed else the loop ends. The value of i is incremented using i++ operator then it has been tested again for the loop condition.
Step 7: The variable count for j is set to 1 and it is less than equal to student and then it has been tested for the condition. If the condition returns true the statement under the loop are executed else the loop ends. The value of month is incremented using j++ operator then it has been tested again for the loop condition.
Step 8: Take input the value of stud_ID and mark_scored for every student of every classroom from user.
Step 9: Print the value of total points for every classroom.
Step 10: stop.

Flowchart:
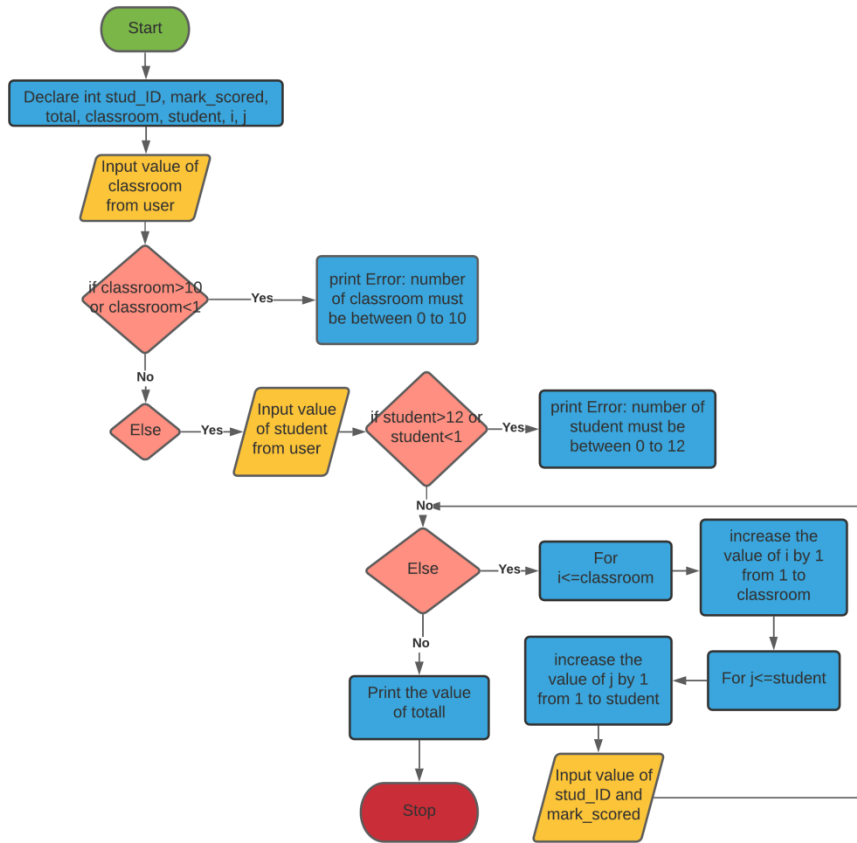
FAQs:

Q1. What is the right way to initialise an array?

    A. int num[6] = { 2, 4, 12, 5, 45, 5 };

    B. int n{} = { 2, 4, 12, 5, 45, 5 };

    C. int n{6} = { 2, 4, 12 };

    D. int n(6) = { 2, 4, 12, 5, 45, 5 };

Ans: A. int num[6] = { 2, 4, 12, 5, 45, 5 };

Q2. What will be the output of the program?

```
#include<stdio.h>

void main()
{
        int t a[5]= {5,1,15,20,25};
        int I,j,k;
        i = ++a[1];
```

```
        j = a[1]++;
        i = a[i++];
        printf("%d, %d, %d", i ,j ,m);
}
```
Ans: Error. Array is not properly initialised, m is not declared, Capital I is declared.

Concept related problem statement: Using array, design a program that lets the user enter the total rainfall for each of 12 months. The program should calculate and display the total rainfall for the year, the average monthly rainfall, and the months with the highest and lowest amounts.

Algorithm:

Step 0:.START.
Step 1: Declare 3 float type and 2 integer type variables.
Step 2: Take the input from the user for the rainfall for the respective month.
Step 3: Calculate average rainfall for the year.
Step 4: Find the minimum and maximum rainfall in the year.
Step 5: Output the average rainfall, minimum rainfall, maximum rainfall.
Step 6: STOP.

Flowchart:
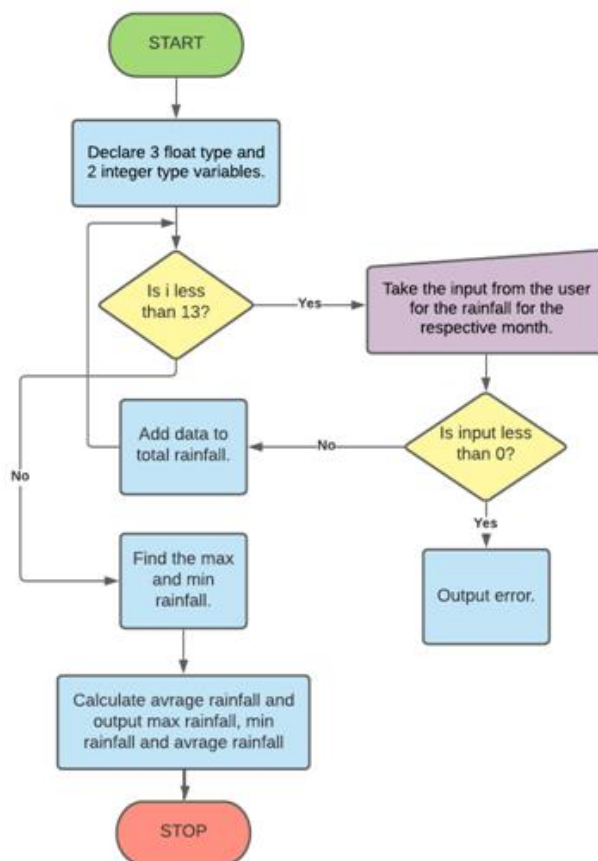
Code:

```c
1    # include<stdio.h>
2    int main()
3    {
4        float rainfall_month[12], avg_rainfall, total_rainfall, highest, lowest;
5        for ( int i = 1; i <= 12; i++)
6        {
7            printf("Enter the rainfall for month %d :",i);
8            scanf("%f", &rainfall_month[i]);
9            if (rainfall_month[i]<0)
10           {
11               printf("Error: Amount of rainfall must be greater than 0");
12           }
13           total_rainfall += rainfall_month[i];
14       }
15       lowest=rainfall_month[0];
16       highest=rainfall_month[0];
17       for (int i = 1; i < 12; i++)
18       {
19           if (rainfall_month[i]>highest)
20           {
21               highest=rainfall_month[i];
22           }
23           else if (rainfall_month[i]<lowest)
24           {
25               lowest=rainfall_month[i];
26           }
27    
28       }
29       avg_rainfall = total_rainfall/12;
30       printf("The average monthly rainfall is: %f\n",avg_rainfall);
31       printf("The highest and lowest rainfall values are %f and %f respectively\n",highest,lowest);
32       return 0;
33   }
```

PROBLEMS   OUTPUT   DEBUG CONSOLE   TERMINAL

```
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PS E:\sare programs> cd "e:\sare programs\.vscode\" ; if ($?) { gcc practice.c -o practice } ; if ($?) { .\practice }
Enter the rainfall for month 1 :1
Enter the rainfall for month 2 :2
Enter the rainfall for month 3 :3
Enter the rainfall for month 4 :4
Enter the rainfall for month 5 :5
Enter the rainfall for month 6 :6
Enter the rainfall for month 7 :7
Enter the rainfall for month 8 :13
Enter the rainfall for month 9 :12
Enter the rainfall for month 10 :11
Enter the rainfall for month 11 :0
Enter the rainfall for month 12 :2
The average monthly rainfall is: 5.500000
The highest and lowest rainfall values are 13.000000 and 0.000000 respectively
PS E:\sare programs\.vscode> █
```

Concept: Loops: String operations:

Lab 8:
Color Mixer
The colors red, blue, and yellow are known as the primary colors because they cannot be made by mixing other colors. When you mix two primary colors, you get a secondary color, as shown here:
▪ When you mix red and blue, you get purple.
▪ When you mix red and yellow, you get orange.
▪ When you mix blue and yellow, you get green.
Design a program that prompts the user to enter the names of two primary colors to mix. If the user enters anything other than "red," "blue," or "yellow," the program should display an error message. Otherwise, the program should display the name of the secondary color that results.

Code: Screenshot of code with Output

```
1    /*Color Mixer
2    The colors red, blue, and yellow are known as the primary colors because they cannot be made by mixing other colors.
3    When you mix two primary colors, you get a secondary color, as shown here:
4    ▪ When you mix red and blue, you get purple.
5    ▪ When you mix red and yellow, you get orange.
6    ▪ When you mix blue and yellow, you get green.
7    Design a program that prompts the user to enter the names of two primary colors to mix. If the user enters anything
8    other than "red," "blue," or "yellow," the program should display an error message. Otherwise, the program should
9    display the name of the secondary color that results.*/
10   # include<stdio.h>
11   # include<string.h>
12
13   int main()
14   {
15       char first[50];
16       char second[50];
17       char blue[]="blue";
18       char red[]="red";
19       char yellow[]="yellow";
20       char ch;
21   do
22   {
23       printf("Enter the primary1 colour\n:");
24       scanf("%s",&first);
25       printf("Enter the primary2 colour\n:");
26       scanf("%s",&second);
27
28       if((strcmp(first, red)==0) && (strcmp(second, blue)==0) || (strcmp(first, blue)==0) && (strcmp(second, red)==0))
29       {
30       printf("Purple\n");
31       }
32   else if((strcmp(first, yellow)==0) && (strcmp(second, blue)==0) || (strcmp(first, blue)==0) && (strcmp(second, yellow)==0))
33       {
34       printf("Green\n");
35       }
36   else if((strcmp(first, yellow)==0) && (strcmp(second, red)==0) || (strcmp(first, red)==0) && (strcmp(second, yellow)==0))
37       {
38       printf("Orange\n");
39       }
40   else
41       {
42       printf("error\n");
43       }
44       printf("Enter Y to continue again:\n");
45       scanf(" %c",&ch);
46       }while(ch=='Y');
47   return 0;
48   }
```

```
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PS E:\sare programs> cd "e:\sare programs\textbook\onlyPRACTICE\" ; if ($?) { gcc Ass7_2213047.c -o Ass7_2213047 } ; if ($?) { .\Ass7_2213047 }
Enter the primary1 colour
:red
Enter the primary2 colour
:yellow
Orange
Enter Y to continue again:
Y
Enter the primary1 colour
:yellow
Enter the primary2 colour
:red
Orange
Enter Y to continue again:
Y
Enter the primary1 colour
:orange
Enter the primary2 colour
:red
error
```

Algorithm:

Step 0: START.
Step 1: Declare 5 string type variables and assign blue, red, and yellow to 3 diffrent strings.
Step 2: Take the input for 2 primary colours from the user.
Step 3: if the user enters red and blue in primary colours the colour produced is purple.
Step 4: if the user enters red and yellow in primary colours the colour produced is orange.
Step 5: if the user enters blue and yellow in primary colours the colour produced is green.
Step 6: Else output input error.
Step 7: STOP.

Flowchart:
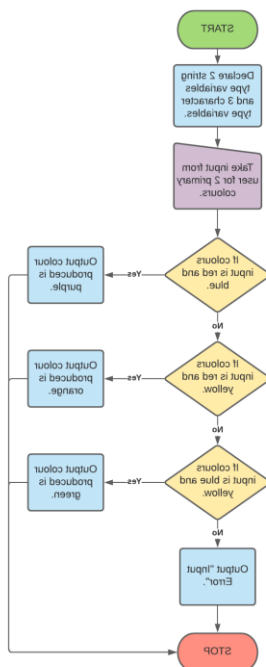
FAQs:

Q1. What is the output of C Program with Strings.?
>   int main()
>   {
>   char ary[]="Discovery Channel";
>   printf("%s",ary);
>   return 0;
>   }
>   Ans. Discovery Channel

Q2. Can we use string keyword in C?
Ans: No.

Concept related problem statement: WAP to find the number of vowels and consonants in a string entered by the user.

Algorithm:

Step 0: START
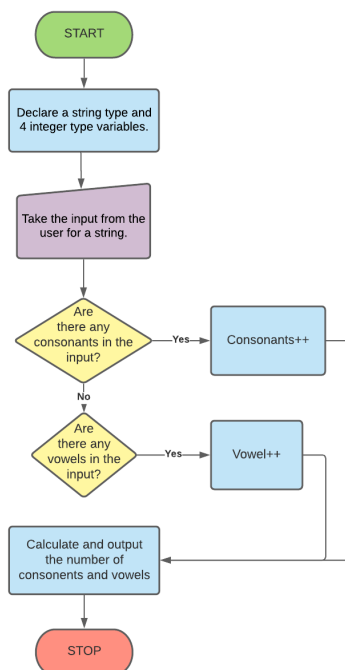Step 1: Declare a string type and 4 integer type variables.
Step 2: Take the input from the user for a string.
Step 3: Find the number of vowels and consonants in the string.
Step 4: Output the number of vowels and consonants in the string.
Step 5: STOP.

Flowchart:

Code:

```c
# include<stdio.h>
# include<string.h>
int main()
{
    char str[1000];
    int i, len, vowel, consonant;
    printf("Enter the sentence:\n");
    gets(str);
    vowel=0;
    consonant=0;
    len=strlen(str);

    for ( i = 0; i < len; i++)
    {
        if ((str[i]>='a' && str[i<='z']) || (str[i]>='A' && str[i<='Z'])  )
        {
            if (str[i]=='A' || str[i]=='E' || str[i]=='I' || str[i]=='O' || str[i]=='U' || str[i]=='a' || str[i]=='e' || str[i]=='i' || str[i]=='o' || str[i]=='u')
            {
                vowel++;
            }
            else
            {
                consonant++;
            }

        }

    }
    printf("Total number of vowel= %d\n", vowel);
    printf("Total number of consonant= %d\n", consonant);
    return 0;
}
```

PROBLEMS   OUTPUT   DEBUG CONSOLE   TERMINAL

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PS E:\sare programs> cd "e:\sare programs\.vscode\" ; if ($?) { gcc p.c -o p } ; if ($?) { .\p }
Enter the sentence:
My name is Sourav.
Total number of vowel= 6
Total number of consonant= 8
PS E:\sare programs\.vscode>

Concept: Loops: Structures:

Lab 9:

An automobile company has serial numbers for engine parts starting from AA0 to FF9. The other characteristics of parts to be specified in a structure are: Year of manufacture, material and quantity manufactured.
1. Specify a structure to store information corresponding to a part.
2. Write a program to retrieve information on parts with serial numbers between BB1 and CC6.

Code: Screenshot of code with Output

```
1    /*Concept: Structure
2    Lab 9: An automobile company has serial numbers for engine parts starting from AA0 to
3    FF9. The other characteristics of parts to be specified in a structure are: Year of
4    manufacture, material and quantity manufactured.
5    1. Specify a structure to store information corresponding to a part.
6    2. Write a program to retrieve information on parts with serial numbers between
7       BB1 and CC6.*/
8    #include<stdio.h>
9
10   struct engine
11   {
12       char serial[5];
13       int yom;
14       char mat[60];
15       int quantity;
16   }part[5];
17   int main()
18   {
19       for (int i = 0; i < 5; i++)
20       {
21           printf("Enter the details for part number: %d\n",i+1);
22           printf("Enter the serial number:\n");
23           scanf("%s",part[i].serial);
24
25           printf("Enter the year of manufacturing:\n");
26           scanf("%d",&part[i].yom);
27
28           printf("Enter the material used:\n");
29           scanf("%s",part[i].mat);
30
31           printf("Enter the quantity:\n");
32           scanf("%d", &part[i].quantity);
33       }
34       for (int i = 2; i < 4; i++)
35       {
36           printf("Details of part for Serial no:%s\n",part[i].serial);
37           printf("Year of manufacture:%d\n Material used:%s\n Quantity:%d\n",part[i].yom,part[i].mat,part[i].quantity);
38       }
39       return 0;
40   }
```

```
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PS E:\sare programs> cd "e:\sare programs\Assignments\" ; if ($?) { gcc Ass8_2213047.c -o Ass8_2213047 } ; if ($?) { .\Ass8_2213047 }
Enter the details for part number: 1
Enter the serial number:
AA1
Enter the year of manufacturing:
2002
Enter the material used:
iron
Enter the quantity:
23
Enter the details for part number: 2
Enter the serial number:
AA2
Enter the year of manufacturing:
1999
Enter the material used:
Aluminium
Enter the quantity:
12
Enter the details for part number: 3
Enter the serial number:
AA3
Enter the year of manufacturing:
2007
Enter the material used:
copper
Enter the quantity:
19
Enter the details for part number: 4
Enter the serial number:
AA4
Enter the year of manufacturing:
1998
Enter the material used:
rubber
Enter the quantity:
24
Enter the details for part number: 5
Enter the serial number:
AA5
Enter the year of manufacturing:
2003
Enter the material used:
plastic
Enter the quantity:
35
Details of part for Serial no:AA3
Year of manufacture:2007
 Material used:copper
 Quantity:19
Details of part for Serial no:AA4
Year of manufacture:1998
 Material used:rubber
 Quantity:24
PS E:\sare programs\Assignments> █
```

Algorithm:

Step 0: START.
Step 1: Define structure which includes 2 character type and 2 integer type variables.
Step 2: Declare 1 integer type variable.
Step3: if the conditions is true, ask the user to input serial number, Year of manufacture, Material, Quantity.
Step 4: Then check for the other condition and output the part details.
Step 5: STOP.

Flowchart:
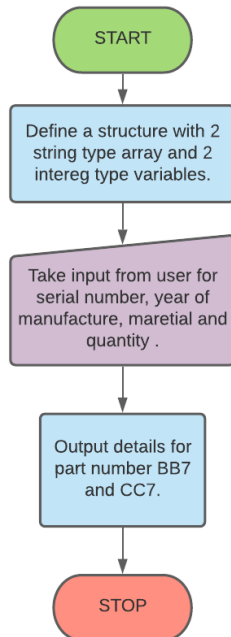
FAQs:

Q1. How is the size of the C structure is calculated?
Ans: In C language, sizeof() operator is used to calculate the size of structure, variables, pointers or data types, data types could be pre-defined or user-defined.

Q2. Choose correct statement for structure given below
```
int main()
{
    struct ship
    {

    };
    return 0;
}
```

a) It is wrong to define an empty structure
b) Member variables can be added to a structure even after its first definition.
c) There is no use of defining an empty structure
d) None of the above

Ans. D.None Of the Above.

Concept related problem statement: Enter the marks of 3 students in Chemistry, Mathematics and Physics (each out of 100) named Marks having elements roll no., name, chem_marks, maths_marks and phy_marks and then display the percentage of each student.

Algorithm:

Step 0: START
Step 1: Define a structure with 1 string type array, 1 integer and 3 float type variables.
Step 2:Take input from user for student roll number, name, chem_marks, phy_marks, and math_marks.
Step 3: Calculate and output the percentage scored by the student.
Step 4: STOP.

Flowchart:
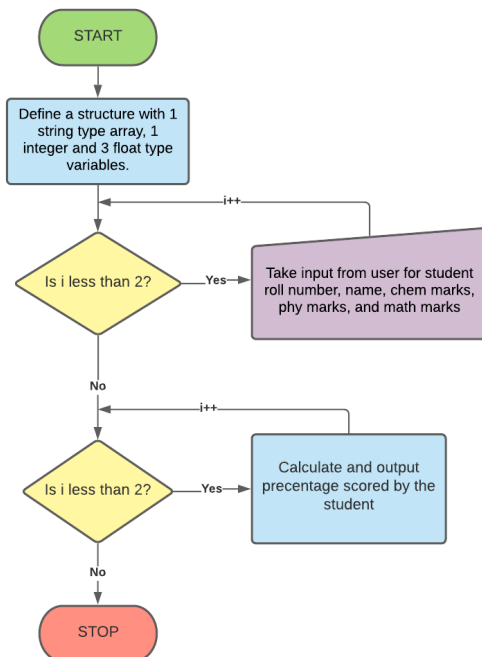
Code:

```c
1    # include<stdio.h>
2    struct Marks
3    {
4        int RollNo[3];
5        char name[100];
6        float chem_marks, maths_marks, phy_marks,total;
7    }student[3];
8
9    int main()
10   {
11       for (int i = 1; i <= 3; i++)
12       {
13       student[i].total=0;
14       printf("\tEnter the roll no of student%d:",i);
15       scanf("%d", &student[i].RollNo);
16       printf("\tEnter first name of the student%d:",i);
17       scanf("%s", student[i].name );
18       printf("\tEnter the marks score by student%d in chemistry:",i);
19       scanf("%d", &student[i].chem_marks);
20       printf("\tEnter the marks score by student%d in physics:",i);
21       scanf("%d", &student[i].phy_marks);
22       printf("\tEnter the marks score by student%d in maths:",i);
23       scanf("%d", &student[i].maths_marks);
24       }
25       for (int i = 1; i <= 3; i++)
26       {
27           printf("Student %d:\n",i);
28           float percentage = (student[i].chem_marks + student[i].maths_marks + student[i].phy_marks)/300 * 100;
29           printf("Percentage: %f\n", percentage);
30       }
31       return 0;
32   }
```

Concept: Loops: Functions:

Lab 10:
Create a program that calls a method that computes the final price for a sales transaction. The program contains variables that hold the price of an item, the salesperson's commission expressed as a percentage, and the customer discount expressed as a percentage. Create a calculatePrice() method that determines the final price and returns the value to the calling method. The calculatePrice() method requires three arguments: product price, salesperson commission rate, and customer discount rate. A product's final price is the original price plus the commission amount minus the discount amount. The customer discount is taken as a percentage of the total price after the salesperson commission has been added to the original price.

Code: Screenshot of code with Output

```
1    /*Concept: Function
2    Lab 10: Create a program that calls a method that computes the final price for a sales
3     transaction. The program contains variables that hold the price of an item, the
4     salesperson's commission expressed as a percentage, and the customer discount
5     expressed as a percentage. Create a calculatePrice() method that determines the final
6     price and returns the value to the calling method. The calculatePrice() method
7     requires three arguments: product price, salesperson commission rate, and customer
8     discount rate. A product's final price is the original price plus the commission
9     amount minus the discount amount. The customer discount is taken as a percentage of
10    the total price after the salesperson commission has been added to the original price.*/
11   # include<stdio.h>
12
13   void price(float base_price,float commission, float discount)
14   {
15       float final_price;
16       commission= (commission/100 * base_price);
17       discount= (discount/100 * base_price);
18       final_price= base_price+commission-discount;
19       printf("The final price of the product is : %f\n",final_price);
20   }
21   void main()
22   {
23       float base_price, commission, discount;
24
25       printf("Enter the base price:\n");
26       scanf("%f",&base_price);
27       printf("Enter the commission price:\n");
28       scanf("%f",&commission);
29       printf("Enter the discount price:\n");
30       scanf("%f",&discount);
31       price(base_price, commission, discount);
32   }
```

PROBLEMS   OUTPUT   DEBUG CONSOLE   TERMINAL

```
Enter the base price:
200
Enter the commission price:
20
Enter the discount price:
10
The final price of the product is : 220.000000
PS E:\sare programs\Assignments> []
```

Algorithm:

Step 0: START.
Step 1: Definne a function to calculate final price of a product
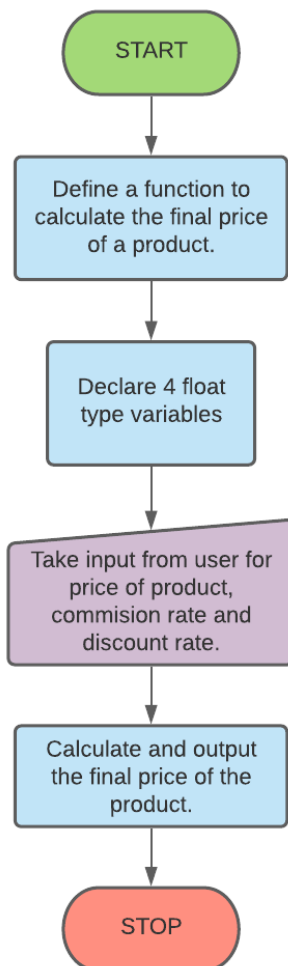   where commission=(commission rate/100)*price and discount=(discount rate/100)*price.
Step 2: Declare 4 float type variables.
Step 3: Take input from the user for price, rate of commission and rate of discount.
Step 4: calculate and output final rate.
Step 5: STOP.

Flowchart:

FAQs:

Q1. Which among the following is odd one out?
    a) printf
    b) fprintf
    c) putchar
    d) scanf
Ans. B. fprintf()

Q2. Predict the output of code given below

```c
#include<stdio.h>
void show_msg(void);

int main()
{
    show_msg();
    printf(" LAB");
    return 0;
}



void show_msg()
{
    printf(" PPS");
}
```

Ans. PPS LAB.

Concept related problem statement: Fat Gram Calculator

Design a program that asks for the number of fat grams and calories in a food item. Validate the input as follows:

- Make sure the number of fat grams and calories are not less than 0.
- According to nutritional formulas, the number of calories cannot exceed *fatgrams*9*. Make sure that the number of calories entered is not greater than *fatgrams*9*.

Once correct data has been entered, the program should calculate and display the percentage of calories that come from fat. Use the following formula:

Percentage of calories from fat = (Fatgrams*9) ÷ Calories

Some nutritionists classify a food as "low fat" if less than 30 percent of its calories come from fat. If the results of this formula are less than 0.3, the program should display a message indicating the food is low in fat.

Algorithm:

Step 0: START.
Step 1: Declare a function check and declare 2 float variables fat and cal.
   If x is greater than 0 and y is greater than 0, return 1.
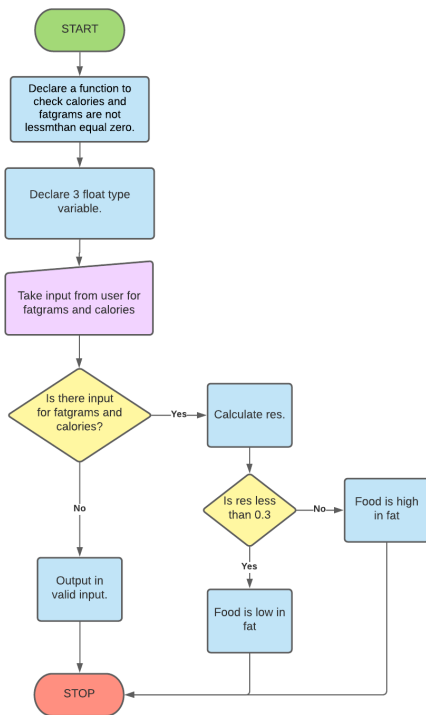Step 2: Declare 3 float variables in the main function fat, cal ad res.
Step 3: Take input from the user for fat and cal variables.
Step 4: if check function equals to 1, res is the percentage of calories from fat and if it is less than equal to 0.3 the print food is low in fat, and if it is not then print food is high in fat.
Step 5: if check function is not equal to 1 then print enter valid input.
Step 6: STOP.

Flowchart:

Code:

```c
#include<stdio.h>
#include<stdlib.h>
int check(float fat, float cat);
void main()
{
  float fat, cal, res;
  printf("Enter the amount of fat grams:\n");
  scanf("%f", &fat);
  printf("Enter the amount of calories:\n");
  scanf("%f", &cal);
  if (check(fat,cal)==1)
  {
    res = ((fat*9)/cal);
    if (res<=0.3)
    {
        printf("Food is low in fat\n");
    }
    else
    {
        printf("Food is high in fat\n");
        main();
    }
  }
  int check(float x, float y)
  {
    if((x>0 && y>0))
    return 1;
  }
}
```

```
PS E:\sare programs> cd "e:\sare pr
Enter the amount of fat grams:3
 Enter the amount of calorues:60
 Food is high in fat
PS E:\sare programs\.vscode>
```

Concept: Loops: Pointers:

Lab 11:
Take two numbers from the user in two variables and interchange their addresses by means of an external module. Display the result from the main function.

Code: Screenshot of code with Output

```
1    /*Concept: Pointer
2    Lab 11: Take two numbers from the user in two variables and interchange their addresses by means of an
3    external module. Display the result from the main function.*/
4    #include<stdio.h>
5
6    void swap (int*, int*);
7    void main()
8    {
9        int num1,num2;
10       printf("Enter the two integer values:\n");
11       scanf("%d%d",&num1,&num2);
12       printf("Where num1=%d and num2=%d before calling the function\n",num1,num2);
13       swap(&num1,&num2);
14       printf("Now num1=%d and num2=%d after the calling of function\n",num1,num2);
15   }
16   void swap(int* num1,int* num2)
17   {
18       int num3;
19       num3=*num1;
20       *num1=*num2;
21       *num2=num3;
22   }
```

PROBLEMS   OUTPUT   DEBUG CONSOLE   TERMINAL

```
Windows PowerShell
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Try the new cross-platform PowerShell https://aka.ms/pscore6

PS E:\sare programs> cd "e:\sare programs\Assignments\" ; if ($?) { gcc Ass10_2213047.c -o Ass10_2213
Enter the two integer values:
2
3
Where num1=2 and num2=3 before calling the function
Now num1=3 and num2=2 after the calling of function
PS E:\sare programs\Assignments> |
```

Algorithm:

Step 0:START.
Step 1: Definne a function to swap two numbers-
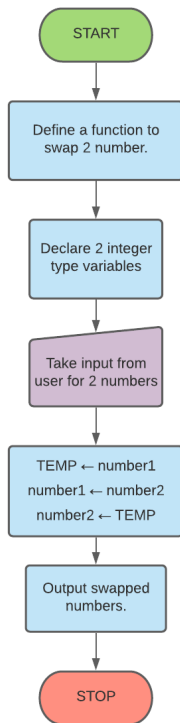   where TEMP ← number1, number1 ← number2, number2 ← TEMP.
Step 2: Declare 2 integer type variables.
Step 3: Take input from the user for 2 numbers.
Step 4: Output the swapped numbers.
Step 5: STOP.

Flowchart:

FAQs:

Q1. What will be the output of the following C code?

```
1.   #include <stdio.h>
2.   int main()
3.   {
4.       int *p, a = 10;
5.       p = &a;
6.       *p += 1;
7.       printf("%d,%d\n", *p, a);
8.   }
```

Ans. 11, 11

Q2. Comment on the following pointer declaration
        int *ip,p;
a) ip is a pointer to integer, p is not
b) ip and p, both are pointers to integer
c) ip is pointer to integer, p may or may not be
d) ip and p both are not pointers to integer

Ans. A. ip is a pointer to integer, p is not.

Concept related problem statement: Traverse an array using the concept of pointers.

Algorithm:

Step 0: START.
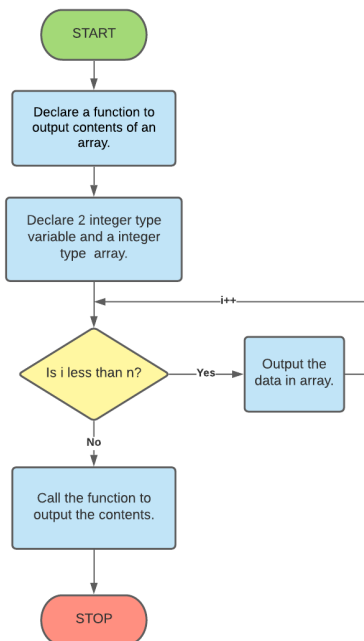Step 1: Declare a function to output contents of an array.
  Using loop extract the data from the array
Step 2: Declare an integer type array and an integer type variable.
Step 3: Use the user defined function to print the array.
Step 4: STOP.

Flowchart:

Code:

```c
1    # include<stdio.h>
2    void printarray(int* arr, int n)
3    {
4        int i;
5        printf("Array:");
6        for ( i = 0; i < n; i++)
7        {
8            printf("%d",arr[i]);
9        }
10       printf("\n");
11   }
12   int main()
13   {
14       int arr[]={2,-1,5,6,0,-3};
15       int n = sizeof(arr)/sizeof(arr[0]);
16       printarray(arr,n);
17       return 0;
18   }
19
```

PROBLEMS   OUTPUT   DEBUG CONSOLE   TERMINAL

```
Windows PowerShell
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Try the new cross-platform PowerShell https://aka.ms/pscore6

PS E:\sare programs> cd "e:\sare programs\.vscode\" ; if ($?) { gcc p.c -o p } ; if ($?) { .\p }
Array:2-1560-3
PS E:\sare programs\.vscode>
```

Concept: Loops: File handling:

Lab 12:

To understand File handling in C like creation , opening, closing, reading from and writing to a File .

Code: Screenshot of code with Output

```
1    /*Concept: File Handling
2    Lab 12: Write a program to read a file and display contents with its line numbers.*/
3    #include<stdio.h>
4    #include<stdlib.h>
5    int main()
6    {
7        FILE *fs;
8        char ch;
9        int i=1;
10       fs=fopen("TEXT.txt","r+");
11       if(fs==NULL)
12       {
13           printf("can't open source file");
14       }
15       printf("%d ",i++);
16       while(1)
17       {
18           ch=fgetc(fs);
19           if(ch==EOF)
20           {
21               break;
22           }
23           printf("%c",ch);
24           if(ch=='\n')
25           {
26               printf("%d ",i);
27               i++;
28           }
29       }
30       fclose(fs);
31   }
```

PROBLEMS   OUTPUT   DEBUG CONSOLE   TERMINAL

Windows PowerShell
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Try the new cross-platform PowerShell https://aka.ms/pscore6

PS E:\sare programs> cd "e:\sare programs\Assignments\" ; if ($?) { gcc Ass11_2213047.c -o Ass11_2213047 } ; if ($?) { .\Ass11_2213047 }
1 LAC SYLLABUS
2 UNIT 1: Matrices
3 UNIT 2: Linear Algebra and Mapping
4 UNIT 3: Limit, Continuity and differentiation of univariate function
5 UNIT 4: Infinte series and Expansion of Functions
6 UNIT 5: Integral Calculus and Fourier Series
PS E:\sare programs\Assignments>

Algorithm:
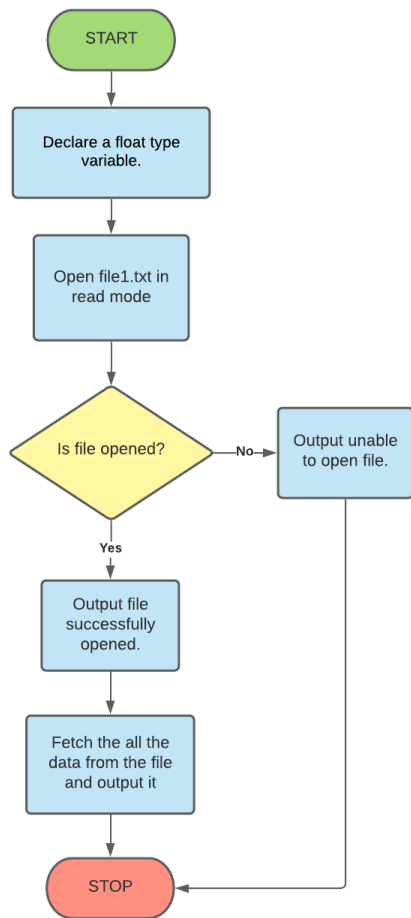
Step 0: START.
Step 1: Declare a character type variable.
Step 2: Open file1.txt in read mode.
Step 3: Check if the file opens.
Step 4: Read the data inside the file and output it.
Step 5: STOP.

Flowchart:

FAQs:

Q1. Which of the following true about FILE *fp

      A. FILE is a keyword in C for representing files and fp is a variable of FILE type.

      B. FILE is a stream

      C. FILE is a buffered stream

      D. FILE is a structure and fp is a pointer to the structure of FILE type

Ans: D. FILE is a structure and fp is a pointer to the structure of FILE type.

Q2. Write a C program to demonstrate basic file handling operations i) open a text file in a write mode ii) Write some contents to file iii) display file contents on screen

Ans:

```c
1   # include<stdio.h>
2   # include<math.h>
3   # include<stdlib.h>
4   int main()
5   {
6       FILE *fptr;
7       char data[1000], ch;
8
9       fptr = fopen("file1.txt","w");
10
11      if(fptr == NULL)
12      {
13          printf("Unable to open file.\n");
14          printf("Please check whether file exists and you have read privilege.\n");
15          exit(EXIT_FAILURE);
16      }
17
18      printf("Enter data: ");
19      gets(data);
20
21      fprintf(fptr,"%s",data);
22
23      fptr = fopen("file1.txt","r");
24
25      fgets(data, 1000, (FILE*)fptr);
26      printf("%s\n", data);
27
28      fclose(fptr);
29
30      return 0;
31  }
```