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## **ANSWERS**

**Q1. Write an algorithm and flowchart for finding the sum of squares of first N natural numbers.**

Step 1 : Start

Step 2 : Assign  $\text{sum}=0$  and  $i=1$

Step 3 : Read limit of number , n

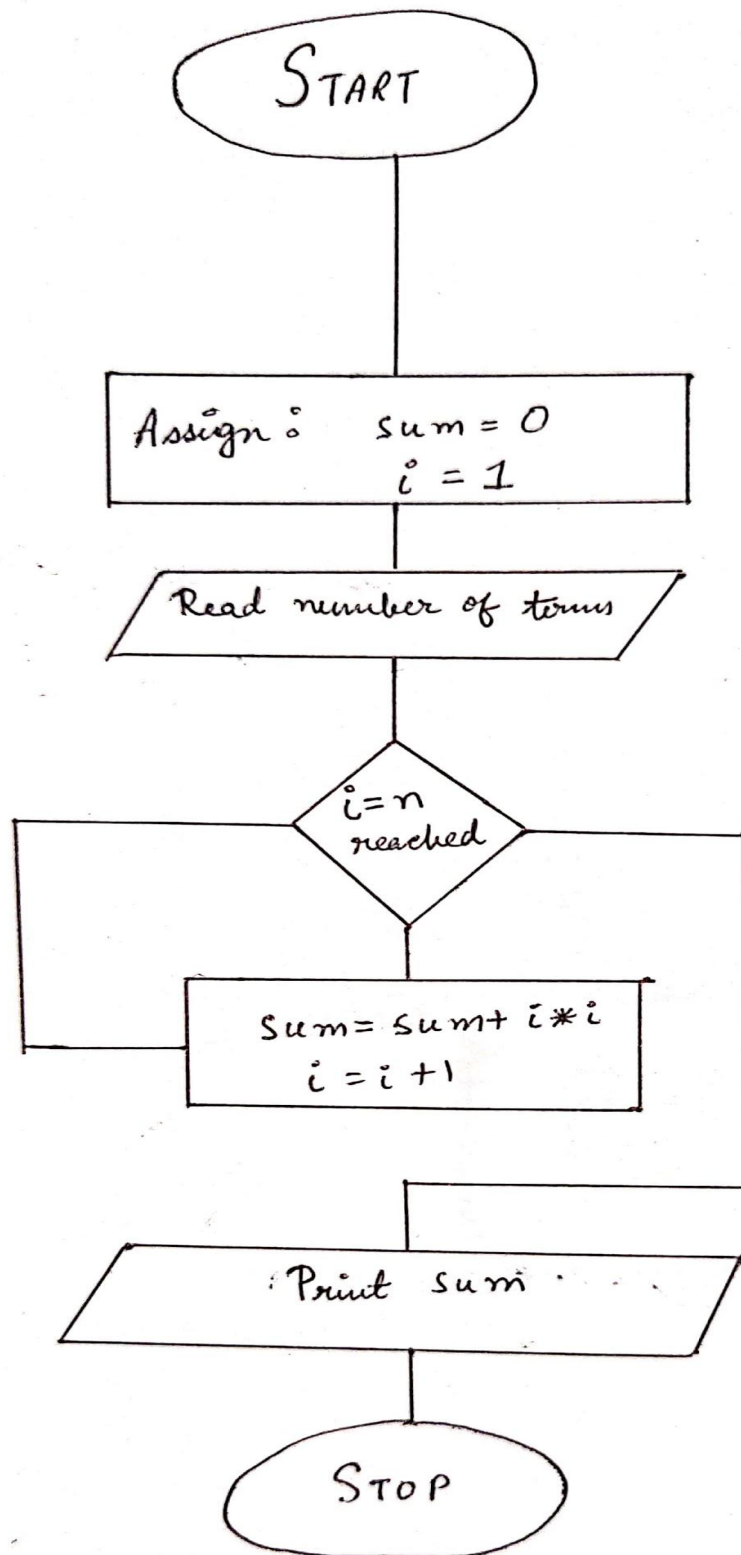
Step 4 : Repeat steps 5 to 6 until  $i=n$  reached

Step 5 : Compute  $\text{sum}=\text{sum}+i^2$

Step 6 : Compute  $i=i+1$

Step 7 : Print sum

Step 8 : Stop



**Flow chart**

## Q2. What is the purpose of #include statement?

#include is a way of including a standard or user-defined file in the program and is mostly written at the beginning of any C program. This directive is read by the pre-processor and orders it to insert the content of a user-defined or system header file into the following program. These files are mainly imported from an outside source into the current program. The process of importing such files that might be system-defined or user defined is known as **File Inclusion**. This type of preprocessor directive tells the compiler to include a file in the source code program. Here are the two types of file that can be included using **#include**:

**1. Header File or Standard files:** This is a file which contains C function declarations and macro definitions to be shared between several source files. Functions like the printf(), scanf() and various other input-output or other standard functions are contained within different header files. So to utilise those functions, the users need to import a few header files which define the required functions.

**2. User-defined files:** These files resembles the header files, except for the fact that they are written and defined by the user itself. This saves the user from writing a particular function multiple times. Once a user-defined file is written, it can be imported anywhere in the program using the **#include** preprocessor.

The “.h” refers to a header file.

**Syntax:**

```
#include<header file>  
#include "user defined files"
```

**Example:**

```
#include<stdio.h>  
#include "process.h"
```

**Q3. Write a program in C to display the sum of the series [ 9 + 99 + 999 + 9999 ...] up to N terms.**

```
#include <stdio.h>
#include <math.h>
main()
{
    int n,sum=0,i;
    printf("Enter the number of elements:\n");
    scanf("%d", &n);
    for (i = 1; i <= n; i++)
    {
        sum = sum+ pow(10, i) - 1;
    }
    printf("The sum of %d digits are: %d",n,sum);
}
```

**Q4. Write a program in C to find out the dot and cross product of two three dimensional vectors.**

```
#include <stdio.h>
#include <math.h>
main()
{
    int a[6],b[6],sum=0,i,dot=0,cross[3];
    printf("Enter the x,y,z of first vector:\n");
    scanf("%d %d %d", &a[0],&a[1],&a[2]);
    printf("Enter the x,y,z of second vector:\n");
    scanf("%d %d %d", &b[0],&b[1],&b[2]);
    a[3] = a[0];
    a[4] = a[1];
    a[5] = a[2];
    b[3] = b[0];
    b[4] = b[1];
    b[5] = b[2];

    for (i = 0; i < 3;i++){
        dot = dot + a[i] * b[i];
        cross[i] = a[i + 1] * b[i + 2] - b[i + 1] * a[i + 2];
    }
    printf("The dot product is: %d\n", dot);
    printf("The cross product is: (%d i,%d j,%d k)", cross[0],cross[1],cross[2]);
}
```

**Q5. A two dimensional array contains roll number and marks of a subject for 50 students. Write a program in C to sort the array in ascending order.**

```
#include <stdio.h>
main()
{
    int n = 50;
    int marks[n][2], b[n][2];
    for (int i = 0; i < n; i++)
    {
        printf("Enter Roll: ");
        scanf("%d", &marks[i][0]);
        b[i][0] = marks[i][0];
        printf("Enter Marks: ");
        scanf("%d", &marks[i][1]);
        b[i][1] = marks[i][1];
    }
    for(int i=0; i<n-1; i++)
    {
        for(int j=i+1; j<n; j++)
        {
            if(marks[j][1]<b[i][1])
            {
                int t;
                t=b[i][1];
                b[i][1]=b[j][1];
                b[j][1]=t;

                int k;
                k=b[i][0];
                b[i][0]=b[j][0];
                b[j][0]=k;
            }
        }
    }
    printf("Original Rank List:\n");
    printf("Roll\tMarks\n");
    for (int i = 0; i < n; i++)
    {
        printf("%d\t%d\n", marks[i][0], marks[i][1]);
    }
    printf("Sorted Rank List:\n");
    printf("Roll\tMarks\n");
    for (int i = 0; i < n; i++)
    {
        printf("%d\t%d\n", b[i][0], b[i][1]);
    }
}
```