Task 1:

1. Write a **function** that will take **3 arguments** as an input i.e. **acceleration, time** and **initial velocity**, and return the **distance** covered. The formula of distance is $S = V_i + 0.5 * a * t^2$. The prototype of the function is given as: **float distance (float acc, float time, float initial)**. You can test in main function as:

```
1. float s = distance(60, 1.5, 10);
2. cout<<s;
```

Solution:

```cpp
#include <iostream>
using namespace std;
float distance(float acc, float time, float initial);

int main() {
    float a,t,in;
    cout<<"Enter acceleration: ";
    cin>>a;
    cout<<"Enter time: ";
    cin>>t;
    cout<<"Enter initial velocity: ";
    cin>>in;

    float dis = distance(a,t,in);
    cout<<endl;
    cout<<"Total Distance is:"<<dis;

cout<<endl;
system("PAUSE");
return 0; }

float distance(float acc, float time, float initial){
    return initial+ (0.5*acc*(time*time));
}
```

Output:

```
Enter acceleration: 3.2
Enter time: 5
Enter initial velocity: 2.37
Total Distance is: 42.37
```

Task 2:

2. Write a **function** with the name **printFancy** which takes **two** input **params** i.e. a **character** x and an **integer** n. You have to print x up to n **times**. For example, if I use: **printFancy** ('*', 10); it will print on screen * 10 **times** as **************. You can test in main function as: **printFancy** ('*', 10);

Solution:

```cpp
#include <iostream>
using namespace std;
void printFancy(char x, int num);
int main() {
    int n;
    char x;
    cout<<"Enter character you wanna print: ";
    cin>>x;
    cout<<"Enter how many time you wanna print: ";
    cin>>n;

    printFancy(x,n);

cout<<endl;
system("PAUSE");
return 0;
}
void printFancy(char x, int num){
    int i=1;
    while(i<= num){
        cout<<x;
        i++;
    }
}
```

Output:

```
Enter character you wanna print: $
Enter how many time you wanna print: 10
$$$$$$$$$$
```

Task 3:

3. What should be done with the **function** above to give space after each
   character? For example, if I use: **printFancy2 ('-', 10);** it will print
   on screen - **10 times** as - - - - - - - - - - -.

Solution:

```cpp
#include <iostream>
using namespace std;
void printFancy(char x, int num);
int main() {
    int n;
    char x;
    cout<<"Enter character you wanna print: ";
    cin>>x;
    cout<<"Enter how many time you wanna print: ";
    cin>>n;

    printFancy(x,n);

cout<<endl;
system("PAUSE");
return 0;
}
void printFancy(char x, int num){
    int i=1;
    while(i<= num){
        cout<<x<<" ";
        i++;
    }
}
```

Output:

```
Enter character you wanna print: #
Enter how many time you wanna print: 10
# # # # # # # # # #
```

Task 4:

4. Write a **function** that will take **two params** as an integer input **i.e start** and **end** and **return** the **sum** of all numbers existing in between.

Solution:

```cpp
#include <iostream>
using namespace std;
int sum(int start, int end){
        int s=0;
        for (int i=start+1;i<end;i++){
            s +=i;
        }
        return s;
    }
int main() {
    int s,e;
    cout<<"Enter start value: ";
    cin>>s;
    cout<<"Enter end value: ";
    cin>>e;

    int a =sum(s,e);
    cout<<"The sum of all number between is "<<a;

cout<<endl;
system("PAUSE");
return 0;
}
```

Output:

```
Enter start value: 2
Enter end value: 8
The sum of all number between is 25
```

Task 5:

5. Write a **function** that will take **three params** as an **integer** input i.e **start**, **end** and **n**. And then print the numbers that are **divisible** by **n** in the range defined by **start** and **end**.

Solution:

```cpp
#include <iostream>
using namespace std;
int sum(int start, int end, int n){
            int s=0;
            for (int i=start+1;i<end;i++){
                if(i%n==0){
                        cout<<i<<" ";
                }
            }

    }
int main() {
      int s,e,n;
      cout<<"Enter start value: ";
      cin>>s;
      cout<<"Enter end value: ";
      cin>>e;
      cout<<"Enter n: ";
      cin>>n;

      sum(s,e,n);

cout<<endl;
system("PAUSE");
return 0;
}
```

Output:

```
Enter start value: 3
Enter end value: 25
Enter n: 3
6 9 12 15 18 21 24
```

Task 6:

6. Write a **function** named **swap(x, y)** where **x** and **y** are **integers**.

Solution:

```cpp
#include <iostream>
using namespace std;
void swap(int x, int y){
     cout<<"Before Swap"<<endl;
     cout<<x<<" "<<y<<endl;
     int a = x;
     x = y;
     y = a;

     cout<<"Before Swap"<<endl;
     cout<<x<<" " <<y;
}
int main() {
     swap(2,5);

cout<<endl;
system("PAUSE");
return 0;
}
```

Output:

```
Before Swap
2 5
After Swap
5 2
```

Task 7:

7. Write a **function** that take **three inputs**: x, y and **choice** and **return** value based on user's **choice**. Choice may be: (S → SQUARE, C → CUBIC, ^ → POWER, M → MAX, N → MIN, + → ADDITION, * → MULTIPLICATION).

Solution:

```cpp
#include <iostream>
#include<cmath>
using namespace std;
    void choice(double x, double y, char c){
        switch(c){
            case 's':
                cout<< pow(x,2) << " " << pow(y,2);
                break;
            case 'c':
                cout<< pow(x,3) << " " << pow(y,3);
                break;
            case '^':
                cout<< pow(x,y);
                break;
            case 'm':
                cout<< max(x,y);
                break;
            case 'n':
                cout<< min(x,y);
                break;
            case '+':
                cout<< x + y;
                break;
            case '*':
                cout<< x * y;
                break;

        }
    }
int main() {
    double a,b;
    char ch;
    cout<<"First Value: ";
    cin>>a;
    cout<<"Second Value: ";
    cin>>b;
    cout<<"Operation: ";
    cin>>ch;

    choice (a,b,ch);

cout<<endl;
system("PAUSE");
return 0;
}
```

Output:

```
First Value: 2
Second Value: 5
Operation: ^
32
```

Task 8:

8. Write following math functions, calculate formula and return value:

$$f(x) = 0.1 + \cos(3x) + 3\sin\left(\frac{1}{0.1 + (x-3)^2}\right) + \cos(\sqrt{11}\,x)$$

Solution:

```cpp
#include <iostream>
#include<cmath>
using namespace std;

float cal(float x){
     return 0.1 + cos(3*x) + 3*sin((1/0.1+pow(x-3,2))) + cos(sqrt(11)*x);
}

int main() {
     float x,a;

     cout<<"Enter value of x: ";
     cin>>x;
     a = cal(x);
     cout<<a;
cout<<endl;
system("PAUSE");
return 0;
}
```

Output:

```
Enter value of x: 7
1.50121
Press any key to continue . . .
```

Task 9:

9. Write a **function** that takes **one param** as **integer** input **taskNo** and calls function accordingly. Let's say user's input is **6**, then ask user input **x, y** then **call swap(x, y)** function. The prototype of the function is given as: **void execTask (int taskNo)**

Solution:

```cpp
#include<iostream>
using namespace std;

void swap(int x, int y);
void execTask(int taskNo);
int main(){

    int num;
    cout<<"Enter number: ";
    cin>>num;

    execTask(num);

 cout<<endl;
 system("PAUSE");
 return 0;
}
void swap(int x, int y){
                    int a = x;
                        x = y;
                        y = a;

                        cout<<x<<" " <<y;
                }
void execTask(int taskNo){
    int x,y;

    for(int i=1;i<=taskNo;i++){
            cout<<"Enter x: ";
            cin>>x;
            cout<<"Enter y: ";
            cin>>y;
            swap(x,y);
            cout<<endl;
            }}
```

Output:

```
Enter number: 3
Enter x: 5
Enter y: 7
7 5
Enter x: 6
Enter y: 4
4 6
Enter x: 9
Enter y: 0
0 9
```

Task 10:

10.   Write a **void** function named **showMenu()** in which you have to show user,
      all the tasks number and name in proper manner. Output may be:

                    1- Calculate Distance
                    2- Fancy
                    3- Improved Fancy
                    4- Sum of all numbers in given range
                    and so on.

Solution:

```cpp
#include<iostream>
using namespace std;

    void menu(){
        cout<<"1. Caluculate Distance \n2. Fancy"<<endl;
        cout<<"3. Improved Fancy \n4. Sum of all numbers in range"<<endl;
        }

int main(){

    menu();

 cout<<endl;
 system("PAUSE");
 return 0;
}
```

Output:

```
1. Caluculate Distance
2. Fancy
3. Improved Fancy
4. Sum of all numbers in range
```

Task 11:

Now ask user any **input** to call **execute** that task.

11.   Code for **main ()** function is as follows:

```
1. // Do Not Change main function
2. int main ()
3. {
4.     int choice;
5.
6.     showMenu()
7.     cin>>choice;
8.     execTask(int taskNo);
9.
10.    system ("PAUSE") ;
11.    return 0 ;
12. }
```

Solution:

```cpp
#include<iostream>
using namespace std;

    void menu(){
        cout<<"1. Caluculate Distance \n2. Fancy"<<endl;
        cout<<"3. Improved Fancy \n4. Sum of all numbers in range"<<endl;
        }

    float distance(float acc, float time, float initial){
        return initial + (0.5*acc*(time*time));
    }

    void printFancy(char x, int num){
        int i=1;
        while(i<= num){
            cout<<x;
```

```cpp
            i++;
        }
    }

    void improvedFancy(char x, int num){
        int i=1;
        while(i<= num){
cout<<x<<" ";
i++;
        }
    }

int sum(int start, int end){
            int s=0;
            for (int i=start+1;i<end;i++){
                s +=i;
            }
            return s;
        }

    void execTask(int opr){

        if(opr == 1){
            float a,t,in;
                cout<<"Enter acceleration: ";
                cin>>a;
                cout<<"Enter time: ";
                cin>>t;
                cout<<"Enter initial velocity: ";
                cin>>in;

                float dis = distance(a,t,in);
                cout<<endl;
                cout<<"Total Distance is: "<<dis;

        }
    else if(opr == 2){
        int n;
            char x;
        cout<<"Enter character you wanna print: ";
            cin>>x;
            cout<<"Enter how many time you wanna print: ";
            cin>>n;

            printFancy(x,n);

        }
    else if(opr == 3){
        int n;
            char x;
            cout<<"Enter character you wanna print: ";
            cin>>x;
            cout<<"Enter how many time you wanna print: ";
            cin>>n;
```

```cpp
            improvedFancy(x,n);

        }
    else if(opr == 4){
        int s,e;
            cout<<"Enter start value: ";
            cin>>s;
            cout<<"Enter end value: ";
            cin>>e;

            int a =sum(s,e);
            cout<<"The sum of all number between is "<<a;
        }
    else
    cout<<"Wrong Entry!!!";
        }

int main(){
    int choice;
    menu();

    cout<<"Enter Number of Operation you wanna perform: ";
    cin>>choice;
    cout<<endl;
    execTask(choice);


 cout<<endl;
 system("PAUSE");
 return 0;
}
```

Output:

```
1. Caluculate Distance
2. Fancy
3. Improved Fancy
4. Sum of all numbers in range
Enter Number of Operation you wanna perform: 4

Enter start value: 3
Enter end value: 56
The sum of all number between is 1534
Press any key to continue . . .
```