```
#include <iostream>
using namespace std;
//apply to all problems

int main() {

        return 0;
}
```

```
2. // assuming numbers to be int
    int a, b;
    cout << a+b << endl;

3. // take char as an example
        char a;
        cout << "the size is" <<
sizeof(a) << endl;
```

Review Exercises (Optional)

1. Write a program to print a welcome text in a separate line.
   ```
   cout << "welcome" << endl;
   ```
2. Write a program to print the sum of two numbers using variables.

3. Write a program to find the size of fundamental data types.

4. Write a program to check the upper and lower limits of integer.

5. Write a program showing **string** manipulation.
   Sample Output:

   The string:: welcome, dear student
   The length of the string:: 21
   The char at index 3 of the string:: c
   The char at index 1 of the string [using array]:: e
   Is the string empty:: 0
   Retrieve the sub-string from 10th position for 4 characters:: dear
   Replace the previous sub-string by 'good':: welcome, good student

6. Write a program to read a sequence of integers and print mode values of the sequence. The number of integers is greater than or equals to 1 and less than or equals to 100.
   Note: The mode of a set of data values is the value that appears most often.

7. Write a program to check whether the sequence of the numbers in a given array is a "Arithmetic" or "Geometric" sequence. Return -1 if the sequence is not "Arithmetic" or "Geometric".
   Note: an arithmetic sequence is a sequence of numbers, where the difference between the consecutive terms is constant (e.g., the sequence 5, 7, 9, 11, 13, 15, . . . is an arithmetic sequence with common difference of 2). A geometric sequence is a sequence of numbers such that each term after the first is found by multiplying the previous one by a fixed, non-zero number called the common ratio (e.g., the sequence 2, 6, 18, 54, ... is a geometric sequence with common ratio 3).

8. Write a program to sum of all positive integers in a sentence.
   Sample string: There are 7 chairs, 10 desks, 3 blackboard and 5 fans.
   Output: 25

9. Write a program to read three ints and to print them in ascending order.

4.

```
#include <iostream>
#include <climites> //libruary for data limits
using namespace std;


int main{
        cout << " The upper limit of int data type is " << INT_MAX << endl;
        cout << " The lower limit of int data type is  " << INT_MIN << endl;

        return 0;
}
```

5.

```cpp
//codes for problem 5
#include <iostream>
#include <string>
using namespace std;


int main() {
    //variables
    string a = "welcome, dear student";
    //displaying
    cout << "The string:: " << a << endl;
    cout << "The length of the string:: "<< a.length() << endl;
    cout << "The char at index 3 of the string:: "<< a[3] << endl;
    cout << "The char at index 1 of the string [using array]:: " << a[1] << endl;
    cout << "Is the string empty:: " << a.empty() << endl;
    cout << "Retrieve the sub-string from 10th position for 4 characters:: " << a[9] << a[10] << a[11] << a[12] << endl;

    //replace
    a[9]='g';
    a[10]='o';
    a[11]='o';
    a[12]='d';
    cout << "Replace the previous sub-string by 'good':: " << a << endl;



    return 0;
}
```

```cpp
//problem 6
//Write a program to read a sequence of integers and print mode values of the sequence.
//The number of integers is greater than or equals to 1 and less than or equals to 100.
//Note: The mode of a set of data values is the value that appears most often.
#include <iostream>
#include <string>
using namespace std;
// function prototype
int mode(int[], int);

int main() {
    int num[7] = {4,4,4,6,7,3,3};

    cout << "Mode is " << mode(num, sizeof(num)/sizeof(num[0])) << endl;
    return 0;
}
//function def
int mode(int a[], int size)
{
    int mode, max=0, count;

    for (int i=0; i<size; i++)
    {
        count=0;
        for (int j=0; j<size; j++)
        {
            if (a[i]==a[j])
                count++;
        }
        if (count > max)
            {
                max = count;
                mode = a[i];
            }
    }
    return mode;
}
```

```cpp
//problem 7
#include <iostream>
#include <string>
using namespace std;

string check(int num[], const int size) {

    int diff_arith = num[1] - num[0]; // for arith: we are looking for the subtractions
    int diff_geo = num[1] / num[0]; //for geo: we are looking for the multifications
    bool arith_flag = true, geo_flag = true;

    for (int y = 0; y < size-1; y++) // loop to check aru
    {
        if (num[y] + diff_arith != num[y + 1])
        {
            arith_flag = false;
            break;
        }
    }
    for (int z = 0; z < size - 1; z++)//loop to check geo
    {
        if (num[z] * diff_geo != num[z + 1])
        {
            geo_flag = false;
            break;
        }
    }
    //return message
    if (arith_flag)
        return "Arithmetic";
    else if (geo_flag)
        return "Geometric";
    else
        return "-1";
}

int main() {

    int num1[] = { 1, 3, 5, 7 };
    int num2[] = { 2, 4, 8, 16, 32 };
    int num3[] = { 1, 2, 3, 4, 5, 6, 8 };
    cout << check(num1, sizeof(num1) / sizeof(num1[0])) << endl;
    cout << check(num2, sizeof(num2) / sizeof(num2[0])) << endl;
    cout << check(num3, sizeof(num3) / sizeof(num3[0])) << endl;

    return 0;
}
```

```cpp
//problem 8
//Write a program to sum of all positive integers in a sentence.
//Sample string: There are 7 chairs, 10 desks, 3 blackboard and 5 fans.
//Output: 25
#include <iostream>
#include <string>
#include <cctype>
using namespace std;
//functuion prototype
int sum (string, int);

int main(){
    string a = "There are 7 chairs, 10 desks, 3 blackboard and 5 fans.";
    //cout << a.length();

    cout << "Output:" << sum(a,a.length()) << endl;

    return 0;
}
//function def
int sum(string a, int len)
{
    int sum = 0;
    int temp = 0;
    for (int i=0; i<len; i++)
    {
        if (isdigit(a[i]))
        {
            temp = a[i]-48; //converting char to int
            //cout << temp << endl;
            for (int j=i+1; j<len; j++)
            {
                if (isdigit(a[j]))//checking whether there is 2-digit or more-digit number
                {
                    int tempj = a[j]-48; //converting char to int
                    temp = temp*10 + tempj ;
                    i = j+1; //palce the flag to the next char of the integer
                }
                else
                    break;
            }
            sum = sum+temp;
        }
    }
    return sum;
}
```

```cpp
//problem 9
//Write a program to read three ints and to print them in ascending order.
#include <iostream>
using namespace std;

int main(){
    int n1, n2, n3;
    cout << "Enter three integers to place in ascending order.";
    cin  >> n1 >> n2 >> n3;

    if (n3< n2 && n2< n1)
        cout << n3 << ", " << n2 << ", " << n1 << "." << endl;
    if (n2< n3 && n3< n1)
        cout << n2 << ", " << n3 << ", " << n1 << "." << endl;
    if (n3< n1 && n1< n2)
        cout << n3 << ", " << n1 << ", " << n2 << "." << endl;
    if (n1< n3 && n3< n2)
        cout << n1 << ", " << n3 << ", " << n2 << "." << endl;
    if (n1< n2 && n2< n3)
        cout << n1 << ", " << n2 << ", " << n3 << "." << endl;
    if (n2< n1 && n1< n3)
        cout << n2 << ", " << n1 << ", " << n3 << "." << endl;
    return 0;
}
```