OR

```
#include<iostream>
using namespace std;
int main()
{
   int i,j ;
   for ( i = 5 ; i > = 1 ; i -- )
                {
                        for (  j = 5 ; j > = I ; j-- )
                                cout<< j * j <<" \t " ;
                        cout<<" \n " ;
                }
   }
```

****

Chapter 8 – Arrays

1. Compare Linear search and Binary search. **[March 2020, Score 2]**

Ans.

Linear search method	Binary search method
The elements need not be in any order	The elements should be in sorted order
Takes more time for the process	Takes very less time for the process
May need to visit all the elements	All the elements are never visited
Suitable when the array is small	Suitable when the array is large

2. Write algorithm for bubble sorting **[March 2020, Score 3]**

Ans. Step 1: Start

Step 2: Accept a value in N as the number of elements of the array

Step 3: Accept N elements into the array AR

Step 4: Repeat Steps 5 to 7, (N - 1) times

Step 5: Repeat Step 6 until the second last element of the list

Step 6: Starting from the first position, compare two adjacent elements in the list. If they are not in proper order, swap the elements.

Step 7: Revise the list by excluding the last element in the current list.

Step 8: Print the sorted array AR

Step 9: Stop

3. Briefly explain about two types of sorting methods. **[July 2019, Score 2]**

Ans. Sorting is the process of arranging the elements of the array in some logical order.

Selection sort

One of the simplest sorting techniques. To sort an array in ascending order, the selection sort algorithm starts by finding the minimum value in the array and moving it to the first position. At the same time, the element at the first position is shifted to the position of the smallest element. This step is then repeated for the second lowest value by moving it to the second position, and so

on until the array is sorted.

Bubble sort

Bubble sort is a sorting algorithm that works by repeatedly stepping through lists that need to be sorted, comparing each pair of adjacent items and swapping them if they are in the wrong order. This passing procedure is repeated until no swaps are required, indicating that the list is sorted

4. Illustrate the concept of two dimensional arrays. **[July 2019, Score 2]**

Ans. A two dimensional array is an array in which each element itself is an array. For instance, an array AR[m][n] is a 2D array, which contains m single dimensional arrays, each of which has n elements. Otherwise we can say that AR[m][n] is a table containing m rows and n columns.

5. Compare linear search with binary search **[March 2019, Score 2]**

Ans.

Linear search method	Binary search method
The elements need not be in any order	The elements should be in sorted order
Takes more time for the process	Takes very less time for the process
May need to visit all the elements	All the elements are never visited
Suitable when the array is small	Suitable when the array is large

6. Write an algorithm for selection sort **[March 2019, Score 3]**

Ans.

Step 1. Start

Step 2. Accept a value in N as the number of elements of the array

Step 3. Accept N elements into the array AR

Step 4. Repeat Steps 5 to 9, (N – 1) times

Step 5. Assume the first element in the list as the smallest and store it in MIN and its position in POS

Step 6. Repeat Step 7 until the last element of the list

Step 7. Compare the next element in the list with the value of MIN. If it is found smaller, store it in MIN and its position in POS

Step 8. If the first element in the list and the value in MIN are not the same, then swap the first element with the element at position POS

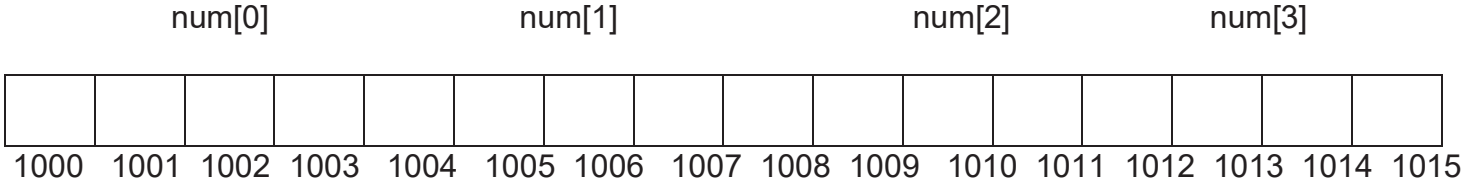
Step 9. Revise the list by excluding the first element in the current list

Step 10. Print the sorted array AR

Step 11. Stop

7. Illustrate the memory allocation for a single dimensional array in C++ **[July 2018, Score 2]**

Ans. The amount of storage required to hold an array is directly related to its type and size.



8. An array AR contains the elements 15,81, 63,25,45, 58,90. Illustrate the working of binary search technique to locate the element 45. **[July 2018, Score 3]**

Ans. Binary search begins by comparing an element in the middle of the array with the target value. If the target value matches the element, its position in the array is returned. If the target value is less than the element, the search continues in the lower half of the array. If the target value is greater than the element, the search continues in the upper half of the array. By doing this, the algorithm eliminates the half in which the target value cannot lie in each iteration

But the condition is that, Binary search works on sorted arrays

So, first of all, the must be sorted as: 15, 25, 45, 58, 63, 81, 90

Then, do the binary search as:

Take middle element. Here it is 48. Check whether it is the required element. If no, take the half of the array at which the required element is present. ie, 15, 25, 45. Again take middle element. Here it is 25. Check whether it is the required element. If no, take the half of the array at which the required element is present. ie, 45. Take the middle element, here it is 45. Check whether it is the required element. The item is found and displayed.

9. Illustrate the working of bubble sort method for sorting the elements 23, 52,43, 61, 73 and 28 in ascending order **[July 2018, Score 3]**

Ans.

23 52 43 61 73 28

23 **52 43** 61 73 28

23 43 **52 61** 73 28

23 43 52 **61 73** 28

23 43 52 61 **28 71**

23 43 52 28 61 71

23 **43 28** 52 61 71

23 28 **43 52** 61 71

23 28 43 52 **61 71**

10. How many bytes are required to store the following arrays: **[March 2018, Score 2]**

a) int a [2] [5] ;

b) int b [25] ;

Ans. a) 4 x 2 x 5 = 40

b) 4 x 25 = 100

11. If 24,54,89, 56,76, 42,5 are the elements of an array, illustrate the working of selection sort algorithm for sorting these elements in descending order. **[March 2018, Score 3]**

Ans.

24 54 **89** 56 76 42 5

89 **54** 24 56 **76** 42 5

89 76 **24** 56 **54** 42 5

89 76 56 **24 54** 42 5

89 76 56 54 **24 42** 5

89 76 56 54 42 24 5

12. Write a C++ program to input the scores of 5 students and display them in reverse order using an array. **[March 2018, Score 3]**

Ans.

```
#include <iostream>
using namespace std;
int main()
{
int i, score [ 5 ] ;
for ( i = 0 ; i < 5 ; i++ ) // Reads the scores
```

```
{
cout<<"Enter a score: ";
cin>>score [ i ] ;
}
for ( i = 4 ; i > = 0 ; i-- ) // Prints the scores
cout<<"score[" << i << "] is " << score[i]<<endl;
return 0;
}
```

13. An array is declared as follows:

int a [5] = { 1 , 2 , 3 , 4 , 5 } ;

What will be the value of a [2] + a [3] ? **[July 2017, Score 1]**

Ans. 7 (a [2] = 3, a [3] = 4 . So, a [2] + a [3] = 3 + 4 = 7)

14. Write C++ statements to double each element of the array int A[100]. **[July 2017, Score 2]**

```
{
int  A[100] , i ;
for ( i = 0 ;i < 100; i++ )
        {
        A [ i ] = 2 * A [ i ] ;
        }
}
```

15. Consider an array A with the following elements sorted in ascending order

5, 9, 10, 13, 16, 17, 19, 20, 25, 37.

Explain the working of binary search algorithm to search. How many comparisons are required for this searching? **[July 2017, Score 3]**

Ans.

1. find the middle element (16+17/2 = 16.5)

2. Compare the element with 16.5

3. If the element is less than 16.5, consider the left half, otherwise right half.

4. Continue this division method and find the location of the item to search.

Here, only 4 comparisons are required for this searching.

16. Find the value of score [4] based on the following declaration statement

int score [5] = { 98, 87, 92, 79, 85 } **[March 2017, Score 1]**

Ans. 85

17. Let M [3] [3] is a 2D array that contains the elements of a square matrix. Write C++ statements to find the sum of the diagonal elements **[March 2017, Score 2]**

Ans. sum = 0 ;

```
for ( i = 1 ; i < = 3 ; i++ )
        sum = sum + M [ i ] [ i ] ;
```

18. Write an algorithm for arranging elements of an array in ascending order using bubble sort.

[March 2017, Score 3]

Ans.

Step 1: Start

Step 2: Accept a value in N as the number of elements of the array

Step 3: Accept N elements into the array AR

Step 4: Repeat Steps 5 to 7. (N - 1) times

Step 5: Repeat Step 6 until the second last element of the list

Step 6: Starting from the first position, compare two adjacent elements in the list. If they are not in proper order, swap the elements.

Step 7: Revise the list by excluding the last element in the current list.

Step 8: Print the sorted array AR

Step 9: Stop

19. ---------- search method is an example for ‘divide and conquer’ method

[July 2016, Score 1]

Ans. Binary search

20. What is an array? Write C++ program to declare and use a single dimensional array for storing the computer science marks of all students in your class **[July 2016, Score 3]**

Ans. An array is a collection of elements of the same type placed in contiguous memory locations. Arrays are used to store a set of values of the same type under a single variable name.

```
int mark [60];
```

21. a) Write C++ program for sorting a list of numbers using bubble sort method.

b) Write the different passes of sorting the following numbers using Bubble sort.

32 21 9 17 5

Ans.

a)
```
#include<iostream>
using namespace std;

int main ( )

{

  int i, j,temp,n,;

  int a[50] ;

  cout<<" Enter number of elements:";

  cin>>n;

  cout <<"Input list ...\n";

  for(i = 0; i<n; i++) {

    cout <<a[i]<<"\t";

  }

cout<<endl;

for(i = 0; i<n; i++) {

  for(j = i+1; j<n; j++)

  {
```

```
      if(a[j] < a[i]) {
         temp = a[i];
         a[i] = a[j];
         a[j] = temp;
      }
   }
}
cout <<"Sorted Element List ...\n";
for(i = 0; i<10; i++) {
   cout <<a[i]<<"\t";
}
return 0;
}
```

b) **32 21** 9 17 5

21 **32 9** 17 5

21 9 **32 17** 5

21 9 17 **32 5**

21 9 17 5 32

9 **21 17** 5 32

9 17 **21 5** 32

9 17 5 21 32

9 **17 5** 21 32

9 5 17 21 32

8 9 17 21 32

21. Declare a two dimensional array to store the elements of a matrix with order 3x5

[March 2016, Score 1]

Ans. int mat [3] [5] ;

22. Declare an array of size 5 and initialize it with numbers 8,7,2,4 and 6 **[March 2016, Score 2]**

Ans. int array [5] = { 8 , 7 , 2 , 4 , 6 } ;

23. Define an array. Also write the algorithm for searching an element in the array using any method that you are familiar with **[March 2016, Score 3]**

Ans. An array is a collection of elements of the same type placed in contiguous memory locations.

Linear search or binary search

24. int num [10] ;

The above C++ statement declares an array named num that can store maximum ---------- integer numbers.

a) 9 b) 10 c) N d) None of these **[July 2015, Score 1]**

Ans. 10

25. a) ---------- is an entry controlled loop **[July 2015, Score 1]**

b) Explain the memory allocation for the following declaration statement

int A [10][10] ; **[July 2015, Score 2]**

Ans. a) while loop / for loop

b) The formula to calculate total number of bytes required for a 2D array is as follows:

total_bytes = sizeof (base type) × number of rows × number of column

i.e. total_bytes = 4 x 10 x 10 = 400

26. Write a C++ program to illustrate array traversal **[July 2015, Score 3]**

```
#include <iostream>

using namespace std ;

int main()

{

int a[10], i ;

cout<<"Enter the elements of the array :" ;
```

```
for ( i = 0 ; i < 10 ; i++ )

cin >> a [ i ] ;

for ( i =0 ; i < 10 ; i++ )

a [ i ] =  a [ i ] + 1 ;

cout<<"\nEntered elements of the array are...\n" ;

for ( i = 0 ;  i < 10 ; i++ )

cout<< a [ i ] << " \t " ;

return 0 ;

}
```

27. Read the following C++ statement :

```
int  MAT [ 5 ] [ 4 ] ;
```

a) how many bytes will be allocated for this array? **[March 2015, Score 1]**

b) Suppose MAT [4] [4] is a 2D array that contains the elements of a square matrix. Write C++ statements to find the sum of all the elements in the array. **[March 2015, Score 2]**

Ans. a) 4 x 5 x 4 = 80

b)
```
for ( i = 1 ; i <= 4 ; i++)
    {
        for ( j = 1 ; j < = 4 ; j++)
            sum = sum + MAT [ j ] [ j ] ;
    }
```

28. Write the names of two searching methods in arrays. Prepare a chart that shows the comparisons of two searching methods **[March 2015, Score 3]**

Ans. Linear search and binary search.

Linear search method	Binary search method
The elements need not be in any order	The elements should be in sorted order
Takes more time for the process	Takes very less time for the process
May need to visit all the elements	All the elements are never visited
Suitable when the array is small	Suitable when the array is large

****

09 - String Handling And I/O Functions

1. String function getchar ( ) is defined in _____ header file. **[March 2020, Score 1]**

Ans. cstdio

2. Differentiate between 'put( )' and 'write( )' with example. **[March 2020, Score 3]**

Ans. Both functions allow a stream of bytes to flow from memory into an output object. The differences are: put ( ) function is used to display a character whereas write function is used to display a string. put ( ) function takes one argument but, write function needs two arguments.

Syntax: cout.put (character constant / character variable) ;

cout.write (string constant / string variable , size) ;

3. How many bytes are required to store the string, "HELLO WORLD" ? **[July 2019, Score 1]**

Ans. 12

4. Name two input stream functions in C++. **[July 2019, Score 1]**

Ans. get ( ) and getline ( )