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ID 11448

Q1

a)

10	14	19	26	27	31	33	35	42	44
0	1	2	3	4	5	6	7	8	9

First, we shall determine half of the array by using this formula

mid = low + (high - low)/2

Here it is, 0 + (9 - 0)/2 = 4 (integer value of 4.5).

So, 4 is the mid of the array.

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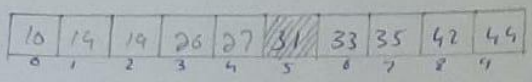
0	1	2	3	4	5	6	7	8	9

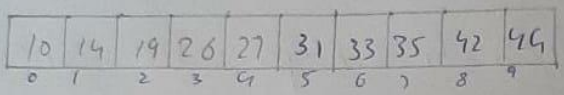
Now we compare the value stored at location 4, with the value being searched i.e 31. We find that the value at location 4 is 27, which is not a match. As the value is greater than 27 and we have a sorted array, so we also know that the target value must be in the upper portion of the array.



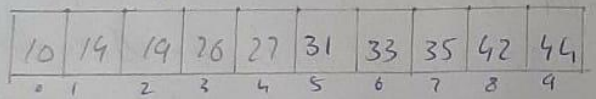
We change our low to mid+1 and find the new mid value again

```
low = mid + 1
mid = low + (high - low)/2
```

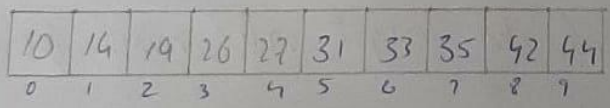
our new mid is 7 now. We compare the value stored at location 7 with our target value 31.



The value stored at location 7 is not a match, rather it is more than what we are looking for. So, the value must be in the lower part from this location.



Hence, we calculate the mid again. This time it is 5



We compare the value stored at location 5 with our target value. We find that it is a match

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0	1	2	3	4	5	6	7	8	9

We conclude that the target value 31 is stored at location 5.

Binary search halves the searchable items and thus reduces the count of comparisons to be made to very less numbers.

Q2a)

```
#include <stdio.h>
main() {
int LA[] = {1, 3, 5, 7, 8};
int item = 10, k = 3, n = 5;
int i = 0, j = n;
printf("The original array elements are:\n");
for (i = 0; i<n; i++) {
printf("LA[%d] = %d \n", i, LA[i]);
}
n = n+1;
while (j >= k) {
    LA[j+1] = LA[j];
    j = j-1;
}
    LA[k] = item;
printf("The array element after insertion:\n");
```

```
for (i=0; i<n; i++) {
printf ("LA[%d] = %d\n", i, LA[i]);
  }
}
```

Output:

The original array elements are:

LA[0] = 1
LA[1] = 3
LA[2] = 5
LA[3] = 7
LA[4] = 8

The array elements after insertion.

LA[0] = 1
LA[1] = 3
LA[2] = 5
LA[3] = 10
LA[4] = 7
LA[5] = 8

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Q3 a)

```
#include <iostream>
using namespace std;
void linear search (int a[], int n).
{
    int temp = -1;
for (int i=0; i<7; i++)
{
  if (a[i]==n)

{
cout<< " Element found at location; "<< i<<endl;
}
}

}
  int main ()
{ int arr[7] = {18, 30, 56, 61, 73, 87, 93};
cout << " Please enter an element to search "<<endl;
  int num;
   cin>> num;
   linear search (arr, num);
   return 0;
}
```