Section A: Aptitude

1) A man walks to a town at 4 kmph, rests there for 45 minutes and rides back at 7 kmph. Find the distance to the town, if the total time spent is 6 hrs 15 min.

2) Seven machines take 7 mins to make 7 identical toys. At the same rate, how many minutes would it take for 100 machines to make 100 toys?

3) Five friends, Betty, Rachel, Stevens, Veronica and Abigail, are sitting in a row facing east. Betty is sitting between Veronica and Stevens. Rachel is second to the left of Stevens. Who is sitting at the south end?

4) A basket contains 3 red 4 blue 5 green toys. If three toys are picked up at random, what is the probability that at least one is green?

5) Archie has 4 coins each of different denominations. What is the number of different sums of money he can form (using one or more coins at a time)?

6) For natural numbers x, y, and z, if $xy + yz = 19$ and $yz + xz = 51$, then the minimum possible value of xyz is

7) Two trucks start from the opposite places on the main road, 150 km apart. The first truck runs for 25 km and takes a right turn and then runs 15 km. It then turns left and then runs for another 25 km and then takes the direction to reach the main road. In the meantime, due to a minor breakdown the other truck has run only 35 km along the main road. What would be the distance between the two trucks at this point?

8) A batsman's average for 20 games is 25 runs. His highest score exceeds his lowest score by 64 runs. If these 2 games are excluded, the average of the remaining 18 games is 24 runs. The highest score of the player is

9) Sheldon is 24 years older than his son. In two years, his age will be twice the age of his son. The present age of the son is

10) Ross spends 75% of his income. His income increased by 20% and he increased his expenditure by 10%. Fine the percentage increase in his savings.

11) A train is moving at a speed of 132 km/hour. If the length of the train is 110 meters, how long (in seconds) will it take to cross a railway platform 165 meters long?

12) Find the odd one out: 385, 462, 572, 396, 427, 671, 264

13) A ferry takes 28 hours for travelling downstream from point A to point B and coming back to point C midway between A and B. If the velocity of the stream is 6km/hr and the speed of the ferry in still water is 9 km/hr, what is the distance between A and B?

14) What will be the next number in the series 4, 9, 18, 31, 48, 69, ...?

15)
I. Mark is older than Shepherd.
II. Shepherd is older than Pierce.
III. Pierce is older than Mark.

If the first two statements are true, is the third statement true or false?

Section B: Programming

1) Write the output of the below snippet:

```
int num = 10;
for (int counter = 0; counter < 5; counter++) {
        switch (counter) {
                case 0:
                        num += 3;
                        break;
                case 2:
                        num -= 5;
                case 4:
                        num *= 2;
                default:
                        num += 1;
                        break;
        }
        printf("%d ", num);
}
```

2) Write the output of the below program

```c
#include <stdio.h>
void main() {
  int p = 5, q = 8;
  int x = (p++) + (++q) + (p--) + (--q);
  int y = (q--) + (--p) + (++q) + (p++);
  printf("%d %d %d %d\n", x, p, y, q);
}
```

3) Write the output of the below program:

```c
#include <stdio.h>
int rec(int n) {
  if (n <= 1)
    return 1;
  return n * rec(n - 1);
}
int main() {
  int num = 5;
  int result = rec(num);
  printf("Result: %d\n", result);
  return 0;
}
```

4) What property of the input number does this function check?

```java
public boolean x(int number)
{
  return (number & 1) == 0;
}
```

5) If the result is 21, find z.

```c
#include <stdio.h>
int main() {
  int x = 5;
  int y = 3;
  int z= ?;
  z = x++ * (--y) + z;
  printf("Result: %d\n", z);
  return 0;
}
```

6) Write the output of the below program:

```c
#include <stdio.h>
void fun(int* arr, int n)
{
    int i;
    *arr += *(arr + n - 1);
    *(arr + n - 1) += *arr;
}
void printArr(int* arr, int n)
{
    int i;
    for(i = 0; i < n; ++i)
        printf("%d ", arr[i]);
}
int main()
{
    int arr[] = {10, 20, 30};
    int size = sizeof(arr) / sizeof(*arr);
    fun(arr, size);
    printArr(arr, size);
    return 0;
}
```

7) What should be the if condition to print "icecream"

```c
#include <stdio.h>
int main() {
    if(_____) {
        printf("%s","ice");
    } else {
        printf("%s","cream");
    }
}
```

8) Write the output of the below program

```c
#include <stdio.h>
int main() {
    int var1 = 5;
    int var2 = 6;
    if ((var2 - 1) == var1)
        printf("%d", var2);
        printf("%d", ++var2);
}
```

9) Write the output /error of the below program:

```java
class main {
        public static int i = 10;
    main () {
        int i = 50;
    }

        public static void main(String[] args) {
                change();
        new main();
                System.out.println(i);
        }
    static int change() {
        i = 20;
        return i;
    }
}
```

10) What does the below function do?

```c
#include<stdio.h>
int fun(int a, int b)
{
    if (b == 0)
        return 0;
    if (b % 2 == 0)
        return fun(a+a, b/2);
    return fun(a+a, b/2) + a;
}
```

Problem 1

Given an array, the distance between two array values is the number of indices between them. Find the minimum distance between any pair of **equal elements** in the array. If no such value exists, return -1.

Sample Input 1
6
7 1 3 4 1 7

Sample Output 1
3

Sample Input 2
5
1 2 3 4 10

Sample Output 2
-1

Problem 2

There is a large pile of socks that must be paired by color. Given an array of integers representing the color of each sock, determine how many pairs of socks with matching colors there are.

Sample Input
10 20 20 10 10 30 50 10 20

Sample Output
3

Problem 3

Given a rational number, print its corresponding equivalent mixed fraction representation.

Note: Safely assume that **float's precision** in C/C++ is enough to handle the given inputs.

Sample Input 1
2.5
Sample Output 1
2 1/2
Sample Input 2
6.25
Sample Output 2
6 1/4

Problem 4

There is a string S, of lowercase English letters, that is repeated infinitely many times. Given an integer N, find and print the number of letter a's in the first N letters of the infinite string.
Note: You should solve this without using any extra memory
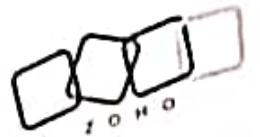
Sample Input 1
aba
10
Sample Output 1
7
Sample Input 2
abcac
10
Sample Output 2
4

Problem 5

Find if a string **A** can be formed by removing a few characters from the other given string **B**. If so String **A** becomes a sub-sequence of String **B**. **A** is said to be a sub-sequence of **B**, if **A** can be obtained by deleting some characters of **B** without changing the order of the remaining characters in **B**. Determine if **A** is a sub-sequence of **B**.

Sample Input 1:
Set   Sangeet

Sample Output 2:
YES

Sample Input 2:
Zoho   India

Sample Output 2:
NO

Sample Input 3:
Set   Step

Sample Output 3:
NO

Problem 6

There is an array of random integers. This array is passed to a class to which you have no access. The class has a method **ConstructBST** which takes the array as input and constructs a BST and stores it inside the class object.

Remember, you do not have access to the constructed tree as well. All you have is the array which was initially passed to the class.

Using this array, you have to print the **in-order traversal** of the constructed binary search tree.

<u>Note</u>: *Print the in-order traversal of the BST without constructing the BST*

Problem 7

You have three stacks of cylinders where each cylinder has the same diameter, but they may vary in height. You can change the height of a stack by removing and discarding its topmost cylinder any number of times.

Find the maximum possible height of the stacks, such that all of the stacks are the same height. This means you must remove zero or more cylinders from the top of zero or more of the three stacks until they are all the same height, then print the height. The removals must be performed in such a way as to maximize the height.

Note: An empty stack is still a stack.

Input Format
The first line contains three space-separated integers n1, n2, n3 describing the respective number of cylinders in stacks 1, 2, 3. The subsequent lines describe the respective heights of each cylinder in a stack from top to bottom:

The second line contains n1 space-separated integers describing the cylinder heights in the stack.

The third line contains n2 space-separated integers describing the cylinder heights in the stack.

The fourth line contains n3 space-separated integers describing the cylinder heights in the stack.

Sample Input 1:

5 3 4
3 2 1 1 1
4 3 2
1 1 4 1

Sample Output 1:

5