Objective:

- To get a grip on problem solving involving repetition structure.

Devise Solution of the following problems using Pseudo Code

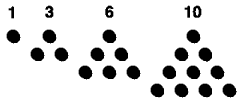
1. I hope you know, how to test/verify the code. In this question, you are required to verify the code given below by filling the table which shows the tracing of variable's values during the execution of the given code.

Assume user enter N = 8315

```
1- Declare N, x;
2- Input N;
3- x = N;
4- Declare a, b, r
5- a = 0
6- b = 0
7- r = 0
8- r = x % 2;
9- Repeat Until ( x != 0 )
      9.1- If ( x % 2 == 1 )
              9.1.1- a=a+1
           otherwise
              9.1.1- If ( b < a )
                        9.1.1.1- b = a;
              9.1.2- a=0;
      9.2- x = x/2;
10- if (b < a)
      10.1- Print a
    otherwise
      10.1- Print b
```

RAM															
N															
x															
a															
b															
r															
Console															

2. How many beans are needed to arrange them in a triangular pattern. For example, for triangle of size/height 4, 10 beans are needed as shown in figure. You are asked to write a pseudo code which takes as input the size of a triangle and output the number of beans needed to arrange given beans in triangular pattern.



3. A perfect number is a positive integer that is equal to the sum of its proper positive divisors, that is, the sum of its positive divisors excluding the number itself. For Example 6 is perfect number.
Your task is to write a pseudo code, which input a number from user and tells whether it's a perfect number or not.

4. Write a program which takes input a number and tells whether its palindrome or not. Note that the number could be of any digit length.

5. Write a program that prompts the user to input an integer and then outputs both the individual digits of the number and the sum of the digits. For example, it should output the individual digits of 3456 as 3 4 5 6, output the individual digits of 8030 as 8 0 3 0, output the individual digits of 2345526 as 2 3 4 5 5 2 6,output the individual digits of 4000 as 4 0 0 0, and output the individual digits of -2345 as 2 3 4 5.

6. Write a program, which takes input of a number, and then display the equivalent binary number of it. For Example: if entered number is 11 then the answer will be 1101.

7. Two integers 'a' and 'b' are said to be co-prime, relatively prime or mutually prime, if the only positive integer that evenly divides both of them is 1. Write a program which takes input from user for a and b and tells whether they are co-prime or not. For Example 14 and 15 are co-prime.

8. Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 1 and 2, the first 10 terms will be: 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, ...
By considering the terms in the Fibonacci sequence, find the sum of the first 'N' even-valued terms.

9. Write a program in which user keep entering the heights of people came for medical checkup. Program will stop taking input if user will enter -99. After this the program should display the smallest of all heights entered by the user, and the tallest of all heights entered by the user and also display the average height of the persons.

10. Write a program, which takes input of two integers. It then displays the least common multiple of the two entered integers.

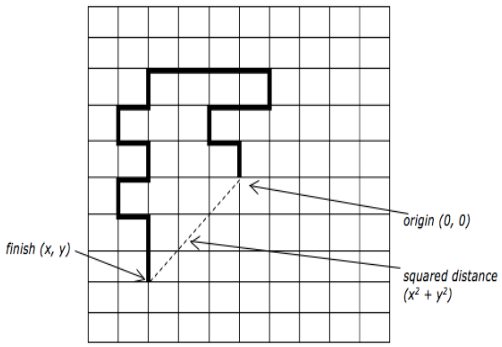
11. A drunkard begins walking aimlessly, starting at a lamp post. At each time step, the drunkard forgets where he or she is, and takes one step at random, either north, east, south, or west. How far will the drunkard be from the lamp post after *N* steps?

Write a pseudo code, which first asks the number of steps that drunkard man has taken. It then asks for the steps taken by the drunkard on the grid (Cartesian coordinate system).
It is assumed that the lamp post position is at origin (0, 0). After inputting/taking all the moves from the drunkard, your pseudo code should print the square of the final distance from the origin.
To further understand, you may look at the sample run and the grid image.

Sample Run 1	***Sample Run 2***
Enter number of Steps: 20 0 1 -1 1 -1 2 0 2 1 2 1 3 0 3 -1 3 -2 3 -3 3 -3 2	Enter number of Steps: 10 0 -1 0 0 0 1 0 2 -1 2 -2 2 -2 1 -1 1 -2 1 -3 1 Squared distance = 10

-4 2 -4 1 -3 1 -3 0 -4 0 -4 -1 -3 -1 -3 -2 -3 -3 Squared distance = 18	

Grid Image for Sample Run 1



Cartesian coordinate system