

AMS_JAVA_OOP
Loops
All Sections

Objectives:

Student should learn how to:

- 1- Follow the loop design strategy to develop loops.
- 2- Control a loop with a sentinel value.
- 3- Write loops using for statements
- 4- Write nested loops
- 5- Combine loops and control statements to solve problems with complex logic

Exercise 1

- 1) How many times is the `println` statement executed in the following code?

```
for (int i = 0; i < 10; i++)  
    for (int j = 0; j < i; j++)  
        System.out.println(i * j)
```

2) Show the output of the following programs?

```
public class Test {  
    public static void main(String[] args) {  
        for (int i = 1; i < 5; i++) {  
            int j = 0;  
            while (j < i) {  
                System.out.print(j + " ");  
                j++;  
            }  
        }  
    }  
}
```

(a)

```
public class Test {  
    public static void main(String[] args) {  
        int i = 0;  
        while (i < 5) {  
            for (int j = i; j > 1; j--)  
                System.out.print(j + " ");  
            System.out.println("*****");  
            i++;  
        }  
    }  
}
```

(b)

```

public class Test {
    public static void main(String[] args) {
        int i = 5;
        while (i >= 1) {
            int num = 1;
            for (int j = 1; j <= i; j++) {
                System.out.print(num + "xxx");
                num *= 2;
            }

            System.out.println();
            i--;
        }
    }
}

```

(c)

```

public class Test {
    public static void main(String[] args) {
        int i = 1;
        do {
            int num = 1;
            for (int j = 1; j <= i; j++) {
                System.out.print(num + "G");
                num += 2;
            }

            System.out.println();
            i++;
        } while (i <= 5);
    }
}

```

(d)

Solution

1)

45 times

2)

a)

```
0 0 1 0 1 2 0 1 2 3
```

b)

```
****  
****  
2 ****  
3 2 ****  
4 3 2 ****
```

c)

```
1xxx2xxx4xxx8xxx16xxx  
1xxx2xxx4xxx8xxx  
1xxx2xxx4xxx  
1xxx2xxx  
1xxx
```

d)

```
1G  
1G3G  
1G3G5G  
1G3G5G7G  
1G3G5G7G9G
```

Exercise 2

Write a program that reads a character then displays the following pattern using the input character (assuming input character is 'A' and height is 6):

```
      A
     A A
    A A A
   A A A A
  A A A A A
 A A A A A A
```

Height of pattern and character are input by user.

(Hint: assuming name of your **Scanner** object is **input**, use **input.next().charAt(0);** to read a character from user.)

Solution

```
import java.util.Scanner;
public class Triangle {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
        System.out.print("Enter character: ");
        char c = input.next().charAt(0);
        System.out.print("Enter height: ");
        int height = input.nextInt();
        for (int i = 1; i <= height; i++) {
            // Print leading space
            for (int j = height - i; j >= 1; j--)
                System.out.print(" ");

            for (int j = i; j >= 1; j--)
                System.out.print(c + " ");
            System.out.println();
        }
    }
}
```