

Hands-on Experiment # 3 : Worksheet

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No more than 3 students per one submission of this worksheet.

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This time, you are provided with a new "Java101.class" as well as its source code.

The file "Java101.class" provides a new method called *Java101.typeOf()* which can be used to determine the data type of its input value.

Part A: Indicate Resulting Data Types of Expressions with Multiple Data Types

1. Determine the data type as well as the value of each expression in the table below.
2. Write a Java program to verify that your answers (both the data types and the values) are correct.
3. Capture a screenshot showing the output of your program.

Expression	Data Type	Value
10.0/2.5	double	4.0
"1"+2+3	String	123
1+"2"+3	String	123
3/4*4	Int	0
3.0/4*4	Double	3.0
(int)1.5	Int	1
1+1.0F+1.0	Double	3.0
4-5==3-4	Boolean	true
(int)(4-5.5)==3-4	boolean	true

List the source code of you program below.

```
public class TypeCheck{

    public static void main(String[] args) {

        System.out.println(Java101.typeOf(10.0/2.5) + ":" + (10.0/2.5) );

        System.out.println(Java101.typeOf("1"+2+3) + ":" + ("1"+2+3) );

        System.out.println(Java101.typeOf(1+"2"+3) + ":" + (1+"2"+3) );

        System.out.println(Java101.typeOf(3/4*4) + ":" + (3/4*4) );

        System.out.println(Java101.typeOf(3.0/4*4) + ":" + (3.0/4*4) );

    }

}
```

```
        System.out.println(Java101.typeOf((int)1.5) + ":" + ((int)1.5) );

        System.out.println(Java101.typeOf(1+1.0F+1.0) + ":" + (1+1.0F+1.0) );

        System.out.println(Java101.typeOf(4-5==3-4) + ":" + (4-5==3-4) );

        System.out.println(Java101.typeOf((int)(4-5.5)==3-4) + ":" + ((int)(4-5.5)==3-4) );

    }

}
```

Insert the screenshot below.

```
C:\Java work\week3>java TypeCheck
double:4.0
String:123
String:123
int:0
double:3.0
int:1
double:3.0
boolean:true
boolean:true
```

Part B: Die Simulation

In this part, you will write a "Die Rolling Simulation" program.



A die has six faces (1-6). When rolled, the face that comes up could be either one of the six faces, each of which with an equal probability of 1/6.

An execution of the program simulates a roll of a die.

The file "Java101.class" also provides a method called *Java101.showDieFace()* which takes an `int` value as its input. When invoked, the method shows the face of a die associated with the input value.

1. Study the following two methods: *Math.random()* and *Math.floor()* from <http://docs.oracle.com/javase/7/docs/api/java/lang/Math.html>
2. Come up with a Java expression using *Math.random()*, *Math.floor()*, and an appropriate cast operator so that the expression produces a random `int` value in the range of 1 to 6, each of which with equal probability.
3. Write a Java program that performs the simulation of the die described. Name the program appropriately.
4. List the source code as well as screenshots of the program.

Show your Java expression in step 2 here.

```
int dice = (int)Math.floor(Math.random()*6);
```

Also, list the source code of the program you wrote below.

```
import java.lang.Math;

public class RollADie {

    public static void main(String[] args) {

        int[] num = new int[6];

        int dice;

        for(int i = 0 ; i < 30 ; i++){

            dice = (int)Math.floor(Math.random()*6);

            Java101.showDieFace(dice+1);

            num[dice] += 1;

        }

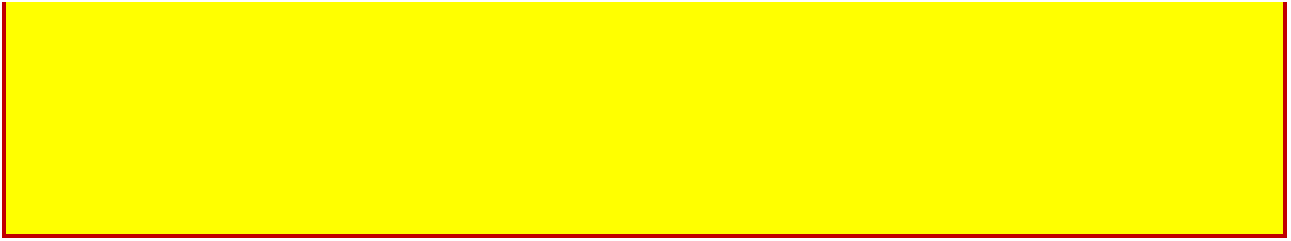
        for(int j = 0 ; j < 6 ; j++){

            System.out.println((j+1)+": " + num[j]);

        }

    }

}
```



Insert the screenshots below.

```
C:\WINDOWS\system32\cmd.exe
```

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```

```
1:6  
2:5  
3:3  
4:6  
5:5  
6:5
```

```
C:\Java work\week3>
```

Part C: Test the Die Simulation

1. Run the program you wrote in Part B 30 times. Note the result of each simulation in the table below.

Rolling #	Result	Rolling #	Result	Rolling #	Result
1	4	11	6	21	6
2	6	12	1	22	5
3	2	13	5	23	4
4	2	14	6	24	1
5	2	15	5	25	2
6	4	16	1	26	1
7	3	17	2	27	4
8	3	18	1	28	5
9	5	19	4	29	4
10	6	20	1	30	3

2. Use the table below to approximate the probability of the die showing each of the faces.

Face	Number of Times	Total Number of Trials	Probability of the Face (Number of Times the Results show the faces / Total Number of Trials)
1	6	30	20%
2	5	30	16.67%
3	3	30	10%
4	6	30	20%
5	5	30	16.67%
6	5	30	16.67%

Submit this worksheet (by only one member of the group) via <http://www.myCourseVille.com> (Assignments > Hands-on Experiment # 3) **within the day after your lecture.**