

Module no : 10

## Collections and important Modules

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### Math Module :-

The java ~~works~~ math module provides the users with various methods relative to maths.

Eg:-

Math.max();

Math.min();

Math.random();

Math. Comparison :-

Sample Code :-

```
class Main {  
    public static void main (String [] args) {  
        int a = Math.max (3, 5);  
        int b = Math.min (3, 5);  
        System.out.println (a); //5  
        System.out.println (b); //3  
    }  
}
```

## **Math Module:**

### Program:

```
package com.company;

class Main{
    public static void main(String[] args){
        double maxValue = Math.max(22.2, 22.1);
        double minVauue = Math.min(22.2,22.1);
        System.out.println("Max Value = "+maxValue);
        System.out.println("Min Value = "+minVauue);
    }
}
```

### Output:

```
"C:\Program Files\Java\jdk-21\bin\java.exe"
Max Value = 22.2
Min Value = 22.1
```

---

```
Process finished with exit code 0
```

## Math - Rounding Off :-

Sample program :-

```
class Main {
    public static void main (String [] args) {
        double x = Math.floor (3.2);
        double y = Math.ceil (3.2);
        double z = Math.round (3.2);
        double a = Math.round (3.8);
        System.out.println (x);
        System.out.println (y);
        System.out.println (z);
        System.out.println (a);
    }
}
```

## **Math Module:**

### Program:

```
package com.company;

class Main{
    public static void main(String[] args){
        double x = Math.floor(3.2);
        double y = Math.ceil(3.2);
        double z = Math.round(3.2);
        double a = Math.round(3.8);

        System.out.println("Math.floor = "+x);
        System.out.println("Math.ceil = "+y);
        System.out.println("Math.round (3.2) = "+z);
        System.out.println("Math.round (3.8) = "+a);
    }
}
```

### Output:

```
"C:\Program Files\Java\jdk-21\bin\java.exe"
Math.floor = 3.0
Math.ceil = 4.0
Math.round (3.2) = 3.0
Math.round (3.8) = 4.0
```

---

```
Process finished with exit code 0
```

## Math - Log & Exponents :-

### Sample program :-

```
class Main {  
    public static void main (String [] args) {  
        double E = Math.E ;  
        System.out.println (E); // 2.7182818284  
        double X = Math.log (E) ;  
        double Y = Math.log10(100) ;  
        System.out.println (X) ; // 1.0  
        System.out.println (Y) ; // 2.0  
        double a = Math.pow (2, 3) ;  
        System.out.println(a) ; // 8.0  
        double l = Math.sqrt (25) ;  
        System.out.println (l) ; // 5.0  
    }  
}
```

## Math Module:

### Program:

```
package com.company;

class Main{
    public static void main(String[] args) {
        double E = Math.E;
        System.out.println("Exponential = "+E);
        double x = Math.log(E);
        double y = Math.log10(100);
        System.out.println("Math.log(E) = "+ x);
        System.out.println("Math.log10(10) = "+y);
        double a = Math.pow(2,4);
        System.out.println("2 power 4 = "+a);
        double b = Math.sqrt(81);
        System.out.println("square root of 81 = "+b);
    }
}
```

### Output:

"C:\Program Files\Java\jdk-21\bin\java.exe"

Exponential = 2.718281828459045

Math.log(E) = 1.0

Math.log10(10) = 2.0

2 power 4 = 16.0

square root of 81 = 9.0

Process finished with exit code 0

---

## Math - Trigonometric Methods :-

### Sample Program :-

class Main {

```
public static void main(String [] args) {
    final double PI = Math.PI;
    System.out.println(PI);
    System.out.println(Math.sin(PI / 6));
    System.out.println(Math.sin(0));
    System.out.println(Math.cos(PI / 3));
    System.out.println(Math.cos(0));
}
```

}

3

## Math Module:

### Program:

```
package com.company;

class Main{
    public static void main(String[] args){
        final double PI = Math.PI;
        System.out.println("Math.PI = "+PI);
        System.out.println("Math.sin(PI/6) = "+Math.sin(PI/6));
        System.out.println("Math.sin(0) = "+Math.sin(0));
        System.out.println("Math.cos(PI/3) = "+Math.cos(PI/3));
        System.out.println("Math.cos(0) = "+Math.sin(0));
    }
}
```

### Output:

```
"C:\Program Files\Java\jdk-21\bin\java.exe"
Math.PI = 3.141592653589793
Math.sin(PI/6) = 0.4999999999999994
Math.sin(0) = 0.0
Math.cos(PI/3) = 0.5000000000000001
Math.cos(0) = 0.0
```

---

```
Process finished with exit code 0
```

## Big Integer = Introduction :-

The BigInteger class is used to store and work with large integer values.

## Sample program :-

```
class Main {  
    public static void main (String [] args) {  
        BigInteger a = new BigInteger ("200000000000000");  
        BigInteger b = new BigInteger ("300000000000000");  
        BigInteger c = a.add (b);  
        System.out.println (c); // 500000000000000  
    }  
}
```

## **Math Module:**

### **Program:**

```
package com.company;

import java.math.BigDecimal;
import java.math.BigInteger;

class Main{
    public static void main(String[] args){
        BigInteger a = new BigInteger("2000000000000000");
        BigInteger b = new BigInteger("3000000000000000");

        BigInteger c = a.add(b);

        System.out.println("a + b = "+c);
    }
}
```

### **Output:**

```
"C:\Program Files\Java\jdk-21\bin\java.exe"
a + b = 5000000000000000
```

---

```
Process finished with exit code 0
```

## Big Integer - Data Conversion :-

### Sample program:-

```
long x = 50;  
BigInteger b = new BigInteger(x + " ");  
System.out.println(b);  
BigInteger b2 = new BigInteger("9823");  
int y = b2.intValue();  
System.out.println(y);  
long z = b2.longValue();  
System.out.println(z);
```

## **BigInteger:**

### Program:

```
package com.company;

import java.math.BigDecimal;
import java.math.BigInteger;

class Main{
    public static void main(String[] args){
        long x = 50;
        BigInteger b = new BigInteger(x + "");
        System.out.println(b);
        BigInteger b2 = new BigInteger("9823");
        int y = b2.intValue();
        System.out.println(y);
        long z = b2.longValue();
        System.out.println(z);
    }
}
```

### Output:

```
"C:\Program Files\Java\jdk-21\bin\java.exe"
50
9823
9823
```

---

```
Process finished with exit code 0
```