Mathematical Functions

In this lesson, an explanation of the java.lang.Math class and the various methods we can find in it are provided.

We'll cover the following

Java math class

The **Java** Math class is from the **java.lang** package. It is easy to use, and since it is a part of the java.lang package and everything from the java.lang package is automatically imported and available, so it does not need to be explicitly imported.

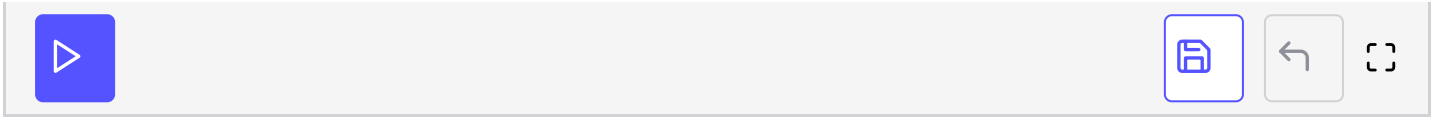
Now, let's look at the different functions it has to offer!

Exponentiation

1. The **pow** method takes two arguments and returns the value of the first argument raised to the power of the second one. `double Math.pow(2,3) returns 8`
2. The **exp** method takes one argument and returns the value of *e* raised to the power of the given argument. `double Math.exp(2) returns e^2`
3. The Math class also has a **sqrt** and **cbrt** methods, which returns the square root and cube root of the number specified. `double Math.sqrt(16) returns 4` and `double Math.cbrt(27) returns 3`.

```
public class exponent {
    public static void main(String[] args) {
```

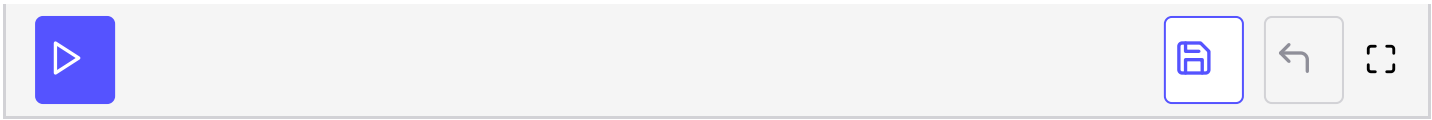
```
    public static void main(String[] args) {
        System.out.println("2 raised to the power 3 is " + Math.pow(2, 3));
        System.out.println("Exponent squared is " + Math.exp(2));
        System.out.println("The square root of 16 is " + Math.sqrt(16));
        System.out.println("The cube root of 27 is " + Math.cbrt(27));
    }
}
```



Logarithms

1. The **log** method takes one argument and returns the natural log of the given argument. `double Math.log(2) returns 0.69`
2. The **log10** method is a useful method that takes in one argument and returns the value of the *common log* of that argument. `double Math.log10(100) returns 2`

```
public class logs {
    public static void main(String[] args) {
        System.out.println("log of 2 is " + Math.log(2));
        System.out.println("log to the base 10 of 100 is " + Math.log10(100));
    }
}
```

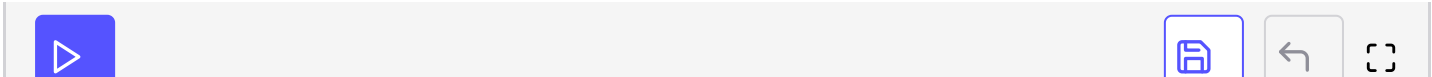


Trigonometry

To perform *trigonometric* operations, Java provides us the following methods: **sin**, **cos**, and **tan**. Each of the *three* takes only *one argument*, of the data type *double*, on which these operations need to be applied.

> **Note:** Trigonometric methods in `java.lang.Math` takes an angle in *RADIANS*.

```
public class trig {
    public static void main(String[] args) {
        System.out.println("tan(45) =" + Math.tan(Math.toRadians(45)));
        System.out.println("sin(45) =" + Math.sin(Math.toRadians(45)));
        System.out.println("cos(45) =" + Math.cos(Math.toRadians(45)));
    }
}
```



Hide Hint

The method Math.toRadians() converts a degree number to a radian number and Math.toDegrees() does vice versa.

Absolute value

The **abs** method is used to return the absolute, i.e., the positive value of the given parameter. This method is compatible with the following types: `int`, `long`, `float`, and `double`.

```
public class absolute {
    public static void main(String[] args) {
        System.out.println("Absolute value of -2: " + Math.abs(-2));
        System.out.println("Absolute value of 2: " + Math.abs(2));
    }
}
```

Maximum and minimum values

The **max** and **min** methods return the maximum and minimum of the two arguments given to the functions, respectively. This method is compatible with the following data types: `int`, `long`, `float`, and `double`.

```
public class max_min {
    public static void main(String[] args) {
        System.out.println("Maximum between 2.04 and 2.05: " + Math.max(2.04, 2.05));
        System.out.println("Minimum between 2 and 23: " + Math.min(2, 23));
    }
}
```

Let’s move on to the key concepts of logical expressions in the next lesson.