

Java Basics: Writing a Program

**CPSC 219: Introduction to Computer Science for Multidisciplinary
Studies II
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Comments

Comments

- Intended only for the human reader → Completely ignored by the interpreter

// single line comment – used to explain line(s) of code

/* multi line comment

used for complex explanations of code */

/**

javadoc comments that create API, used for classes/functions

What you see in online Javadoc API

Example <https://docs.oracle.com/en/java/javase/20/docs/api/java.base/java/util/Scanner.html>

*/

Basic Program

Java – Boilerplate Main.java Syntax (for now)

```
//We always make a class in Java  
public class Main{
```

```
    //We always have to make a main in Java! (python treated our whole file as a main)  
    public static void main(String[] args){
```

```
    }
```

```
}
```

Python (right)

```
//We always make a class in Java  
public class Main{
```

```
//We always have to make a main in Java! (python treated our whole file as a main)  
public static void main(String[] args){
```

```
#Calculating Fahrenheit to Celsius
```

```
OFFSET = 32
```

```
RATIO_CHANGE = 5/9
```

```
#Obtaining Fahrenheit degree
```

```
sFahrenheit = input("Please enter the degree in Fahrenheit")
```

```
#Converting the input to float
```

```
iFahrenheit = float(sFahrenheit)
```

```
#Calculating the Celsius
```

```
fCelsius = (iFahrenheit - OFFSET) * RATIO_CHANGE
```

```
#Printing the result
```

```
print ("The degree in Celsius is: ", fCelsius)
```

Java (left) Python (right)

```
//Import the Scanner class for input
import java.util.Scanner;

//We always make a class in Java
public class Main{

    //We indicate constants with final (and explicit types!)
    static final int OFFSET = 32;
    static final double RATIO_CHANGE = 5.0/9.0;

    //We always have to make a main in Java! (python treated out whole file as a main)
    public static void main(String[] args){

        //Get input from user with Scanner
        Scanner scanner = new Scanner(System.in);

        //Get an input line (then we parse it)
        System.out.println("Please enter the degree in Fahrenheit: ");
        String sFahrenheit = scanner.nextLine();
        int iFahrenheit = Integer.parseInt(sFahrenheit);
        // OR iFahrenheit = scanner.nextInt();

        //Do our math to calculate change
        double dCelsius = (iFahrenheit - OFFSET) * RATIO_CHANGE;

        //Print the output
        System.out.println("The degree in Celsius is: " + dCelsius);
    }
}
```

```
#Calculating Fahrenheit to Celsius
OFFSET = 32
RATIO_CHANGE = 5/9
```

```
#Obtaining Fahrenheit degree
sFahrenheit = input("Please enter the degree in Fahrenheit: ")
```

```
#Converting the input to float
iFahrenheit = float(sFahrenheit)
```

```
#Calculating the Celsius
fCelsius = (iFahrenheit - OFFSET) * RATIO_CHANGE
```

```
#Printing the result
print ("The degree in Celsius is: ", fCelsius)
```

Java (left) Python (right)

```
//Import Scanner for input
import java.util.Scanner;

//ABRA
public class Main{

    //GLOBAL CONSTANTS
    static final Integer OFFSET = 32;
    static final Double RATIO_CHANGE = 5.0/9.0; //float division

    //KADABRA
    public static void main(String[] args){

        //Create Scanner
        Scanner scanner = new Scanner(System.in);

        //Message
        System.out.print("Enter temperature (F): ");

        //Get String input and change type
        String sFahr = scanner.nextLine();
        Double dFahr = Double.parseDouble(sFahr);
        // Double dFahr = scanner.nextDouble(); //Also

        //Calc result
        Double celcius = (dFahr - OFFSET) * RATIO_CHANGE;

        //Output
        System.out.println("The degree in Celcius is: "+celcius);
    }
}
```

```
#Calculating Fahrenheit to Celsius
OFFSET = 32
RATIO_CHANGE = 5/9

#Obtaining Fahrenheit degree
sFahrenheit = input("Please enter the degree in Fahrenheit: ")

#Converting the input to float
iFahrenheit = float(sFahrenheit)

#Calculating the Celsius
fCelsius = (iFahrenheit - OFFSET) * RATIO_CHANGE

#Printing the result
print ("The degree in Celsius is: ", fCelsius)
```


Importing

Import

- **import <Module Name>.<Sub Module Name>.*;**
- **import <Module Name>.<Sub Module Name>.<Class Name>;**
- Example:
 - import java.util.*;**
 - import java.util.Scanner;**
 - import java.lang.Math;**

java.lang.Math

- Many additional math functions are available
- <https://docs.oracle.com/en/java/javase/20/docs/api/java.base/java/lang/Math.html>
- Located in the math library (by default imported, like all java.lang.*)

```
import java.lang.Math;
```

Some things are the same in math library

Like Math.cos(), Math.sin(), Math.floor()

Some like Math.pow(num, pow), Math.min(var1, var2), Math.max(var1, var2) you are used to finding as base functions in python but they are in java.util.Math in Java

Writing A Program

Area of a circle (Python)

```
# import math library
import math

# get radius from the user
sRadius = input("Enter the radius of your circle (float):")

# change type of radius from string to float
fRadius = float(sRadius)

# do the calculation area = pi * r ^ 2
fArea = math.pi * fRadius ** 2

# output print
print("The area of the circle is", fArea)
```

Area of a circle (Java)

```
# import math library
import math

# get radius from the user
sRadius = input("Enter the radius of your circle")

# change type of radius from string to float
fRadius = float(sRadius)

# do the calculation area = pi * r ^ 2
fArea = math.pi * fRadius ** 2

# output print
print("The area of the circle is", fArea)
```

Area of a circle (Java)

We need

1. An outer class
2. Import outside the class
3. Possible constants?
4. Inner main function

In main(String[] args)

1. Get input
2. Do math
3. Do output

```
# import math library
import math

# get radius from the user
sRadius = input("Enter the radius of your circle")

# change type of radius from string to float
fRadius = float(sRadius)

# do the calculation area = pi * r ^ 2
fArea = math.pi * fRadius ** 2

# output print
print("The area of the circle is", fArea)
```

Area of a circle (Java)

We need

1. An outer class
2. Import outside the class (Scanner/Math)
3. Possibly constants?
4. Inner main function

In main(String[] args)

1. Get input using Scanner
2. Do math using Math.PI/Math.pow
3. Print output

```
# import math library
import math

# get radius from the user
sRadius = input("Enter the radius of your circle")

# change type of radius from string to float
fRadius = float(sRadius)

# do the calculation area = pi * r ^ 2
fArea = math.pi * fRadius ** 2

# output print
print("The area of the circle is", fArea)
```


Area of a circle (Java)

```
import java.util.Scanner;
import java.lang.Math;

public class Area {

    /**
     * This is a function javadoc comment
     *
     * @param args The command line arguments
     */
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.println("Enter the radius of your circle (float):");
        double dRadius = scanner.nextDouble();
        double dArea = Math.PI * Math.pow(dRadius, 2);
        System.out.println("The area of the circle is " + dArea);
    }
}
```

```
# import math library
import math

# get radius from the user
sRadius = input("Enter the radius of your circle")

# change type of radius from string to float
fRadius = float(sRadius)

# do the calculation area = pi * r ^ 2
fArea = math.pi * fRadius ** 2

# output print
print("The area of the circle is", fArea)
```

Formatting

Formatting

Basic Java format method can be used to format floats

Parts

A string

Format **float/double** to **2** decimals

Format function for strings

The value(s) to format

"pi is %.2f"

%.2f

String.format(string, var1, var2,...)

Math.pi

Example:

```
import java.lang.Math;
```

```
System.out.println(String.format("pi is %.2f when rounded to 2 decimal places" , Math.PI))
```

```
System.out.println(String.format("%s : %.10f" , "PI variable", Math.PI))
```

```
//Same but one command (have to add own new line)
```

```
System.out.printf("%s : %.10f %n" , "PI variable", Math.PI )
```

Formatting

types

f – float/double

s – string

d – integer

[width].[precision][type]

width – total characters in final result (“” is default) (add 0 in front to pad 0’s)

precision – how many decimal points

Ex. 05.3f

float, pad with 0s if shorter than 5 to get width of 5, but only after showing precision of 3

Onward to ... conditionals, repetition, and functions.

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