**Unit 1: Java Basics**

**Lab Exercises**

Create a folder called unit1 labs on your OneDrive in folder Structures and Algorithms\Code to hold your lab solutions.

1. Create a program in a class called DateOfBirthTest that uses a suitable method of the Input class to input a day, a month and a year that represent a date of birth and then outputs this information.

A typical run of the program is (inputs are highlighted in bold):

the day you were born: **10**

the month you were born: **5**

the year you were born: **1980**

your date of birth is: 10/5/1980

2. Write a program in a class called ArithmeticTest that uses a suitable method of the Input class to get 2 whole number values and then outputs the results of adding, subtracting, multiplying and dividing these values (both whole number division (to include remainder) and floating point division). For the purposes of this exercise, embed the actual calculation within the println statement e.g.

System.out.println("multiplication: "+firstNumber\*secondNumber);

A typical run of the program is (inputs are highlighted in bold):

first number: **13**

second number: **4**

addition: 17

subtraction: 9

multiplication 52

whole number division: 3 remainder 1

floating point division: 3.25

3. Create a program in a class called RadiusTest that uses a suitable method of the Input class to get a real number radius value. Write expressions to calculate and then output (as real numbers):

* the circumference of the corresponding circle (2πr)
* the area of the corresponding circle (πr2)

4

3

* the volume of the corresponding sphere ( πr3)

Use 3.142 as the value for π.

A typical run of the program is (input is highlighted in bold):

radius: **3.5**

circumference: 21.994

area: 38.4895

volume: 179.61766666666665

4. Write a program that converts from whole number values for feet and inches to whole number values for meters and centimeters rounding up the centimeters value as appropriate

Typical runs of the program (inputs are highlighted in bold):

feet: **5**

inches: **11**

1m 80cm

feet: **6**

inches: **0**

1m 83cm

There are 2.54 centimeters in an inch.

Hint: to round a floating point value to the nearest whole number:

* add 0.5 to the floating point value
* convert the result to a whole number

5. Write a program that helps the user count their change. The program should ask how many of each denomination of coin the user has: 50 pence, 20 pence, 10 pence, 5 pence, 2 pence and 1 pence coins. The program should tell the user how much money they have in change, expressed in pounds and pence. Create the program in a class called ChangeCounterTest.

A typical run of the program is (inputs are highlighted in bold):

number of 50p coins: **1**

number of 20p coins: **2**

number of 10p coins: **3**

number of 5p coins: **4**

number of 2p coins: **5**

number of 1p coins: **6**

pounds: 1 pence: 56