



## Lab 1 – Variables

### Java Variables Exercise 1

**Goal:** Create a simple program in Java using TextPad that contains an int variable. Ensure it compiles and runs successfully.

1. Launch TextPad and enter the code shown below, ensuring that the java file is named correctly:

```
1  // Enter you name and student ID in a comment at the top of your code
2
3  public class JavaVariables1
4  {
5      public static void main(String[] args)
6      {
7          //Declare and assign variables
8          int myInt;
9          myInt = 200;
10
11          //Output to console
12          System.out.println(myInt);
13
14      }
15  }
```

Add a second integer variable called myInt2 in the appropriate location. Assign the value 99 to this variable. Add an additional separate line of code that outputs the value of the new variable. Your program should produce a result similar to as shown below:

A screenshot of a Windows command prompt window. The title bar shows the path "C:\Windows\system32\cmd.exe". The window has a black background with white text. The first two lines of output are "200" and "99". The third line is "Press any key to continue . . .".

```
C:\Windows\system32\cmd.exe
200
99
Press any key to continue . . .
```

## Java Variables Exercise 2

**Goal: Create a simple program in Java that contains two double variables. Ensure it compiles and runs successfully.**

Create a new file called JavaVariables2 for this exercise. Following the guide below, create a program that has the following specification:

- Declare a variable named *num1* of the data type **double** that is assigned the value 20
- Declare a variable named *num2* of the data type **double** that is assigned the value 55.6
- Finally, print all variables in the console. Your output should be as shown below:

A screenshot of a Windows command prompt window. The title bar shows "C:\Windows\system32\cmd.exe". The command prompt displays the output of a Java program: "20.0", "55.6", and "Press any key to continue . . .".

*Note that even though the value 20 was assigned to the variable num1, it is displayed as 20.0 because it is a double.*

2. Use the **addition** operator on both variables

Amend your code so that a third line of output shows the addition of the two variables, eg:

```
System.out.println(num1 + num2);
```

Your output should now be similar to as shown here:

A screenshot of a Windows command prompt window. The title bar shows "C:\Windows\system32\cmd.exe". The command prompt displays the output of a Java program: "20.0", "55.6", "75.6", and "Press any key to continue . . .".

3. Use the subtract operator on both variables

Amend your code so that a fourth line of output shows the results of the subtraction of num1 and num2.

```
System.out.println(num1 - num2);
```

A screenshot of a Windows command prompt window. The title bar shows "C:\Windows\system32\cmd.exe". The command prompt displays the output of a Java program: "20.0", "55.6", "75.6", "-35.6", and "Press any key to continue . . .".

## Java Variables Exercise 3

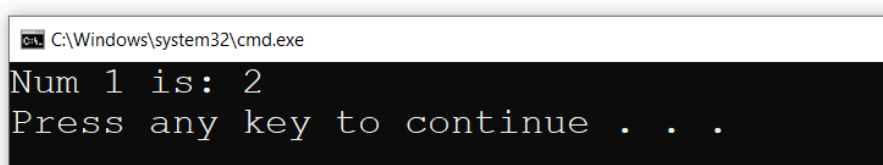
**Goal: Create a simple program in Java that contains an int variable and uses *concatenation* in the output.**

1. Create a new file called JavaVariables3 for this exercise.

Following the guide below, create a program that has the following specification:

- Declare a variable named *num1* of the data type **byte** that is assigned the value 2
- Concatenate the text "Num 1 is:" to the output

```
1 // Enter your name and student ID in a comment at the top of your code
2
3 public class JavaVariables3
4 {
5     public static void main(String[] args)
6     {
7         byte num1 = 2;
8
9         System.out.println("Num 1 is " + num1);
10
11     }
12 }
```

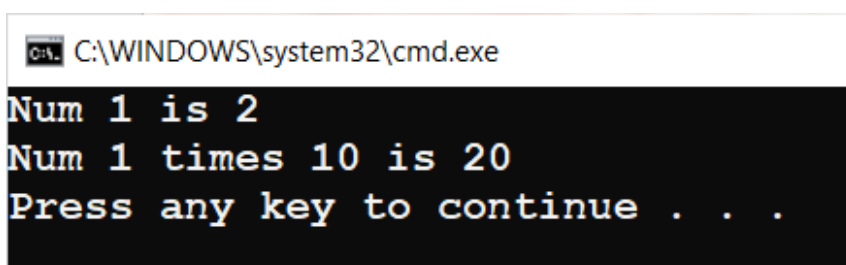


C:\Windows\system32\cmd.exe

Num 1 is: 2

Press any key to continue . . .

Amend your code so that the following output is created (using the multiplication operator \*):



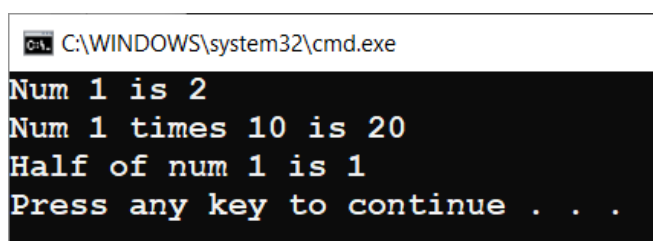
C:\WINDOWS\system32\cmd.exe

Num 1 is 2

Num 1 times 10 is 20

Press any key to continue . . .

Amend your code so that the following output is created (using the multiplication and division operators):



C:\WINDOWS\system32\cmd.exe

Num 1 is 2

Num 1 times 10 is 20

Half of num 1 is 1

Press any key to continue . . .

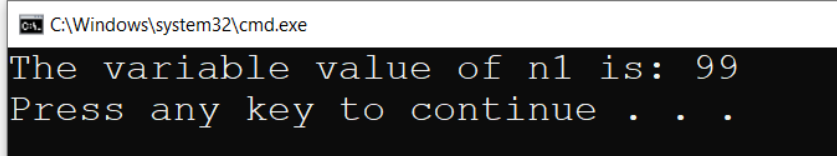
## Java Variables Exercise 4

**Goal:** Create a simple program in Java that contains a string variable and an int, using concatenation in the output.

1. Create a new file called JavaVariables4 for this exercise.

Following the guide below, create a program that has the following specification:

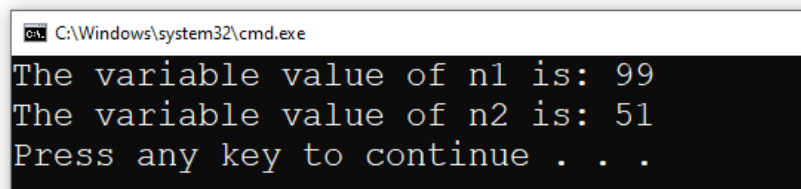
- Declare a variable named *n1* of the data type **int** that is assigned the value 99  
Write a program that produces the following output:



```
C:\Windows\system32\cmd.exe
The variable value of n1 is: 99
Press any key to continue . . .
```

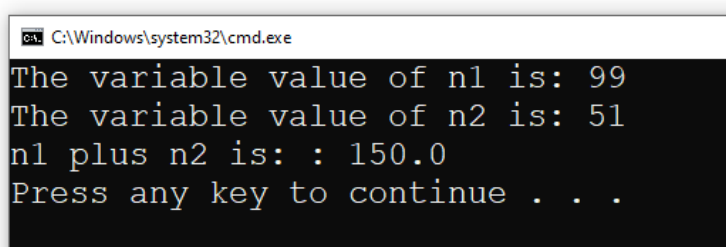
Amend your code to include a second int variable called *n2*, that is assigned the value 51.

The output should now look similar to as shown below:



```
C:\Windows\system32\cmd.exe
The variable value of n1 is: 99
The variable value of n2 is: 51
Press any key to continue . . .
```

Amend your code to include a new variable called *resultAdd* (you choose the data type) that will contain the addition of *n1* and *n2*. Output a new message as shown:

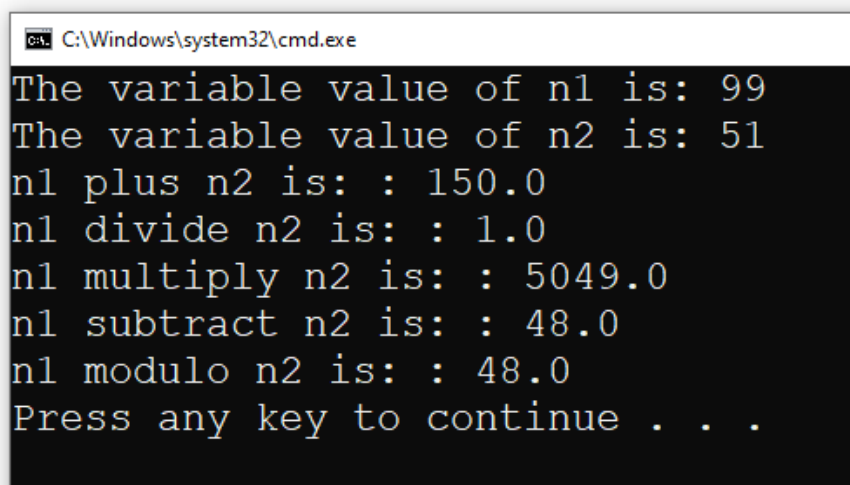


```
C:\Windows\system32\cmd.exe
The variable value of n1 is: 99
The variable value of n2 is: 51
n1 plus n2 is: : 150.0
Press any key to continue . . .
```

Add additional variables to your program so that the program displays subtraction, multiplication, division and remainder, eg:

```
double add = n1 + n2;  
System.out.println("n1 plus n2 is: " + add);  
  
double divide = n1 / n2;  
System.out.println("n1 divide n2 is: " + divide);
```

Your output should be similar to as shown below:

A screenshot of a Windows command prompt window. The title bar shows the path 'C:\Windows\system32\cmd.exe'. The window has a black background with white text. The output of the program is displayed as follows:

```
The variable value of n1 is: 99  
The variable value of n2 is: 51  
n1 plus n2 is: : 150.0  
n1 divide n2 is: : 1.0  
n1 multiply n2 is: : 5049.0  
n1 subtract n2 is: : 48.0  
n1 modulo n2 is: : 48.0  
Press any key to continue . . .
```

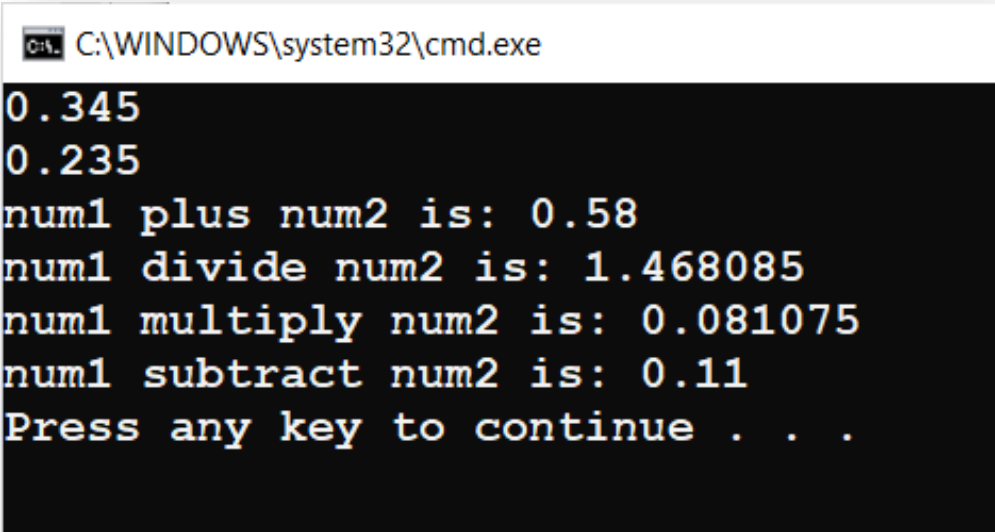
## Java Variables Exercise 5

**Goal:** Create a simple program in Java that contains float variables.

1. Create a new file called JavaVariables5 for this exercise.

Following the guide below, create a program that has the following specification:

- Declare a variable named *number1* of the data type **float** that is assigned the value 0.345f (don't forget to include the f at the end of the number).
- Declare a variable named *number2* of the data type **float** that is assigned the value 0.235f. Using the 2 variables shown above, write a program that produces the following output:

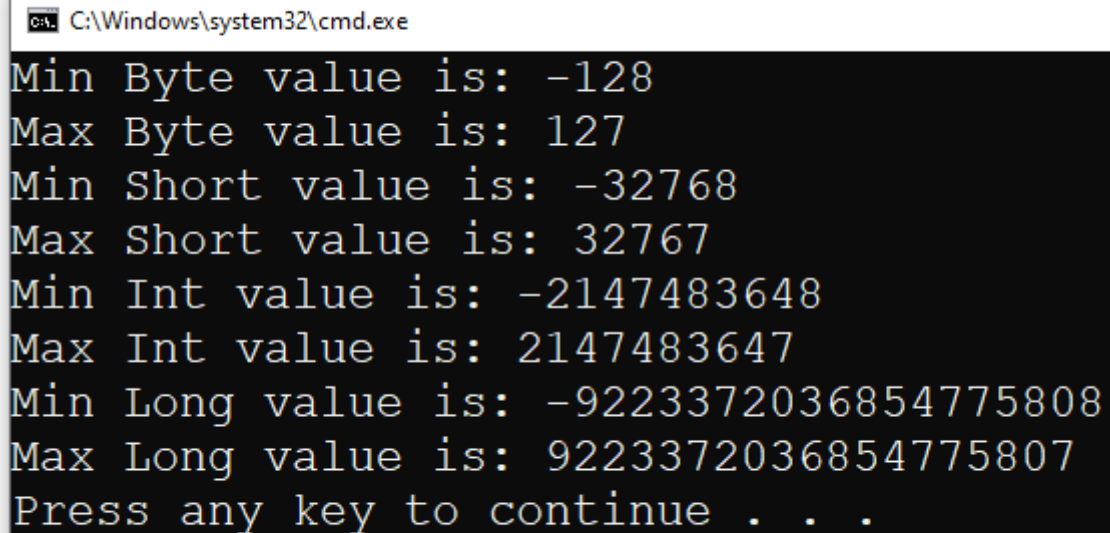


```
C:\WINDOWS\system32\cmd.exe
0.345
0.235
num1 plus num2 is: 0.58
num1 divide num2 is: 1.468085
num1 multiply num2 is: 0.081075
Press any key to continue . . .
```

## Java Variables Exercise 6

Create a program that displays the minimum and maximum values for all primitive data types.

Your output should look similar to as shown here:



```
C:\Windows\system32\cmd.exe
Min Byte value is: -128
Max Byte value is: 127
Min Short value is: -32768
Max Short value is: 32767
Min Int value is: -2147483648
Max Int value is: 2147483647
Min Long value is: -9223372036854775808
Max Long value is: 9223372036854775807
Press any key to continue . . .
```

Use appropriate variables to store the min and max values. Expand your program to include all Java Primitive data types (double, float) and provide a sample output for and char and Boolean.

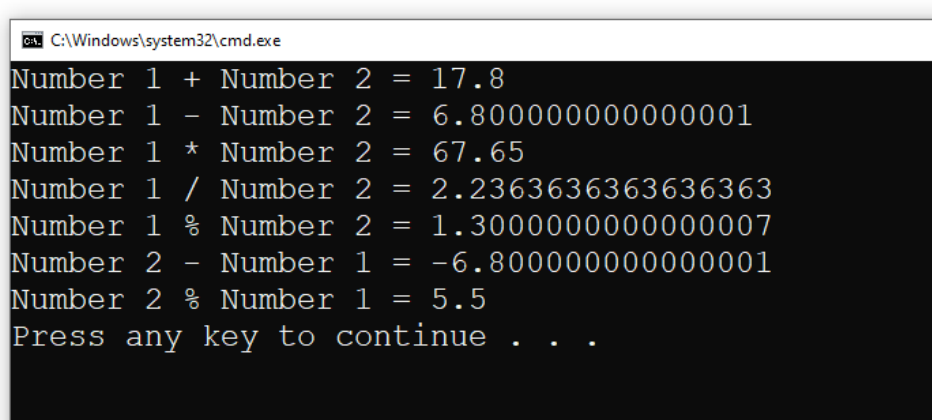
## Java Variables Exercise 7

**Goal: Create a program in Java using TextPad that contains two double variables. Ensure it compiles and runs successfully.**

1. Create a new file called JavaVariables7 for this exercise.

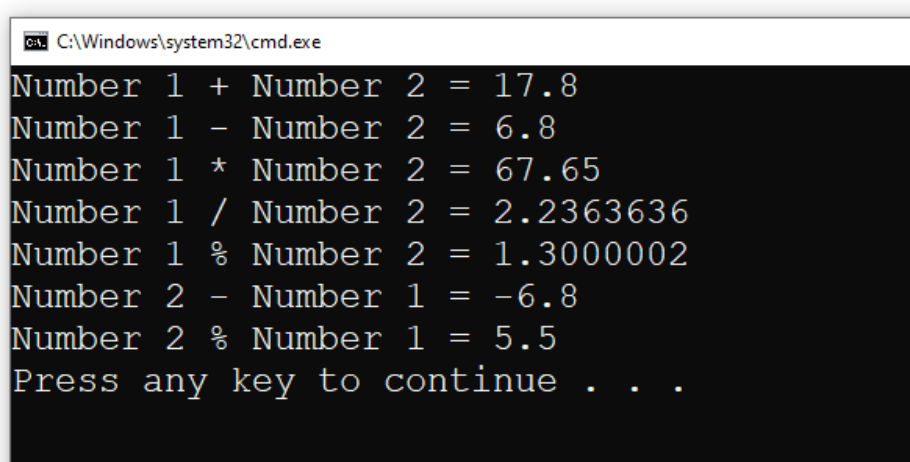
Following the guide below, create a program that has the following specification:

- Write Java statements that declare the following variables: *number1* and *number2* of type double.
- Assign the values 12.3 to the number1 variable and 5.5 to the number2 variable
- Write Java statements output a variety of calculations as shown in the output below.



```
C:\Windows\system32\cmd.exe
Number 1 + Number 2 = 17.8
Number 1 - Number 2 = 6.8000000000000001
Number 1 * Number 2 = 67.65
Number 1 / Number 2 = 2.2363636363636363
Number 1 % Number 2 = 1.3000000000000007
Number 2 - Number 1 = -6.8000000000000001
Number 2 % Number 1 = 5.5
Press any key to continue . . .
```

Change the type of the variables from double to float, and recompile your code. Your result should be similar to as shown below:



```
C:\Windows\system32\cmd.exe
Number 1 + Number 2 = 17.8
Number 1 - Number 2 = 6.8
Number 1 * Number 2 = 67.65
Number 1 / Number 2 = 2.2363636
Number 1 % Number 2 = 1.3000002
Number 2 - Number 1 = -6.8
Number 2 % Number 1 = 5.5
Press any key to continue . . .
```



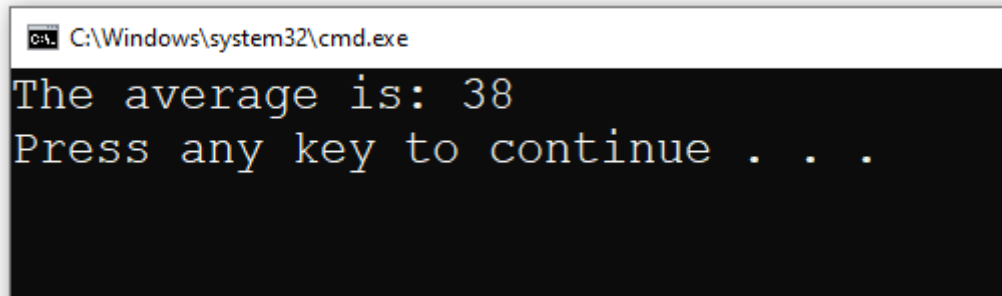
## Java Variables Exercise 8

**Goal:** Create a simple program in Java that contains three int variables. Ensure it compiles and runs successfully. Your program should assign values to each int variable. It should output the average value of the 3 numbers.

1. Create a new file called JavaVariables8 for this exercise.

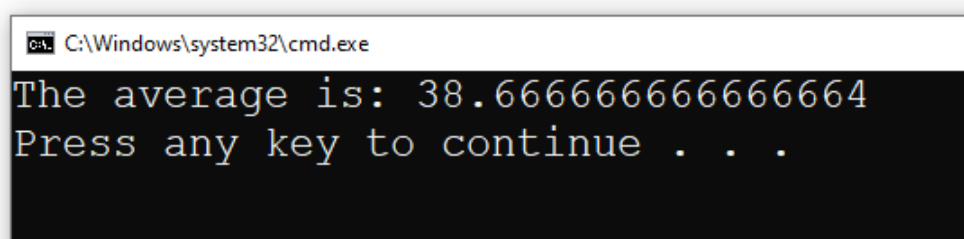
Following the guide below, create a program that has the following specification:

- Write Java statements that declare the following variables: *num1*, *num2*, and *num3*, and *average* of type int.
- Write Java statements that store 22 into *num1*, 32 into *num2*, and 65 into *num3*.
- Write a Java statement that stores the average of *num1*, *num2*, and *num3* into the *average* variable.
- Output a message to the console stating the average.
- Compile and run your program. Your output should be similar to as shown below:



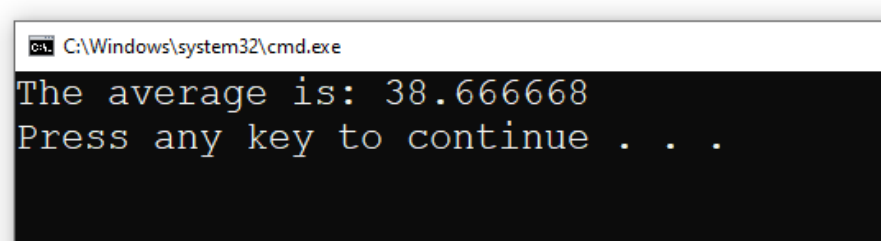
```
C:\Windows\system32\cmd.exe
The average is: 38
Press any key to continue . . .
```

2. Amend your program (by changing the *average* variable to a **double**) so that the output has greater precision when calculating the average of the three numbers, and so that your output is similar to as shown below:



```
C:\Windows\system32\cmd.exe
The average is: 38.666666666666664
Press any key to continue . . .
```

3. Amend your program (by changing the *average* variable to a **float**), and ensure that your output is similar to as shown below:



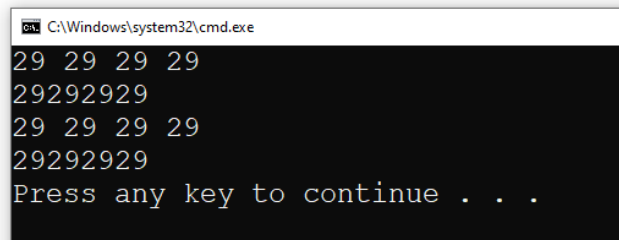
```
C:\Windows\system32\cmd.exe
The average is: 38.666668
Press any key to continue . . .
```

## Java Variables Exercise 9

1. Create a new file called JavaVariables9 for this exercise.

Following the guide below, create a program that has the following specification:

- Declare a variable named *num1* of the data type **byte** that is assigned the value 29
- Write the code so that the console displays the num1 variable four times in a row (separated by blank spaces), and then four times in the next row, with no separation. This should be repeated so that your result should look similar to as shown:



```
C:\Windows\system32\cmd.exe
29 29 29 29
29292929
29 29 29 29
29292929
Press any key to continue . . .
```

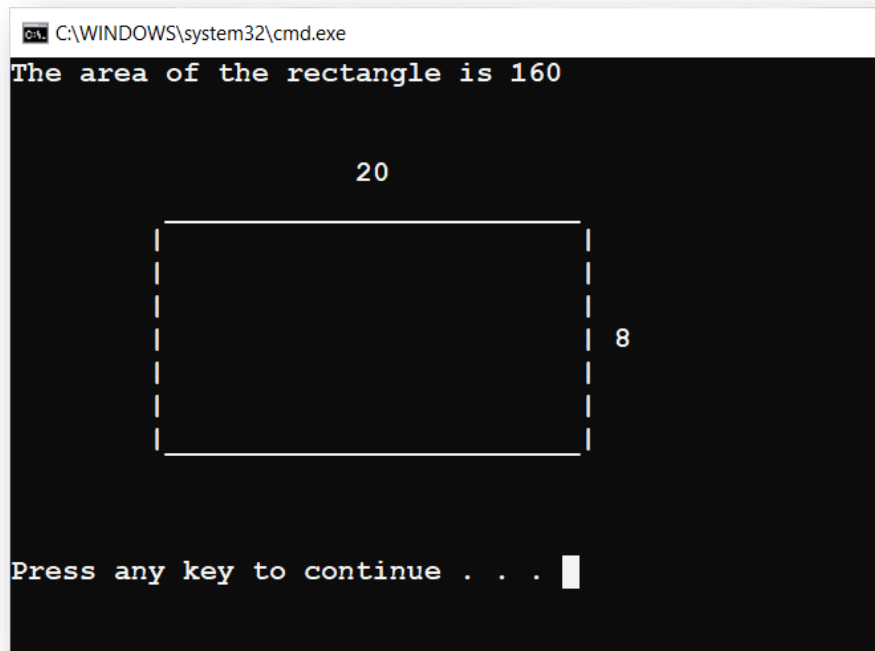
## Java Variables Exercise 10

**Goal:** Create a program in Java that calculates the area of a rectangle and displays a basic representation of the shape.

1. Create a new file called JavaVariables10 for this exercise.

Following the guide below, create a program that has the following specification:

- Declare a variable named *length* of the data type *int* that is assigned the value 20
- Declare a variable named *width* of the data type *int* that is assigned the value 8
- Declare a variable named *area* of the data type *int* that is assigned the value of the length multiplied by the width.
- Write a program that produces the following output:



```
C:\WINDOWS\system32\cmd.exe
The area of the rectangle is 160

      20
  +-----+
  |                     |
  |                     |
  |                     |
  |                     |
  |                     |
  |                     |
  |                     |
  |                     |
  +-----+
      8

Press any key to continue . . .
```

Amend the values of the length and width variables to 345 and 57 accordingly. Ensure your output looks similar to as shown below:

C:\WINDOWS\system32\cmd.exe

The area of the rectangle is 19665

345



57

Press any key to continue . . .

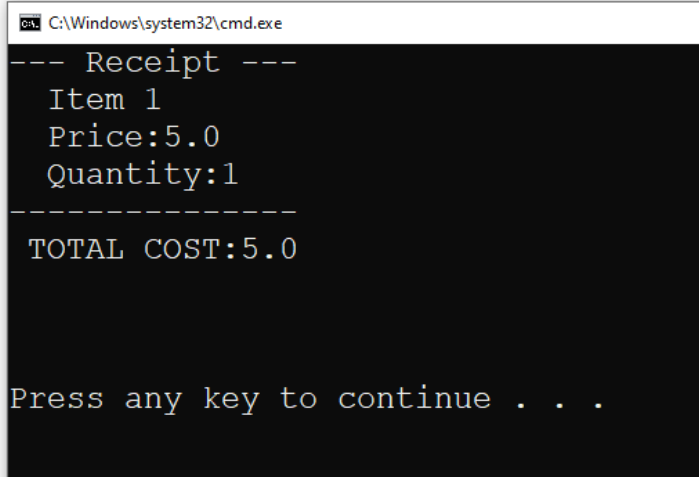
## Java Variables Exercise 11

**Goal:** Create a program in Java that outputs information to the console. This program will generate a receipt based on the quantity and price for an item, and show the total cost.

1. Create a new file called `JavaVariables11` for this exercise.

Following the guide below, create a program that has the following specification:

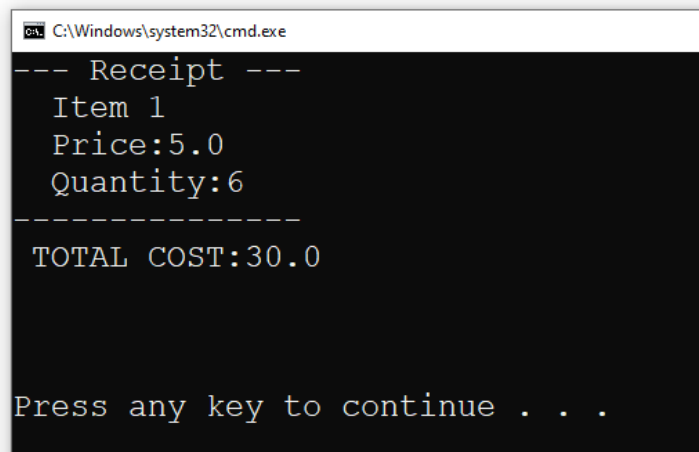
- Declare a variable named *quantityItem1* of the data type **int** that is assigned the value 1  
*This variable will store the quantity that is being bought by a customer.*
- Declare a variable named *priceItem1* of the data type **double** that is assigned the value 5.00
- Declare a variable named *totalCost* of the data type **double** that will calculate the total cost –the price multiplied by the quantity.
- Compile and run your program, your output should be similar to as shown below:



```
C:\Windows\system32\cmd.exe
--- Receipt ---
Item 1
Price:5.0
Quantity:1
-----
TOTAL COST:5.0

Press any key to continue . . .
```

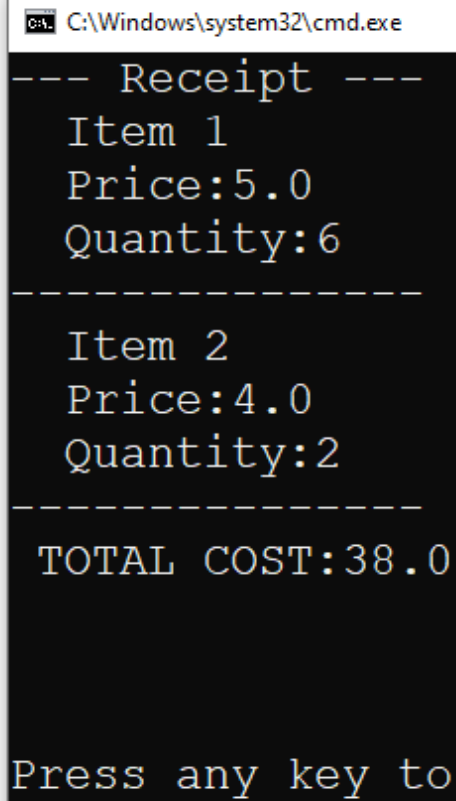
Amend your program so that the value for quantity is 6. Re-compile and run your program, your output should be similar to as shown below:



```
C:\Windows\system32\cmd.exe
--- Receipt ---
Item 1
Price:5.0
Quantity:6
-----
TOTAL COST:30.0

Press any key to continue . . .
```

Amend your program so that there is an additional product. After adding this second product (where price of the item is 4.00 and the quantity is 2), your output should be similar to as shown below:



```
C:\Windows\system32\cmd.exe
--- Receipt ---
Item 1
Price:5.0
Quantity:6
-----
Item 2
Price:4.0
Quantity:2
-----
TOTAL COST:38.0

Press any key to continue . . .
```

## Java Variables Exercise 12

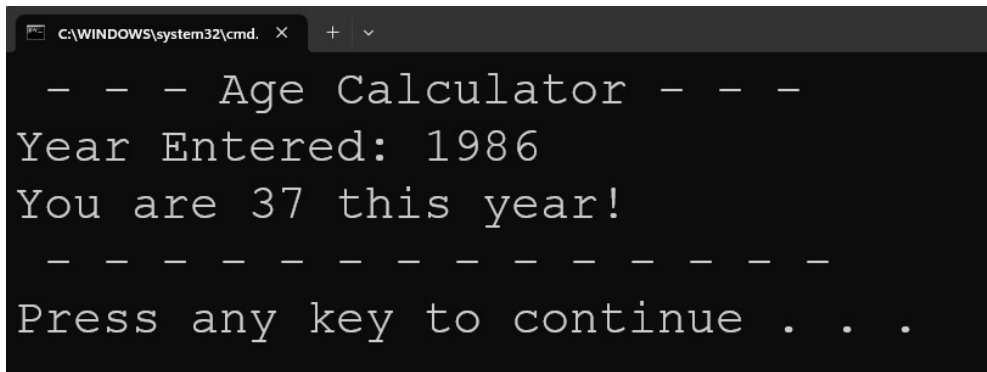
**Goal:** Create a simple program in Java that contains 2 int variables, and a simple calculation to determine age.

Create a new file called JavaVariables12 for this exercise.

Following the guide below, create a program that has the following specification:

- Declare an *int* variables to store the year you were born (you choose the name of the variable)
- Declare another int variable that will calculate your age by subtracting the value in the year variable from the current year.

Write a program using the variables and data above to produce the following output:



```
C:\WINDOWS\system32\cmd. X + v
- - - Age Calculator - - -
Year Entered: 1986
You are 37 this year!
- - - - -
Press any key to continue . . .
```

## Java Variables Exercise 13

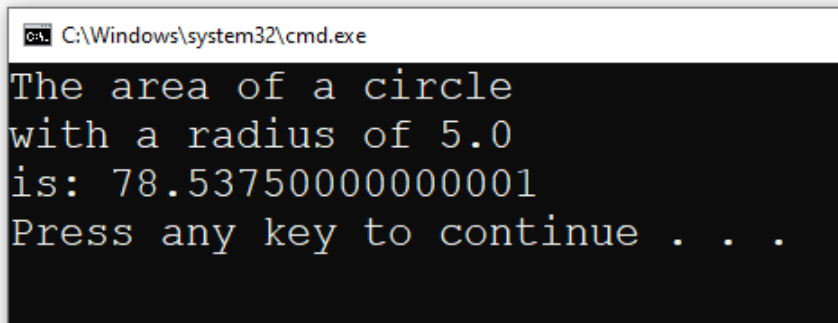
**Goal: Create a program in Java that will calculate the area of a circle.**

1. Create a new file called JavaVariables13 for this exercise.

Following the guide below, create a program that has the following specification:

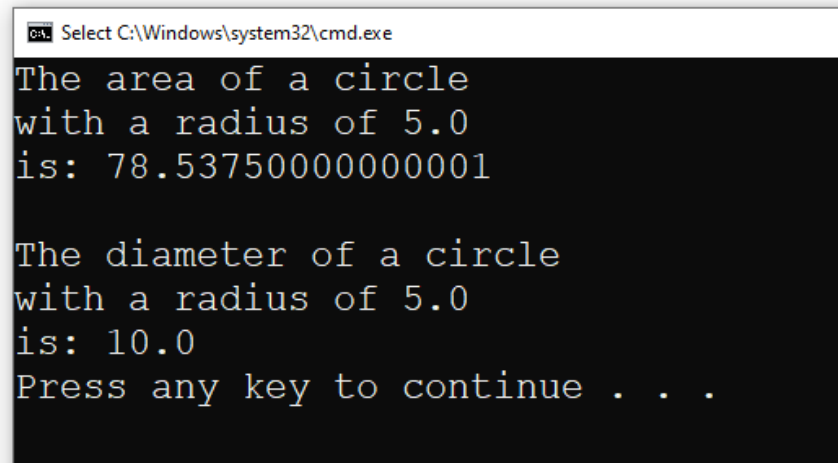
- Declare a double variable called *pi* and assign the value 3.1415.
- Declare a double variable called *radius* with the value of 5.
- Declare a double variable called *area*. This variable will be used to store the following:  $\pi * (\text{radius} * \text{radius})$

Write a program using the variables and data above to produce the following output:



```
C:\Windows\system32\cmd.exe
The area of a circle
with a radius of 5.0
is: 78.53750000000001
Press any key to continue . . .
```

Amend your code to add a calculation showing the diameter. (The diameter is twice the radius)



```
Select C:\Windows\system32\cmd.exe
The area of a circle
with a radius of 5.0
is: 78.53750000000001

The diameter of a circle
with a radius of 5.0
is: 10.0
Press any key to continue . . .
```



Amend your code to add a calculation showing the circumference. The circumference is  $\pi \times (\text{radius} \times 2)$ .

```
C:\Windows\system32\cmd.exe
The area of a circle
with a radius of 5.0
is: 78.53750000000001

The diameter of a circle
with a radius of 5.0
is: 10.0

The circumference of a circle
with a radius of 5.0
is: 31.415000000000003
Press any key to continue . . .
```

## Java Variables Exercise 14

A bag of cookies holds 40 cookies. The calorie information on the bag claims that there are 10 servings in the bag and that a serving equals 300 calories. Write a program that reports the number of total calories consumed for the following:

1 cookie - 3 cookies - 5 cookies - 10 cookies - Calories per serving

Calories in the whole bag

Your output should be similar to as shown:

```
C:\WINDOWS\system32\cmd.exe
Calories per 1 cookie: 75
Calories per 3 cookies: 225
Calories per 5 cookies: 375
Calories per 10 cookies: 750
Calories per serving: 300
Calories in the whole bag: 3000

Press any key to continue . . .
```

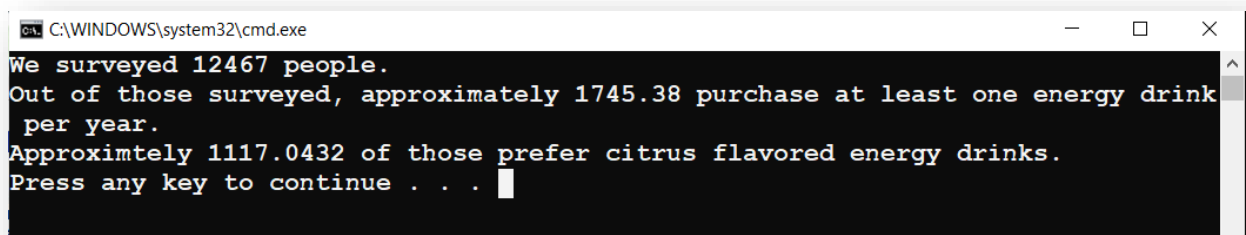
## Java Variables Exercise 15

A soft drink company recently surveyed 12,467 of its customers and found that approximately 14 percent of those surveyed purchase one or more energy drinks per week. Of those customers who purchase energy drinks, approximately 64 percent of them prefer citrus flavoured energy drinks.

*Write a java program that displays the following:*

The approximate number of customers in the survey who purchased one or more energy drinks per week

The approximate number of customers in the survey who prefer citrus flavoured energy drinks

A screenshot of a Windows command prompt window. The title bar shows the path 'C:\WINDOWS\system32\cmd.exe'. The window has standard minimize, maximize, and close buttons. The command prompt displays the following text: 'We surveyed 12467 people.', 'Out of those surveyed, approximately 1745.38 purchase at least one energy drink per year.', 'Approximtely 1117.0432 of those prefer citrus flavored energy drinks.', and 'Press any key to continue . . .'. A cursor is visible at the end of the last line.

```
C:\WINDOWS\system32\cmd.exe
We surveyed 12467 people.
Out of those surveyed, approximately 1745.38 purchase at least one energy drink
per year.
Approximtely 1117.0432 of those prefer citrus flavored energy drinks.
Press any key to continue . . .
```

## Java Variables Exercise 16

Last month, Joe purchased some stock in Acme Software, Inc. Here are the details of the purchase:

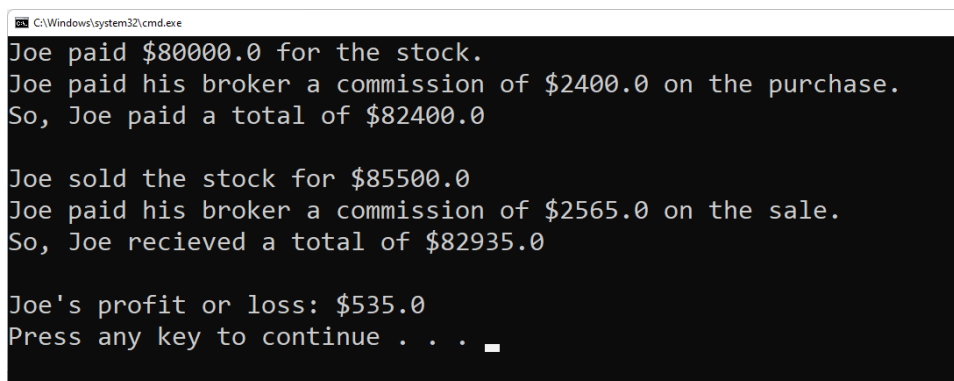
- \* The number of shares that Joe purchased was 2,000.
- \* When Joe purchased the stock, he paid \$40.00 per share.
- \* Joe paid his stockbroker a commission that amounted to 3 percent of the amount he paid for the stock.

Two weeks later, Joe sold the stock. Here are the details of the sale:

- \* The number of shares that Joe sold was 2,000.
- \* He sold the stock for \$42.75 per share.
- \* He paid his stockbroker another commission that amounted to 3 percent of the amount he received for the stock.

*Write a program that displays the following information:*

- \* The amount of money Joe paid for the stock.
- \* The amount of commission Joe paid his broker when he bought the stock.
- \* The amount for which Joe sold the stock.
- \* The amount of commission Joe paid his broker when he sold the stock.
- \* Display the amount of money that Joe had left when he sold the stock and paid his broker (both times). If this amount is positive, then Joe made a profit. If the amount is negative, then Joe lost money.



```
C:\Windows\system32\cmd.exe
Joe paid $80000.0 for the stock.
Joe paid his broker a commission of $2400.0 on the purchase.
So, Joe paid a total of $82400.0

Joe sold the stock for $85500.0
Joe paid his broker a commission of $2565.0 on the sale.
So, Joe recieved a total of $82935.0

Joe's profit or loss: $535.0
Press any key to continue . . .
```