

CS4091 Exercise Sheet

Q1 You are required to write a Java application program that when executed will request the user to enter the Celsius value he/she wishes to convert to Fahrenheit and the Fahrenheit value he/she wishes to convert to Celsius. Figure 1 gives an example.

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Enter celsius value to convert to fahrenheit: 20.1
Enter fahrenheit value to convert to celsius: 68
```

Figure 1

Your program should undertake the conversions using the following formula

$$\begin{aligned}\text{Celsius} &= (5/9) * (\text{Fahrenheit} - 32) \\ \text{Fahrenheit} &= ((9/5) * \text{Celsius}) + 32\end{aligned}$$

Finally your program should display the equivalent Fahrenheit value for the Celsius value input and the equivalent Celsius value for the Fahrenheit value input. Figure 2 gives an example. Note the Unicode symbol for degrees Fahrenheit is 2109 while the symbol for degrees Celsius is 2103.

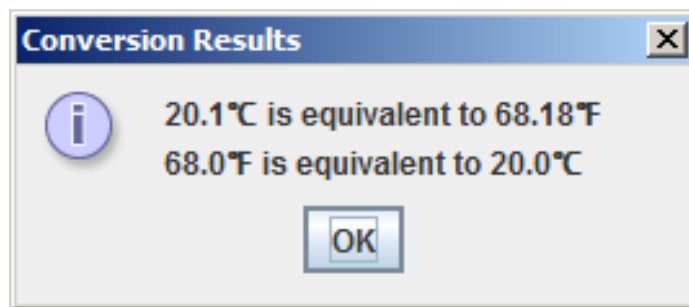


Figure 2

Q2 You are required to write a Java application program that will accept

- a value representing the radius of a circle
- a value representing the length of a square
- a value representing the base of a triangle
- a value representing the height of a triangle.

All inputs should be accepted from the console window/command prompt.

Your program is required to calculate the area of each shape using the following formulas.

- area of circle is: $\pi \times \text{radius}^2$ (you may assume that $\pi = 3.14$)
- area of square is: $\text{length} \times \text{length}$
- area of triangle is: $\frac{1}{2} \text{ base} \times \text{height}$

Finally, your program should output the results using one dialog box, similar to that shown in Figure 3.

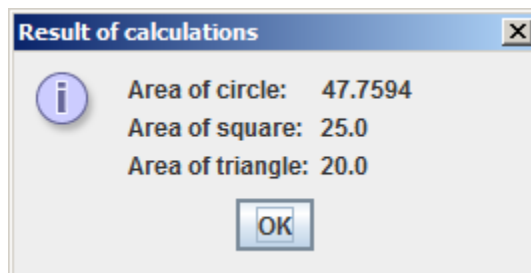


Figure 3

Q3 You are required to write a Java application program that will undertake currency conversions. Your program should accept a value representing Euros and another value representing US dollars. All inputs should be accepted from the console window/command prompt.

Your program should convert the Euro value to US dollars and the US dollar value to Euros. You should assume the following exchange rate

€1 is equivalent to \$1.12786 US

The result of all conversions should be displayed using one dialog box. The format of output is shown in Figure 4. You are expected to use the Unicode values to display \$ and € symbols. The Unicode value for € is 20AC and the Unicode the value for \$ is 0024.

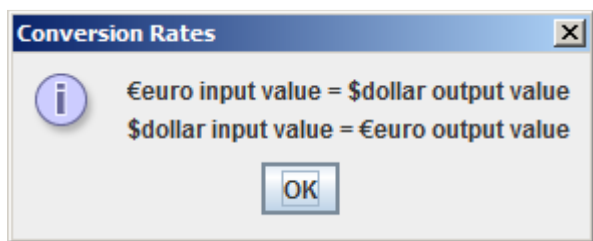


Figure 4

Q4 Mean arterial pressure (MAP) is defined as the average pressure in a patient's arteries during one cardiac cycle. It can be calculated using a formula involving the systolic blood pressure (SBP) and the diastolic blood pressure (DBP). Two formulas have been presented for calculating the MAP (cf. Figure 5).

$\text{MAP} = \frac{\text{SBP} + 2 (\text{DBP})}{3}$	$\text{MAP} = \frac{1}{3} (\text{SBP} - \text{DBP}) + \text{DBP}$
<i>Formula 1</i>	<i>Formula 2</i>

Figure 5

You are required to write a Java application program to accept the relevant values and to calculate and display the MAP using each formula. In addition, your program should determine if there is a difference between the two resulting values.

- User input should be accepted from the default input device at the command prompt/console window.
- Output should be displayed using a single dialog box. The format of the message that should be displayed to the end user is as follows:

First formula:	Result of applying first formula
Second formula:	Result of applying second formula
Difference:	The actual difference between the result of applying formula 1 and the result of applying formula 2

Q5 CSIS Radio offers each winner of a competition the choice of two books from one of three categories. The management have requested you to write a Java program that will allow them to enter the category chosen by a winner and your program will calculate the total cost of sending the books to this winner. The total cost comprises the cost of the books chosen as well as an additional cost of €10 for postage and packaging. If a book category other than those shown in the table below is entered your program should display an "Incorrect book category" message.

Book Category	Subject Area	Book Price
1	Fitness	€32.50
2	Computing	€30
3	Arts and Crafts	€25.75

Q6 Write a program that allows the user to enter four integer numbers. Your program should display the minimum of the numbers entered.

Q7 A copying centre charges 5c per copy for the first 100 copies and 3c per copy for each additional copy. Write a program that requests the number of copies as input and displays the total cost.

Q8 A car rental company charges €1.25 per mile if the total mileage does not exceed 100 miles. If the total mileage is over 100, the company charges €1.25 for the first 100 miles, then it charges €0.30 per mile for any additional mile over 100. You are required to write a program that will be used by the administrator in the car rental company each time a car is returned. The administrator will enter the number of miles and your program will display the total price to be paid.

Q9 Write a program that requests an exam score and displays the corresponding letter grade using the information in the following table.

Score	Letter Grade
90-100	A
80-89	B
70-79	C
60-69	D
0-59	F

Q10 You are required to write a Java application program to determine and display the overall cost of a project. The overall cost of a project is made up of a fixed cost and a variable cost.

Each project has a fixed cost of €10,000 and depending on the project category and the service type a variable cost is added.

To determine the variable cost of a project, your program should accept a project category and a service type from the end user and depending on their values, determine the variable cost of the project based on the data in Table 1. A valid project category is one of 1, 2 or 3. If the user does not supply a valid project category an appropriate error message should be displayed and your program should end. If the user supplies a valid project category he/she should then be requested to enter a key service type. A valid service type is one of 1, 2 or 3. If the user supplies and invalid key service type an appropriate error message should be displayed and your program should end. If a valid service type is supplied then your program should determine the overall cost and display it.

Project Category/Service Type	1	2	3
1	€ 5,600.50	€ 5,500.00	€ 6,000.00
2	€10,600.50	€11,000.00	€13,500.00
3	€17,000.00	€22,000.00	€25,000.00

Table 1

Q11 Concert Bookings Not Online allows potential concert goers to buy tickets over the phone. A potential concert goer may choose from one of three types of ticket. You have been requested to write a program that will allow the telephone operator to enter the ticket type and the number of tickets of this type a potential concert goer would like to purchase. The possible ticket types and the associated ticket costs are shown in Table 2.

Your program should present a menu similar to that shown in Figure 6. Once the telephone operator has specified the ticket type your program must next request the operator to enter the number of tickets of this type that the potential concert goer wishes to purchase (cf. Figure 7). For example if the potential concert goer wishes to buy

tickets of type 2 you would request the number of tickets he/she requires of ticket type 2 (cf. Figure 7). If the operator supplies an invalid ticket type your program should display an appropriate error message and then terminate.

Ticket Type	Cost per ticket
1	€62.50
2	€55.00
3	€35.75

Table 2

In a single transaction at most 5 tickets of a type may be purchased by a person i.e. a person can requested between 1 and 5 tickets. If the value supplied by the operator is outside of this range your program should display an appropriate error message and then terminate.

If valid selections have been made your program should display the total cost of the tickets in a manner similar to that shown in Figure 8. For example, if the operator selected ticket type 2 and requested 3 tickets your program would display the message shown in Figure 8.

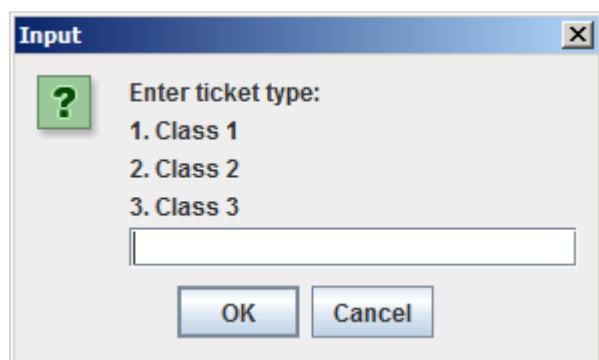


Figure 6

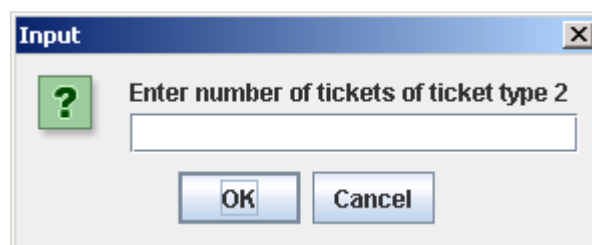


Figure 7

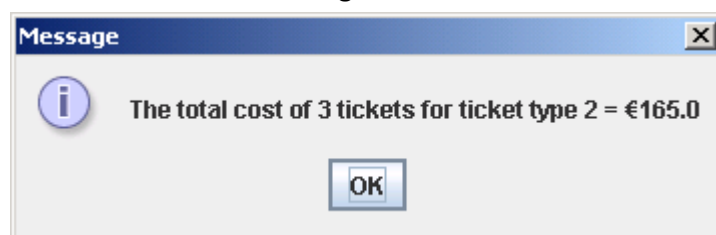


Figure 8

Q12 Body Mass Index (BMI) relates height to weight and helps to determine ideal body proportions. BMI is calculated as follows:

$$\text{BMI} = \text{Weight} / \text{Height}^2$$

where

W is weight in kilograms and
H is height in meters.

The resulting BMI is interpreted in accordance with Table 3.

	Female	Male
Underweight	< 19	< 20
Acceptable	19 to < 25	20 to < 25
Overweight	25 to < 30	25 to < 30
Obese	30 to <= 40	30 to <= 40
Morbidly Obese	> 40	> 40

Table 3

Your program should also allow the end user to have their BMI calculated and interpreted. The end user should be allowed to enter his/her weight in kilograms and his/her height in centimeters.

- Permissible values for weight are in the range ≥ 2 and ≤ 650 kilograms.
- Permissible values for height are in the range ≥ 30 and ≤ 300 centimeters.

If a person's weight is not in the desired range an appropriate error message should be displayed and your program should end. If a person's height is not in the desired range an appropriate error message should be displayed and your program should end.

If values supplied are in the correct ranges your program should report the user's BMI. In addition, your program should interpret this result based on the information in Table 1 and display the result of the interpretation.
