

Exercise 1

Write a program that allow the user to create an estimate of the cost to build multiple tables. This will be a menu driven program that will continue until the user specifically states that they do not want any additional estimates or until they reach 20 estimates (whichever comes first). **You are going to use procedural model**

Requirements:

This program will need to do the following:

- The program needs to create four arrays. The arrays are needed to hold the following:
 - The area of each table
 - The shape of each table
 - The type of material used for each table
 - The cost of each table
- The program should call a void method to display a welcome message. Include your name as the table builder.
- The program should call an integer method to display a menu of the shapes of the table. The menu should display Rectangular, Circular, Trapezoid and End Program
 - The method must assure that the menu item entered is valid. If an invalid entry is made, the method should display an error message, redisplay the menu and allow for reentry
 - Once the user enters a valid entry for a table, the method returns the entry to main
- Inside main, the program must use a switch statement for the next steps
 - If the user selects Rectangular:
 - The program must allow entry of the length and the width. The program must validate the entry (both sides must be > 0).
 - The program calls an OVERLOADED method to calculate the total area ($\text{area} = \text{length} * \text{width}$). Once the calculation is done, the method returns the area to main.
 - If the user selects Circular:
 - The program must allow entry of the diameter. The program must validate the entry (must be > 0). NOTE: The program must allow entry of the diameter. It is NOT correct to enter in the radius. In the real world, the radius cannot be accurately measured.
 - The program calls an OVERLOADED method to calculate the total area ($\text{area} = \text{PI} * \text{radius} * \text{radius}$). Once the calculation is done, the method returns the area to main. NOTE: use the construct `Math.PI` to get the Java library version of PI
 - If the user selects Trapezoid (see area calculation below):

- o The program must allow entry of the short base, the long base and the height. The program must validate all of the entries (must be > 0).
 - o The program will calculate the total area ($\text{area} = (\text{short} + \text{long}) / 2 * \text{height}$). Once the calculation is done, the method returns the area to main.
- Once the area is calculated, the code should call a method to ask the user what type of material they want to use:
 - The method displays a menu with two options
 - Option 1 is laminate – the laminate costs 12.5 Birr per square inch
 - Option 2 is oak – oak costs 25.25 Birr per square inch
 - The method must validate the entry of the choice.
 - o If the menu entry is invalid, the method must display an error message, redisplay the menu and allow reentry of the option
 - Once a valid option is selected, the method returns the value to main.
- Once the material option is returned, the program will calculate the cost of the table. The cost is defined as the number of square inches * cost per square inch based on the type of material selected. The program will then store the area, the shape, the material and the cost of the table for each table.
- The program needs to keep track of the total number of estimates that have been requested and it must keep track of the total cost of all of the estimates.
- The menu redisplay and allows a new estimate to be requested.
- Once the user selects End Program or has reached the 10th entry, the program will call a method to display an output report, a method to calculate the total cost of all of the tables and a third method to display the final estimation report.
 - The method for the output report has the four arrays as parameters. The method displays the following:
 - o A title
 - o The table number
 - o The shape and the calculated area of the table
 - o The type of the material for the table
 - o The cost of the table
 - The method to determine the total cost of the tables will be a double method that accepts the array of the individual table costs as the parameter
 - o The total cost method MUST use an enhanced for loop to calculate the total cost.
- The method for the final output report will display:
 - o If the user only asked for one table, the output will display the final total estimate with table as singular
 - o If the user asked for multiple tables, the output will display the number of tables (with tables plural) and the total cost

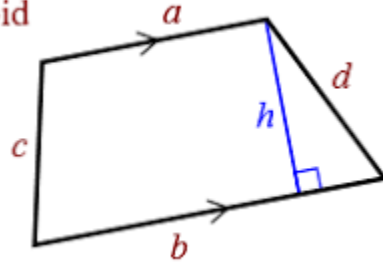
- o If the user did not request any estimates at all, the program display a message stating that.
 - o If the user purchased more than 8000 Birr, the estimate has a discount of 5%.
 - o If the user purchased more than 24000 Birr, the estimate has a discount of 10%.
 - o The method should call another method to determine the discount. If the discount is greater than 0, the method should display the discount amount and the final total.
 - o Display a final goodbye message and end the program.
- Remember to close out the Scanner object.
- All numbers should be declared as public static final values; make sure that there are no hard-coded numbers anywhere in the code

Additional Requirements

- The final product should have the main method and the following additional methods
 - Void method to display the welcome message
 - Integer method to display the menu and input the shape of the table
 - A common double method that gets, validate and return the required dimensions (length, width, long base, short base and height, or diameter). The method takes the min valid value, the max valid value and a string describing what is being entered. For example, you cannot create a table the is bigger then the size of a door. So, perhaps the max for any side is 144 inches. Often, the min is easy to determine but the max is more difficult. So, select something that is “real world” here.
 - Three, overloaded double methods to calculate the area
 - Integer method to display the menu and input the material
 - Void method to display the output report for the all of the tables in a single report
 - A double method to calculate the total cost of all of the tables
 - Void method to display the final estimate total with discount (if applicable) and a goodbye message
 - Double method to calculate the discount
- A Javadoc comment must appear at the top of the source code containing: Your name, course number and section and a brief description of what the program does.
- An end-of-line comment must appear after each closing brace describing the block being closed.
- Proper indentation must be used.
- The source file must be submitted.

Area of a Trapezoid

$$A = \frac{1}{2}(a+b)h$$



Sample output

Welcome to Tables are Us - Your Olne Stop Table Shop
Hiwot - Master Table Builder

What shape of table do you wish to build?

1. Rectangular
2. Circular
3. Trapezoid
4. End Program

Enter menu entry: 1

Enter the length of the table (in inches): 56

Enter the width of the table (in inches): 68

What type of material of do you want to use?

1. Laminate (1.25 Birr per square inches)
2. Oak (2.15 Birr per square inches)

Enter menu entry: 2

What shape of table do you wish to build?

1. Rectangular
2. Circular
3. Trapezoid
4. End Program

Enter menu entry: 2

Enter the radius of the table (in inches): 48

What type of material of do you want to use?

1. Laminate (1.25 Birr per square inches)
2. Oak (2.15 Birr per square inches)

Enter menu entry: 2

What shape of table do you wish to build?

1. Rectangular

2. Circular
3. Trapezoid
4. End Program

Enter menu entry: 3

Enter the short base of the table (in inches): 60

Enter the long base of the table (in inches): 72

Enter the height of the table (in inches): 48

What type of material do you want to use?

1. Laminate (1.25 Birr per square inches)
2. Oak (2.15 Birr per square inches)

Enter menu entry: 1

What shape of table do you wish to build?

1. Rectangular
2. Circular
3. Trapezoid
4. End Program

Enter menu entry: 4

Output Report

Table 1

The area of the rectangular table is 3808.00 square inches

The table will be made of Oak

The cost of this table is 8187.20 Birr

Table 2

The area of the circular table is 7238.23 square inches

The table will be made of Oak

The cost of this table is 15562.19 Birr

Table 3

The area of the trapezoidal table is 3168.00 square inches

The table will be made of Laminate

The cost of this table is 4752.00 Birr

The total cost of the 3 tables you estimated is 28501.39 Birr

Your discount is 1425.07 Birr

Your final total is 27076.32 Birr

Thank you for using the table cost estimation program!

Goodbye!!