PROGRAM PRACTICALLY WITH

JAVA

Scenarios and Solutions

Build your programming muscle series

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Approaches to using this book

Like many things in life we have choice, so in using this book we have an opportunity to choose different approaches to build our Java skills. Two possible methods for completing the labs and exercises are recommended and both will give us the same skills and learning. The choice will be very much dependent on what we feel is the best approach for us.

Approach One

Each of the ten labs has a series of ten exercises where the exercises are incremental, one exercise building on the previous exercise. This approach will be useful if we wish to build a 'complex' example as one unit. Studying any individual lab will build our learning using an incremental methodology where the concepts covered, and the order of coverage are shown in the diagram below.

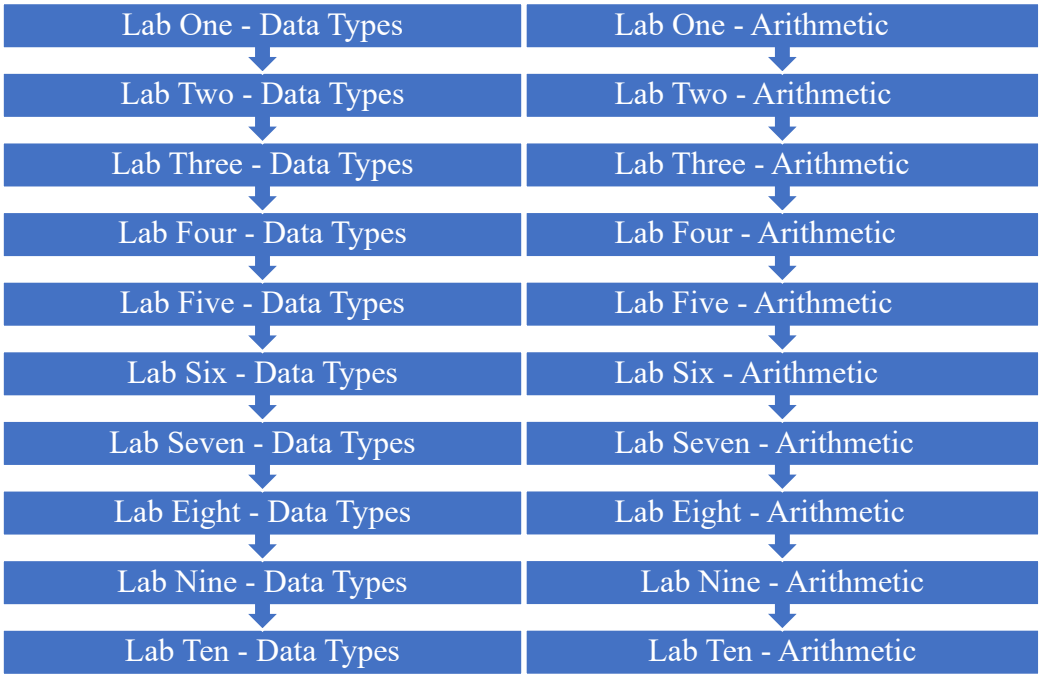
Using this approach can be useful if we have an understanding of each individual concept and it might help us to develop the exercises in each subsequent lab quicker, as we will be repeating the same process in each lab (building your muscle).

Approach Two

Each of the ten labs has a series of ten exercises where the exercises can be taken in isolation and if we wish, we can return to the next exercise in a lab and build on our learning of the concepts by completing the exercise.

By completing the first exercise in each lab we will reinforce our skills in a specific concept since we will have completed multiple exercises one after the other. On concluding one set of exercises, one exercise from each lab, we can then move to the next exercise in each lab and build our skills in the selected concept using the code already completed from the previous exercise in the lab.

Studying using the exercise concept across all labs will build our learning of a concept as illustrated in the diagram below.



Using this approach can be useful if we are trying to build a good understanding of each individual concept before learning the next concept and it might help us to develop each subsequent exercise quicker as we move across the labs, as we will be repeating the same process in each exercise (building your muscle).

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Lab One – Ten related exercises

Lab One

Exercise One - Data Types

Create a package called labone

- Create a package called exerciseone inside the labone package.
- Create a class called RectangleSquare in the package called exerciseone.
- Create a main method.
- Ask the user to input the length of a shape and assign it to a variable of type double.
- Ask the user to input the breadth of a shape and assign it to a variable of type double.
- Display an output message similar to:

The rectangle has a length of ------- and a breadth of ------.

Sample Output

```
What is the length of the shape
20
What is the breadth of the shape
10
The rectangle has a length of 20.00 and a breadth of 10.00
```

Exercise Two – Arithmetic

In this exercise arithmetic will be used to perform some calculations.

- Create a package called exercisetwo inside the labone package.
- Copy the RectangleSquare class file from the package exerciseone.
- Paste the copied file into the exercisetwo package.
- Rename the file to RectangleSquareArithmetic.
- Amend the existing code to:
  - calculate the area of the shape (length times breadth) and assign it to a variable of type double
  - calculate the perimeter of the shape (twice the length plus twice the breadth) and assign it to a variable of type double
  - display an output message similar to:

The rectangle has an area of ------- and a perimeter of ------.

Sample Output

```
What is the length of the shape
20
What is the breadth of the shape
10
The rectangle has an area of 200.00 and a perimeter of 80.00
```

Exercise Three – Selection

In this exercise selection will be used decide if a shape is a rectangle or square.

- Create a package called exercisethree inside the labone package.
- Copy the RectangleSquareArithmetic class file from the package exercisetwo.
- Paste the copied file into the exercisethree package.
- Rename the file to RectangleSquareSelection.
- Amend the existing code to:
  - calculate the area of the shape (length times breadth) and assign it to a variable of type double
  - calculate the perimeter of the shape and assign it to a variable of type double:
    - if it is a square use only one dimension (length or breadth) to perform the calculation
    - if it is a rectangle use both dimensions (length and breadth) to perform the calculation
  - use selection to display the appropriate message using the business logic:
    - if the two input values are the same, display the message

      The square has an area of **value1** and a perimeter of **value2**
    - if the two input values are the different, display the message

      The rectangle has an area of **value** and a perimeter of **value2**

Sample Output

```
What is the length of the shape
20
What is the breadth of the shape
10
The rectangle has an area of 200.00 and a perimeter of 60.00
```

```
What is the length of the shape
20
What is the breadth of the shape
20
The square has an area of 400.00 and a perimeter of 80.00
```

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Lab One – Possible solutions

Lab One Possible Solutions

Exercise One - Possible solution

```
package labone;

import java.util.Scanner;

public class RectangleSquare
{
   static Scanner myScanner = new Scanner(System.in);
   static double length, breadth;

   public static void main(String[] args)
   {
      System.out.println("What is the length of the shape");
      length = myScanner.nextDouble();

      System.out.println("What is the breadth of the shape");
      breadth = myScanner.nextDouble();

      System.out.printf("The rectangle has a length of %.2f and a breadth of %.2f ", length, breadth);

   } // End of main() method
} // End of RectangleSquare class
```

Exercise Two - Possible solution

```
package labone;

import java.util.Scanner;

public class RectangleSquareArithmetic
{
   static Scanner myScanner = new Scanner(System.in);
   static double length, breadth, perimeter, area;

   public static void main(String[] args)
   {
      System.out.println("What is the length of the shape");
      length = myScanner.nextDouble();

      System.out.println("What is the breadth of the shape");
      breadth = myScanner.nextDouble();

      // Calculate the area of the shape
      area = length * breadth;

      // Calculate the perimeter of the shape
      perimeter = 4 * length;

      // Display the shape details
      System.out.printf("The rectangle has an area of %.2f and a perimeter of %.2f ", area, perimeter);

   } // End of main() method
} // End of RectangleSquareArithmetic class
```

Exercise Three - Possible solution

```
package labone;

import java.util.Scanner;

public class RectangleSquareSelection
{
   static Scanner myScanner = new Scanner(System.in);
   static double length, breadth, perimeter, area;

   public static void main(String[] args)
   {
      System.out.println("What is the length of the shape");
      length = myScanner.nextDouble();

      System.out.println("What is the breadth of the shape");
      breadth = myScanner.nextDouble();

      // Calculate the area - same formula for rectangle and square
      area = length * breadth;

      // Make a selection based on the length and breadth
      if(length == breadth)
       {
         perimeter = 4 * length;
         System.out.printf("The square has an area of %.2f and a perimeter of %.2f ", area, perimeter);
      }
      else
         {
         perimeter = 2 * (length + breadth);
         System.out.printf("The rectangle has an area of %.2f and a perimeter of %.2f ", area, perimeter);
      }
   } // End of main() method
} // End of RectangleSquareSelection class
```