C# Workbook

1. **Create a method that will convert temperature from Fahrenheit to Celsius:**
    a. This method should take in one decimal parameter, perform a calculation, and return the converted value
    b. The formula for conversion is: C = (F – 32) x (5.0 / 9.0)

    Expected output:
    "45F converted to C is: 7.222222"

2. **Create a method that will find the smallest of 3 numbers:**
    a. This method should take 3 integer parameters and return the smallest one

    Expected output:
    "The smallest of 5, 3 and 10 is: 3"

3. **Create a method that will find the smallest number in an array:**
    a. This method should take an Integer array as a parameter
    b. The method should find the smallest number in the array and return its value

    Expected Output:
    "The smallest number from [3, 6, 4, 3, 2] is: 2"
    "The smallest number from [3, 6, 4, 3, 2, 2, 3, 5, 6, 1, 7] is: 1"

4. **Create a method that will print the multiplication table for a given number:**
    a. This method should take a single parameter
    b. The method should print the times table for that number, up to 12

    Expected Output:
    "1 times 4 is 4"
    "2 times 4 is 8"
    "3 times 4 is 12"
    …
    "12 times 4 is 48"

5. **Create a method that will apply a discount at a checkout:**
    a. This method should accept a single parameter, the total before discount
    b. Discounts are applied as follows:
        i. If spend is less than £20 then no discount is applied
        ii. If spend is £20 or greater then apply a 5% discount
        iii. If spend is £50 or greater then apply a 12% discount
        iv. If spend is greater than £100 then apply a 20% discount
    c. The total after discount should be returned

Expected Output:

"£20 total after discount is £19"
"£50 total after discount is £44"
"£100 total after discount is £88"
"£101 total after discount is £80.8"

6. **Create a method that will calculate a students' grade based on their test scores:**
    a. The method should accept a String array of student names and an Integer array of student scores

e.g.
```
String[] names = {"Ann", "Bob", "Chip", "Dee", "Erin", "Frank"};
int[] scores = {81, 65, 52, 45, 28, 24};
```

    b. The method should assign grades to the students using the following grading scheme:

<25 - F
25-44 - E
45-50 - D
51-60 - C
61-80 - B
>80 - A

Expected Output:
"Ann got grade A"
"Bob got grade B" etc…

7. **Create a new class called Rectangle:**
    a. This class should have a constructor that takes 2 parameters, the length and breadth of the rectangle
    b. The class should have the following 3 methods:
        i. calculateArea() - to return the area of the rectangle (length x breadth)
        ii. calculatePerimeter() – to return the perimeter of the rectangle – length of all the sides
        iii. checkSquare() - to return true if the rectangle is a square, otherwise will return false
    c. Create a new instance of the Rectangle class and call the 3 methods above

Expected Output:
"The area is : ..."
"The perimeter is : ..."
"Is the shape a square? ..."

8. **Create a method that will count the number of vowels in a given sentence:**
    a. This method should take a single String parameter for the sentence
    b. The method should return the number of vowels that are present in the sentence

    Hint: `char[] characters = sentence.oCharArray();` might be useful here

    Expected Output:
    "There are 11 vowels in the sentence 'The quick brown fox jumps over the lazy dog' "

9. **Create a method that prints the Fibonacci sequence up to an nth number:**
    a. This method should take a single integer parameter
    b. The method should print the Fibonacci sequence up to the given number

    Note: Each number in the Fibonacci sequence is the sum of the previous 2 numbers,
    0 1 1 2 3 5 8 13 21 35 54 etc...

    Expected Output:
    "Given 5, the Fibonacci sequence is:"
    "0 1 1 2 3"

10. **Create a method that will generate a password based on a person's name:**
    a. This method should take 2 parameters, a first name and a surname
    b. The generated password should follow the format:
    First 4 characters from surname + first character of first name + 3 random integers.
    c. The password should be in capital letters

```
Random random = new Random();
int x = random.nextInt(900) + 100;
```

    Expected Output:
    "First name = Steve"
    "Surname = Brown"
    "Generated password: BROWS751"

11. **Create a method that will calculate the factorial (!) of a given number:**
    a. Factorials are calculated as n * (n-1) * (n-2) * (n-3) * … * 1
    b. This method should take a single integer parameter, and return the answer

    Hint: **Recursion** can be useful here

    Expected Output:
    "4! Is 24"
    "10! Is 3628800"

12. **Create a system for storing information about a training course:**
    a. Create a class called TrainingCourse
    b. This class will have a constructor that takes a single parameter called maxAttendees
    c. The class will have 7 methods as follows:
        i. setCourseTitle() to set the title of the course
        ii. setLocation() to set the location of the course
        iii. setDate() to set the date of the course
        iv. setTrainer() to set the name of the trainer who will deliver the course
        v. setDuration() to set the duration for the course in days
        vi. addAttendee() to add the name of an attendee on the course
            1. Note that the number of attendees cannot exceed the maxAttendees
        vii. generateEmailContent() to compile and display a message containing all of the information about the course

    Expected Output:
    "Dear Stuart, the upcoming Java course will be held at SLC on Thursday 31st October.
    The following 8 people will be in attendance: [Anna, Bob, Charlie, David, Erin, Frank, George, Harry]"

13. **Create a system that will simulate a bank account:**
    a. Create a class called BankAccount
    b. This class will have a constructor that takes 3 parameters:
        i. initialFunds, overdraftLimit and interestRate
    c. The class should have 4 methods:
        i. displayBalance() will display the current bank balance
        ii. deposit() will add funds to the account
        iii. withdraw() will remove funds from the account
            1. Note that you cannot exceed the overdraft limit
        iv. applyInterest() will apply a rate of interest to the account

    Expected Output:
    "Account created with balance of £500, overdraft limit of £100 and an interest rate of 0.05%"
    "£1000 added to the account"
    "Account balance is: £1500"
    "Interest applied" etc.

14. **Create a method that will multiply 2 integers, without using multiplication:**
    a. This method will take in 2 integer parameters
    b. The method should work out the product of the numbers, without using multiplication, and return the result

    Expected Output:
    "4 times 8 is 32"