File - /Users/seanwelch/programming/labs/Week7Lab/src/guessing/Guessing.java

```java
package guessing;

import java.util.Arrays;
import java.util.Scanner;

public class Guessing {
    private final Scanner scanner;

    public Guessing(Scanner scanner) {
        this.scanner = scanner;
    }

    private int generateRandomNumber() {
        return (int) (Math.random() * 10) + 1;
    }

    private int generateUserGuess() {
        int userGuess;

        while (true) {
            userGuess = scanner.nextInt();
            scanner.nextLine();

            if (userGuess > 0 && userGuess < 11) {
                break;
            } else {
                System.out.println("Invalid Guess, must be greater than 0 and less than 10.");
            }
        }

        return userGuess;
    }

    private boolean checkResult(int userGuess, int generatedNumber) {
        if (userGuess == generatedNumber) {
            System.out.println("Correct, You Win");
        } else {
            System.out.println("Incorrect, try again!");
            if (userGuess > generatedNumber) {
                System.out.println("Hint: Your guess was too high.");
            } else {
                System.out.println("Hint: Your guess was too low.");
            }
        }

        return userGuess == generatedNumber;
    }

    private int[] checkFinalResults(int[] userGuesses) {
        int length = userGuesses.length;

        for (int guess: userGuesses) {
            if (guess == 0) length--;
        }

        int[] finalResults = new int[length];

        System.arraycopy(userGuesses, 0, finalResults, 0, finalResults.length);

        return finalResults;
    }


    // public constructor method for private fields
    public void initGuessingGame() {
        int maxAttempt = 5;
        int currAttempt = 1;

```

File - /Users/seanwelch/programming/labs/Week7Lab/src/guessing/Guessing.java

```
 69         int randomNumber = generateRandomNumber();
 70
 71         boolean guessCorrect = false;
 72         int[] userGuesses = new int[maxAttempt];
 73
 74         while (currAttempt <= maxAttempt) {
 75             System.out.println("Attempt " + currAttempt + " of " + 5);
 76             System.out.println("----------------------");
 77
 78             int userGuess = generateUserGuess();
 79             userGuesses[currAttempt - 1] = userGuess;
 80
 81             boolean result = checkResult(userGuess, randomNumber);
 82
 83             if (result) {
 84                 guessCorrect = true;
 85                 break;
 86             } else {
 87                 currAttempt++;
 88             }
 89         }
 90
 91         if (!guessCorrect) {
 92             System.out.println("----------------------");
 93             System.out.printf("You ran out of attempts! The number was: %s%n", randomNumber);
 94             System.out.println("----------------------");
 95         }
 96
 97         int[] finalResults = checkFinalResults(userGuesses);
 98
 99         System.out.println("----------------------");
100         System.out.printf("User Guesses: %s%n", Arrays.toString(finalResults));
101         System.out.println("----------------------");
102     }
103 }
```

File - /Users/seanwelch/programming/labs/Week7Lab/src/guessing/GuessingApp.java

```java
package guessing;

/*
 Question 2
 Alter the guessing game application so that every time it plays the user is asked do they want to play again.
 Depending on what the user enters the application should keep going until they wish to stop.
 Bonus: store the user guesses and return them to the user when they finish or win.
 Note this may necessitate the creation of a large blank array
*/

import java.util.InputMismatchException;
import java.util.Scanner;

public  class GuessingApp {
    public static void main(String[] args) {
        try (Scanner scanner = new Scanner(System.in)) {
            Guessing guessing = new Guessing(scanner);

            boolean playAgain = true;
            System.out.println("Try guess the same number as the computer... " +
                    "Pick a random number between 1 and 10: ");

            while (playAgain) {
                guessing.initGuessingGame();

                boolean validInput = false;
                while (!validInput) {
                    System.out.println("Would you like to play again? (y/n): ");
                    System.out.println("----------------------");
                    String userInput = scanner.nextLine().toLowerCase();

                    if (userInput.equals("n") || userInput.equals("no")) {
                        System.out.println("----------------------");
                        System.out.println("Okay, bye!");
                        playAgain = false;
                        validInput = true;
                    } else if (userInput.equals("y") || userInput.equals("yes")) {
                        validInput = true;
                    } else {
                        System.out.println("Input is not valid. Please confirm with (y/n)!");
                    }
                }
            }
        } catch (InputMismatchException err) {
            System.out.println("An error was made along the way, please try again: " + err);
        }
    }
}
```

File - /Users/seanwelch/programming/labs/Week7Lab/src/subjects/Subjects.java

```java
package subjects;

import java.util.Arrays;
import java.util.Scanner;

public class Subjects {
    private final Scanner scanner;

    public Subjects(Scanner scanner) {
        this.scanner = scanner;
    }

    public enum SubjectOptions{
        MATH, PHYSICS, BIOLOGY, HISTORY, RELIGION, PROGRAMMING, ACCOUNTING, FINANCE
    }

    private int chooseSubjectsNumber() {
        int chosenSubjects;

        while (true) {
            System.out.println("How many subjects do you take?");
            chosenSubjects = scanner.nextInt();

            if (chosenSubjects > 0 && chosenSubjects < 9) {
                scanner.nextLine();
                break;
            } else {
                System.out.println("Error: please choose from 1-8 subjects, try again!");
            }
        }
        return chosenSubjects;
    }

    private boolean validateSubjectOptions(String input) {
        for (SubjectOptions option: SubjectOptions.values()) {
            if (option.name().equalsIgnoreCase(input)) {
                return true;
            }
        }
        return false;
    }

    private String[] chooseSubjectOptions(int numberSubjects) {
        System.out.printf("You're currently enrolled in %s subjects. Please list them below: %n", numberSubjects);
        System.out.println("-----------------------");

        for (SubjectOptions subjectOptions: SubjectOptions.values()) {
            System.out.println(subjectOptions.name());
        }
        System.out.println("-----------------------");

        String[] chosenSubjects = new String[numberSubjects];

        for(int i = 0; i < numberSubjects; i++) {
            System.out.println("Enter Subject " + (i + 1) + ": ");
            String input = scanner.nextLine();

            while (!validateSubjectOptions(input)) {
                System.out.println("Invalid Subject, please choose from an option in the aforementioned list");
                System.out.println("Enter Subject" + (i + 1) + ": ");
                input = scanner.nextLine();
            }

            chosenSubjects[i] = input;
        }

        return chosenSubjects;
    }
```

File - /Users/seanwelch/programming/labs/Week7Lab/src/subjects/Subjects.java

```
69
70      private boolean confirmSubjectChoices(String[] chosenSubjects) {
71          System.out.println("You're enrolled in: " + Arrays.toString(chosenSubjects) + " Is this correct?: (y/n)");
72
73          while (true) {
74              String input = scanner.nextLine().toLowerCase();
75              if (input.equals("y") || input.equals("yes")) {
76                  return true;
77              } else if (input.equals("n") || input.equals("no")) {
78                  return false;
79              } else System.out.println("Input is not valid. Please confirm with (y/n)!");
80          }
81      }
82
83      private int[] getSubjectResults(String[] chosenSubjects) {
84          System.out.println("-----------------------");
85          System.out.println("Enter your results for each subject...");
86          int[] subjectResults = new int[chosenSubjects.length];
87
88          for (int i = 0; i < chosenSubjects.length; i++) {
89              System.out.println("What Grade did you get in: " + chosenSubjects[i]);
90              while (true) {
91                  int grade = scanner.nextInt();
92                  scanner.nextLine();
93
94                  if (grade >= 0 && grade <= 100) {
95                      subjectResults[i] = grade;
96                      break;
97                  } else {
98                      System.out.println("Please enter a valid grade between 0-100!");
99                  }
100             }
101         }
102
103         return subjectResults;
104     }
105
106     private void displaySubjectsAndGrades(String[] chosenSubjects, int[] subjectResults) {
107         if (chosenSubjects.length != subjectResults.length) {
108             System.out.println("Mismatch in results and subjects data: length is not equal!");
109             return;
110         }
111
112         System.out.println("-----------------------");
113         System.out.printf("Here are your final results: %n");
114
115
116         for (int i = 0; i < chosenSubjects.length; i++)
117             System.out.printf("(Subject: %s, Result: %s) %n", chosenSubjects[i], subjectResults[i]);
118     }
119
120     private int getSubjectAverage(int[] subjectResults) {
121         int sum = 0;
122
123         for (int result: subjectResults) {
124             sum += result;
125         }
126
127         return sum / subjectResults.length;
128     }
129
130     public int collectSubjectsData() {
131         int averageGrade;
132
133         while (true) {
134             int numSubjects = chooseSubjectsNumber();
135             System.out.println("-----------------------");
136             String[] chosenSubjects = chooseSubjectOptions(numSubjects);
```

File - /Users/seanwelch/programming/labs/Week7Lab/src/subjects/Subjects.java

```
137             System.out.println("----------------------");
138
139             if (confirmSubjectChoices(chosenSubjects)) {
140                 int[] subjectResults = getSubjectResults(chosenSubjects);
141                 System.out.println("----------------------");
142                 displaySubjectsAndGrades(chosenSubjects, subjectResults);
143
144                 averageGrade = getSubjectAverage(subjectResults);
145                 break;
146             } else {
147                 System.out.println("Let's restart the subject selection process.");
148             }
149         }
150
151         return averageGrade;
152     }
153 }
```

File - /Users/seanwelch/programming/labs/Week7Lab/src/subjects/SubjectsApp.java

```java
package subjects;

/*
 Question 1:
 Create an application that asks a user to enter how many subjects they have.
 The application should then ask the user to enter the results for each subject.
 Store these results in an array and print them back to the user
 along with their overall average and grade for each module.
*/

import java.util.InputMismatchException;
import java.util.Scanner;

public class SubjectsApp {
    public static void main(String[] args) {
        try (Scanner scanner = new Scanner(System.in)) {
            Subjects subjects = new Subjects(scanner);

            int maxRetries = 3;
            boolean success = false;

            while (!success && maxRetries > 0) {
                try {
                    int averageGrade = subjects.collectSubjectsData();
                    System.out.println("-----------------------");
                    System.out.printf("Average Grade: %s%n", averageGrade);
                    success = true;
                } catch (Exception err) {
                    System.out.println("Error: " + err.getMessage());
                    System.out.println("Try again!");
                    maxRetries--;
                }
            }

        } catch (InputMismatchException err) {
            System.out.println("An error was made along the way, please try again: " + err);
        }
    }
}


```