Programming Fundamentals
Programming Assignment 1 (Cipher)

Introduction
Encoding is the process of transforming a set of characters (or numbers), called the *plaintext*, into another set of characters (numbers), called the *ciphertext*. For example, during a battle you may want to encode the message "attackatonce" into something seemingly random like "cvvcemcvqpeg", so that your opponent will not be able to recognize the message if it is intercepted. One of the simplest ways to do this is using the Caesar Code (also the least secure). For this assignment, instead of encoding each character, you will encode each digit in a number. To do this, you will add the key value to each digit of the number and then do modulo 10.

Example 1: number is 57, key is 4
The encoded number will be 91, since (5+4)%10=9 and (7+4)%10=1

Example 2: number is 5, key is 8
The encoded number will be 83, since (0+8)%10=8 and (5+8)%10=3

Requirements
For this assignment, you are to create a program in Java that allows the user to encode the sum of 5 numbers using the Caesar Code, as shown above. You are to work on this assignment independently. The program will work as follows:

1. Ask the user to enter 5 integers in the range from 0 to 19 (inclusive). If they enter a number outside of this range, display the message "Please read directions and try again!" and terminate the program.
2. Sum these 5 numbers and store it in a variable. This will be your plaintext (the unencoded number).
3. Create a random integer in the range of 0 to 9 (inclusive). This will be your key for the encoding. Display this key to the user.
4. Encode each digit of the plaintext separately using the Caesar Code (see above). The encoded number should be 2 digits (even if plaintext is only 1 digit).
5. Display the encoded number to the user.

Additional Requirements
1. The name of your Java Class that contains the main method should be `Cipher`. All your code should be within the main method.
2. Your code should follow good coding practices, including good use of whitespace (indents and line breaks) and use of both inline and block comments.
3. You need to use meaningful identifier names that conform to standard Java naming conventions.
4. At the top of each file, you need to put in a block comment with the following information: your name, course name, semester, and assignment name.
5. The output of your program should **exactly** match the sample program output given at the end.

What you Need to Know
- How to read user input from the keyboard using the Scanner object
- How to generate random numbers using the Random object
- How to use Math methods
- How to use conditional statements.

HINTS
- In order to encode the individual digits of the number, separate the number into 2 integers representing the ones and the tens places. You can then apply the encoding and recombine the number.
- You can separate a number into tens and ones digits using arithmetic operators.
- The statement `System.exit(0);` can be used to terminate the program at any point.

What to Turn In
You will turn in the single `Cipher.java` file using BlackBoard.

Sample Program Output 1

```
Programming Fundamentals
NAME: <name>
PROGRAMMING ASSIGNMENT 1

Welcome to the Cipher program.
Please enter 5 numbers between 0 and 19
1st number: 3
2nd number: 5
3rd number: 7
4th number: 12
5th number: 1

Total = 28
Your random key is 9
Your encoded number is 17
```

Sample Program Output 2

```
Programming Fundamentals
NAME: <name>
PROGRAMMING ASSIGNMENT 1

Welcome to the Cipher program.
Please enter 5 numbers between 0 and 19
1st number: 3
2nd number: 5
3rd number: 24
Please read directions and try again!
```

NOTE: Replace <name> with your actual name.