MathTutor Mastery ReflectionLog

The original outline of my code is captured below, I utilized a random int generator to decide on the operator, and then an if else statement to print the equation accordingly. This would serve as my template to add further too.

```java
package Mastery;

import java.util.Scanner;

public class MathTutor {

    public static void main(String[] args) {

        //Preparing for user input
        Scanner userInput = new Scanner(System.in);

        //Calculates both random numbers
        int num1 = (int)((10 - 1 + 1) * Math.random() + 1);
        int num2 = (int)((10 - 1 + 1) * Math.random() + 1);

        //Calculates random operator
        int rand = (int)((4 - 1 + 1) * Math.random() + 1);

        if (rand == 1) {
            System.out.print(num1 + " + " + num2);
        } else if (rand == 2) {
            System.out.print(num1 + " - " + num2);
        } else if (rand == 3) {
            System.out.print(num1 + " * " + num2);
        } else if (rand == 4) {
            System.out.print(num1 + " / " + num2);
        }

    }
}
```

Below is the first completed rendition of my code, in it I used several nested if else statements to check if the inputted number matches the correct answer within the original if else statement. Because of this I found it extremely difficult to read and redundant.

```java
//Decides on operator
if (rand == 1) {
    double ans = (num1 + num2);
    System.out.print(num1 + " + " + num2 + " : ");
    double user = userInput.nextInt();
    if (user == ans) {
        System.out.print("Correct!");
    } else {
        System.out.print("Incorrect, the correct answer was " + ans);
    }
} else if (rand == 2) {
    double ans = (num1 - num2);
    System.out.print(num1 + " - " + num2 + " : ");
    double user = userInput.nextInt();
    if (user == ans) {
        System.out.print("Correct!");
    } else {
        System.out.print("Incorrect, the correct answer was " + ans);
    }
} else if (rand == 3) {
    double ans = (num1 * num2);
    System.out.print(num1 + " * " + num2 + " : ");
    double user = userInput.nextInt();
    if (user == ans) {
        System.out.print("Correct!");
    } else {
        System.out.print("Incorrect, the correct answer was " + ans);
    }
} else if (rand == 4) {
    double ans = ((double) num1 / num2);
    System.out.print(num1 + " / " + num2 + " : ");
    double user = userInput.nextInt();
    if (user == ans) {
        System.out.print("Correct!");
} else {
    System.out.print("Incorrect, the correct answer was " + ans);
}
```

An example of a division question at the time.

```
2 / 7 : 10000
Incorrect, the correct answer was 0.2857142857142857
```

My original code didn't round, and would result in irrational numbers when doing division, to fix this I made sure to include rounding in my division portion of the if else statement.

```java
} else if (rand == 4) {
    //Calculates the answer for division
    double ans =((double) num1 / num2);
    ans = Math.round(ans * 100) / 100.0;
    System.out.print(num1 + " / " + num2 + " : ");
    double user = userInput.nextDouble();
    if (user == ans) {
        System.out.print("Correct!");
} else {
    System.out.print("Incorrect, the correct answer was " + ans);
}
```

An example of the updated division question.

```
4 / 9 : 0.44
Correct!
```

Complete second revision of my code, with rounding and using doubles vs ints.

```java
//Decides on operator
if (rand == 1) {
    //Calculates the answer for addition
    double ans = (num1 + num2);
    //Prints equation and prompts for user input
    System.out.print(num1 + " + " + num2 + " : ");
    //Records user input
    double user = userInput.nextDouble();
    //Checks if user input = correct answer
    if (user == ans) {
        //Prints if correct
        System.out.print("Correct!");
    } else {
        //Prints if incorrect
        System.out.print("Incorrect, the correct answer was " + ans);
    }
} else if (rand == 2) {
    //Calculates the answer for subtraction
    double ans = (num1 - num2);
    System.out.print(num1 + " - " + num2 + " : ");
    double user = userInput.nextDouble();
    if (user == ans) {
        System.out.print("Correct!");
    } else {
        System.out.print("Incorrect, the correct answer was " + ans);
    }
} else if (rand == 3) {
    //Calculates the answer for multiplication
    double ans = (num1 * num2);
    System.out.print(num1 + " * " + num2 + " : ");
    double user = userInput.nextDouble();
    if (user == ans) {
        System.out.print("Correct!");
    } else {
        System.out.print("Incorrect, the correct answer was " + ans);
    }
} else if (rand == 4) {
    //Calculates the answer for division
    double ans =((double) num1 / num2);
    ans = Math.round(ans * 100) / 100.0;
    System.out.print(num1 + " / " + num2 + " : ");
    double user = userInput.nextDouble();
    if (user == ans) {
        System.out.print("Correct!");
} else {
    System.out.print("Incorrect, the correct answer was " + ans);
}
```

Because the original code renditions were incredibly redundant and over complicated I decided to completely overhaul the calculation and input section of the code, removing the nested if else statements, and instead performing the input / check outside the loops.

```java
//Decides on operator
if (rand == 1) {
    //Calculates the answer for addition
    ans = (num1 + num2);
    //Declares addition operator
    operator = "+";
} else if (rand == 2) {
    //Calculates the answer for subtraction
    ans = (num1 - num2);
    //Declares subtraction operator
    operator = "-";
} else if (rand == 3) {
    //Calculates the answer for multiplication
    ans = (num1 * num2);
    //Declares multiplication operator
    operator = "*";
} else if (rand == 4) {
    //Calculates the answer for division
    ans =((double) num1 / num2);
    ans = Math.round(ans * 100) / 100.0;
    //Declares division operator
    operator = "/";
}

System.out.print(num1 + operator + num2 + ": ");

//Records user input
double user = userInput.nextDouble();
//Checks if user input = correct answer
if (user == ans) {
    //Prints if correct
    System.out.print("Correct!");
} else {
    //Prints if incorrect
    System.out.print("Incorrect, the correct answer was " + ans);
}
```