package ap.compsci.project.s1;

/\*

\* @author lucca

\*/

public class APCompsciProjectS1 {

public static void main(String[] args) {

StudyBuddy mathematics = new StudyBuddy(5); //creates an object from the StudyBuddy class

System.out.println(mathematics.test()); //prints the return statement from the object performing the test method

}

}

package ap.compsci.project.s1;

import java.util.Scanner;

/\*\*

\*

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\*/

public class StudyBuddy{

int questionsAsked;

//has overloaded constructors so if a double was accidentally inputted, it can turn into an integer and be used perfectly normally.

public StudyBuddy(int questions){

questionsAsked = questions;

}

public StudyBuddy(double questions){

//uses Math.Round method to round the inputted double to the nearest integer.

questionsAsked = (int)(Math.round(questions));

}

public String test(){

boolean[] gotRight = new boolean[questionsAsked];

int numberCorrect = 0;

double percentCorrect = 0;

int difficulty = 0;

int arithmeticType = 0;

//the following code asks for the user to input the difficulty they want to play on while the difficulty is thrown through a while statement to make sure no numbers that are not difficulties get counted as such (because they would crash the program).

while(difficulty < 1 || difficulty > 4)

{

Scanner difficultyLevel = new Scanner(System.in);

System.out.println("Do you want to play on 'Easy', 'Medium', 'Hard', or 'Death' mode?");

System.out.println("Easy = 1, Medium = 2, Hard = 3, Death = 4.");

System.out.println("Please enter the number associated with your preferred difficulty.");

difficulty = difficultyLevel.nextInt();

System.out.println("Difficulty chosen is " + difficulty + ". If this is not 1, 2, 3, or 4, please re-enter the difficulty. If not, move on.");

}

//the following code asks for the user to input the arithmetic type they want to play with. Afterwards, it is thrown through a while statement to make sure no numbers that are not difficulties get counted as such (because they would crash the program).

while(arithmeticType < 1 || arithmeticType > 5)

{

Scanner typeOfArithmetic = new Scanner(System.in);

System.out.println("Do you want to do 'Addition', 'Subtraction', 'Multiplication', 'Division', or 'Random'.");

System.out.println("Addition = 1, Subtraction = 2, Multiplication = 3, Division = 4, Random = 5.");

System.out.println("Please enter the number associated with your preferred type of arithmetic?.");

arithmeticType = typeOfArithmetic.nextInt();

System.out.println("Arithmetic Type chosen is " + arithmeticType + ". If this is not 1, 2, 3, 4, or 5, please re-enter the difficulty. If not, move on.");

}

//the program enters one of these if statements depending on which number for arithmeticType was entered. Then it runs the method associated with it’s arithmetic type for as many times as the number of questions they wanted to be asked (the first input). Afterwards, it assigns the return value (boolean) to an element of an array.

if(arithmeticType == 1)

{

for(int count = 0; count < questionsAsked; count++)

{

gotRight[count] = addition(difficulty);

}

}

else if(arithmeticType == 2)

{

for(int count = 0; count < questionsAsked; count++)

{

gotRight[count] = subtraction(difficulty);

}

}

else if(arithmeticType == 3)

{

for(int count = 0; count < questionsAsked; count++)

{

gotRight[count] = multiplication(difficulty);

}

}

else if(arithmeticType == 4)

{

for(int count = 0; count < questionsAsked; count++)

{

gotRight[count] = division(difficulty);

}

}

else if (arithmeticType == 5)

{

//if arithmeticType was entered as a 5, the program would randomly generate questions from all four arithmetic types after randomly picking which arithmetic type it would use for each and every question.

for(int count = 0; count < questionsAsked; count++)

{

//this is the Math.random() method used to randomly generate numbers. It is from the Math class and will generate numbers between and including 1 and 4.

int arithmeticTypeRandom = (int)(Math.random() \* 4) + 1;

if(arithmeticTypeRandom == 1)

{

gotRight[count] = addition(difficulty);

}

else if(arithmeticTypeRandom == 2)

{

gotRight[count] = subtraction(difficulty);

}

else if(arithmeticTypeRandom == 3)

{

gotRight[count] = multiplication(difficulty);

}

else if(arithmeticTypeRandom == 4)

{

gotRight[count] = division(difficulty);

}

}

}

//the following code goes through the boolean array and counts all the times that the student got the question correct (ie. gotRight[count] was made to be true.)

for(int count = 0; count < questionsAsked; count++)

{

if(gotRight[count] == true)

{

numberCorrect++;

}

}

// in the following lines of code, the percent of the questions that the student got correct in the test they ‘played’ is calculated.

//To prevent lossy conversion and truncation, questionsAsked and numberCorrect’s values are assigned to doubles instead of integers, which are then used for the calculation of percentCorrect, a double with a value more than likely less than 1. The reason it’s so important it’s a double is because if it wasn’t, any value less than 100% correct would truncate to 0%. If the student got 99% correct (an A+), it would truncate to a 0% (an F).

double questionsAskedDouble = questionsAsked;

double numberCorrectDouble = numberCorrect;

percentCorrect = numberCorrectDouble/questionsAskedDouble;

//prints percentCorrect multiplied by 100 (so it’s out of 100 instead of out of 1)

System.out.println("You got " + (percentCorrect\*100) + "% correct.");

//returns the grade that the student got depending on the % right they got.

if(percentCorrect >= .95){

return("You got an A+");

}

else if(percentCorrect >= .90){

return("You got an A");

}

else if(percentCorrect >= .85){

return ("You got a B+");

}

else if(percentCorrect >= .80){

return ("You got a B");

}

else if(percentCorrect >= .75){

return ("You got a C+");

}

else if(percentCorrect >= .70){

return ("You got a C");

}

else if(percentCorrect >= .65){

return ("You got a D+");

}

else if(percentCorrect >= .60){

return ("You got a D");

}

else if(percentCorrect < .60){

return ("You got an F");

}

else{

return ("This score is invalid.");

}

}

public boolean addition(int difficulty){

int number1 = 0;

int number2 = 0;

//the following code randomly generates the two numbers that will be used in the equation using the aforementioned Math.random() method.

if (difficulty == 1)

{

number1 = (int)(Math.random() \* 20) - 10;

number2 = (int)(Math.random() \* 20) - 10;

}

else if(difficulty == 2)

{

number1 = (int)(Math.random() \* 200) - 100;

number2 = (int)(Math.random() \* 200) - 100;

}

else if(difficulty == 3)

{

number1 = (int)(Math.random() \* 2000) - 1000;

number2 = (int)(Math.random() \* 2000) - 1000;

}

else if(difficulty == 4)

{

number1 = (int)(Math.random() \* 200000) - 100000;

number2 = (int)(Math.random() \* 200000) - 100000;

}

//the following code adds the numbers that were randomly generated together, then asks the user to do the same. If the number that the computer calculates is different to the number that the student calculates, the system returns that the student was incorrect (false). If not, the computer returns that the student was correct (true).

int computerAnswer = number1 + number2;

Scanner playerAnswerScanner = new Scanner(System.in);

System.out.println("What is " + number1 + " + " + number2 + " ?");

int playerAnswer = playerAnswerScanner.nextInt();

if(playerAnswer == computerAnswer){

System.out.println("You are correct!");

return true;

}

else{

System.out.println("You are wrong...");

return false;

}

}

public boolean subtraction(int difficulty){

int number1 = 0;

int number2 = 0;

//the following code randomly generates the two numbers that will be used in the equation using the aforementioned Math.random() method.

if (difficulty == 1)

{

number1 = (int)(Math.random() \* 20) - 10;

number2 = (int)(Math.random() \* 20) - 10;

}

else if(difficulty == 2)

{

number1 = (int)(Math.random() \* 200) - 100;

number2 = (int)(Math.random() \* 200) - 100;

}

else if(difficulty == 3)

{

number1 = (int)(Math.random() \* 2000) - 1000;

number2 = (int)(Math.random() \* 2000) - 1000;

}

else if(difficulty == 4)

{

number1 = (int)(Math.random() \* 200000) - 100000;

number2 = (int)(Math.random() \* 200000) - 100000;

}

//the following code subtracts the numbers that were randomly generated, then asks the user to do the same. If the number that the computer calculates is different to the number that the student calculates, the system returns that the student was incorrect (false). If not, the computer returns that the student was correct (true).

int computerAnswer = number1 - number2;

Scanner playerAnswerScanner = new Scanner(System.in);

System.out.println("What is " + number1 + " - " + number2 + " ?");

int playerAnswer = playerAnswerScanner.nextInt();

if(playerAnswer == computerAnswer){

System.out.println("You are correct!");

return true;

}

else{

System.out.println("You are wrong...");

return false;

}

}

public boolean multiplication(int difficulty){

int number1 = 0;

int number2 = 0;

//the following code randomly generates the two numbers that will be used in the equation using the aforementioned Math.random() method.

if (difficulty == 1)

{

number1 = (int)(Math.random() \* 20) - 10;

number2 = (int)(Math.random() \* 20) - 10;

}

else if(difficulty == 2)

{

number1 = (int)(Math.random() \* 200) - 100;

number2 = (int)(Math.random() \* 200) - 100;

}

else if(difficulty == 3)

{

number1 = (int)(Math.random() \* 2000) - 1000;

number2 = (int)(Math.random() \* 2000) - 1000;

}

else if(difficulty == 4)

{

number1 = (int)(Math.random() \* 200000) - 100000;

number2 = (int)(Math.random() \* 200000) - 100000;

}

//the following code multiplies the numbers that were randomly generated together, then asks the user to do the same. If the number that the computer calculates is different to the number that the student calculates, the system returns that the student was incorrect (false). If not, the computer returns that the student was correct (true).

int computerAnswer = number1 \* number2;

Scanner playerAnswerScanner = new Scanner(System.in);

System.out.println("What is " + number1 + " \* " + number2 + " ?");

int playerAnswer = playerAnswerScanner.nextInt();

if(playerAnswer == computerAnswer){

System.out.println("You are correct!");

return true;

}

else{

System.out.println("You are wrong...");

return false;

}

}

public boolean division(int difficulty){

int number1 = 0;

int number2 = 0;

int dividable = 1;

int computerAnswer = 0;

//the code in this while loop is only executed if there is a remainder in the equation.

while((dividable > 0 || dividable < 0))

{

//the following code randomly generates the two numbers that will be used in the equation using the aforementioned Math.random() method.

if (difficulty == 1)

{

number1 = (int)(Math.random() \* 20) - 10;

number2 = (int)(Math.random() \* 20) - 10;

}

else if(difficulty == 2)

{

number1 = (int)(Math.random() \* 200) - 100;

number2 = (int)(Math.random() \* 200) - 100;

}

else if(difficulty == 3)

{

number1 = (int)(Math.random() \* 2000) - 1000;

number2 = (int)(Math.random() \* 2000) - 1000;

}

else if(difficulty == 4)

{

number1 = (int)(Math.random() \* 200000) - 100000;

number2 = (int)(Math.random() \* 200000) - 100000;

}

while(number2 == 0)

{

//the following code randomly re-generates the denominator of the division question if it is a 0, so that the program does not crash.

if(difficulty == 1)

number2 = (int)(Math.random() \* 20) - 10;

else if(difficulty == 2)

number2 = (int)(Math.random() \* 200) - 100;

else if(difficulty == 3)

number2 = (int)(Math.random() \* 2000) - 1000;

else if(difficulty == 4)

number2 = (int)(Math.random() \* 200000) - 100000;

}

computerAnswer = number1 / number2;

dividable = number1 % number2;

}

//the following code divides the numbers that were randomly generated by each other, then asks the user to do the same. If the number that the computer calculates is different to the number that the student calculates, the system returns that the student was incorrect (false). If not, the computer returns that the student was correct (true).

Scanner playerAnswerScanner = new Scanner(System.in);

System.out.println("What is " + number1 + " / " + number2 + " ?");

int playerAnswer = playerAnswerScanner.nextInt();

if(playerAnswer == computerAnswer){

System.out.println("You are correct!");

return true;

}

else{

System.out.println("You are wrong...");

return false;

}

}

}