

**Question: 1****Problem: Galactic Arithmetic**

In a far-off galaxy named Arithmetical, beings have been using a newly discovered number system to make their life easier. However, they are facing difficulties in performing basic arithmetic operations. As the resident genius of planet Earth, you have been called upon to help them. Your first task is to build a function that will be able to add two numbers in their number system.

**Function:**

```
public static long galacticAddition(long num1, long num2);
```

**Inputs:**

The function `galacticAddition(long num1, long num2)` will receive two parameters:

- num1 : a long integer representing the first number in the Arithmetical number system.
- num2 : a long integer representing the second number in the Arithmetical number system.

**Outputs:**

The function will return a long - the sum of num1 and num2 in the Arithmetical number system.

**Sample Input:**

125678

9876543210L

**Sample Output:**

9876668888L

**Note:**

In the sample input, the two numbers provided to the function are 125678 and 9876543210. The sum of these two numbers is  $125678 + 9876543210 = 9876668888$ , so the function returns 9876668888 as the output. Your task is to help the beings of Arithmetical perform this basic operation with ease. Good luck, Earth's genius!

## **Question:2**

### **Problem: Arithmetic Operations**

You are a programmer in a school. The mathematics teacher has asked for your help to teach basic arithmetic operations to students. Your task is to create a set of functions that will do subtraction, multiplication, division, and find the remainder of two numbers.

#### **Functions:**

```
public static int subtractNumbers(int num1, int num2);  
public static int multiplyNumbers(int num1, int num2);  
public static double divideNumbers(int num1, int num2);  
public static int findRemainder(int num1, int num2);
```

#### **Inputs:**

Each function will receive two parameters:

- num1 : an integer which represents the first number.
- num2 : an integer which represents the second number.

#### **Outputs:**

1. The subtractNumbers function will return an integer - the result of subtracting num2 from num1.
2. The multiplyNumbers function will return an integer - the result of multiplying num1 and num2.
3. The divideNumbers function will return a double - the result of dividing num1 by num2.

4. The findRemainder function will return an integer - the remainder when num1 is divided by num2.

**Sample Input:**

```
subtractNumbers(20, 5);
```

```
multiplyNumbers(4, 5);
```

```
divideNumbers(20, 4);
```

```
findRemainder(10, 3);
```

**Sample Output:**

15

20

5.00

1

**Note:**

In the sample input, the numbers given to the functions are (20, 5), (4, 5), (20, 4) and (10, 3) respectively. The functions correctly return the results of subtraction, multiplication, division and finding the remainder.

**Question: 3**

**Problem: The Double Trouble**

You are participating in a coding competition at your school. The challenge is to create a function that can double the value of any number provided. This function will help in the game design where scores need to be doubled under certain conditions.

**Function:**

```
public static int doubleTheNumber(int num);
```

**Inputs:**

The function `doubleTheNumber(int num)` will receive one parameter:

- num : an integer which represents the number to be doubled.

**Outputs:**

The function will return an integer - the result of doubling the num.

**Sample Input:**

```
doubleTheNumber(15);
```

Sample Output:

30

**Note:**

In the sample input, the number given to the function is 15. The double of this number is  $15 \times 2 = 30$ , so the function returns 30 as the output. Your function should work accurately to make sure you win this competition. Good Luck!

Question: 4

**Problem: The String Joiner**

You are creating a new social networking site. In one of the features, you have to combine the user's first name and last name to display the full name. Your task is to write a static method that will concatenate two strings.

**Function:**

```
public static String joinStrings(String str1, String str2);
```

**Inputs:**

The function `joinStrings(String str1, String str2)` will receive two parameters:

- `str1` : a string which represents the first string.
- `str2` : a string which represents the second string.

**Outputs:**

The function will return a string - the result of concatenating `str1` and `str2`.

**Sample Input:**

```
joinStrings("Hello, ", "World!");
```

**Sample Output:**

```
"Hello, World!"
```

**Note:**

In the sample input, the function is given two strings: "Hello, " and "World!". These two strings are concatenated to form "Hello, World!", which is the output. Make sure your function works properly to display the user's full name correctly on the social networking site.

Question 5:

**Problem: The Journey Calculator**

You are a developer at a transportation company. The company is developing a new app that helps users track their journey. One of the features of the app is to calculate the distance travelled given the speed and time of the journey. Your task is to create a method that takes speed and time and returns the distance travelled. This method should be a non-static method and should be implemented inside a class named JourneyCalculator.

**Class Definition:**

```
public class JourneyCalculator {  
    public double calculateDistance(double speed, double time);  
}
```

**Inputs:**

The method calculateDistance(double speed, double time) will receive two parameters:

- speed : a double representing the speed of the vehicle in km/h.
- time : a double representing the time travelled in hours.

**Outputs:**

The method will return a double - the distance travelled. Round off the result to 2 decimal places.

**Sample Input:**

```
JourneyCalculator journeyCalculator = new JourneyCalculator();  
journeyCalculator.calculateDistance(60.0, 1.5);
```

**Sample Output:**

90.00

**Note:**

In the sample input, the user's speed is 60 km/h and the time travelled is 1.5 hours. The distance travelled is  $\text{speed} \times \text{time} = 60 \times 1.5 = 90$  kilometers, so the method returns 90.00 as the output. Your method will be crucial in helping users track their journey accurately. Good luck, developer!

Question 6:

**Problem: The Temperature Converter**

You are working as a software developer at a weather forecasting company. The company is developing a new feature for their app that allows users to convert temperatures from Fahrenheit to Celsius. Your task is to create a method that takes a temperature in Fahrenheit and converts it to Celsius.

**Hint:** The formula to convert temperature from Fahrenheit to Celsius is:

$$C = (F - 32) * 5/9$$

Where:

- C is the temperature in Celsius
- F is the temperature in Fahrenheit

**Class Definition:**

```
public class TemperatureConverter {
```

```
    public double convertFahrenheitToCelsius(double fahrenheit);  
}
```

**Inputs:**

The method `convertFahrenheitToCelsius(double fahrenheit)` will receive one parameter:

- `fahrenheit` : a double representing the temperature in Fahrenheit.

**Outputs:**

The method will return a double - the temperature converted to Celsius.

**Sample Input:**

```
TemperatureConverter temperatureConverter = new TemperatureConverter();  
temperatureConverter.convertFahrenheitToCelsius(68.0);
```

**Sample Output:**

20.00

**Note:**

In the sample input, the user's temperature in Fahrenheit is 68.0. The temperature in Celsius is  $(68 - 32) * 5/9 = 20.00$ , so the method returns 20.00 as the output. Your method will be crucial in helping users understand the temperature in Celsius. Good luck, developer!

Question 7 :

**Problem: Semester Marks Averager**

You are creating a student portal for your school. The portal needs to display the average marks of a student for 8 semesters. Your task is to write a Java function that takes the marks of each semester individually and returns the average.



**Function:**

```
public static double calculateAverage(int sem1, int sem2, int sem3, int sem4, int sem5, int sem6, int sem7, int sem8);
```

**Inputs:**

The function calculateAverage(int sem1, int sem2, int sem3, int sem4, int sem5, int sem6, int sem7, int sem8) will receive eight parameters:

- sem1, sem2, sem3, sem4, sem5, sem6, sem7, sem8 : Eight integers each representing the total marks obtained in a semester.

**Outputs:**

The function will return a double - the average marks over 8 semesters. Round off the result to 2 decimal places.

**Example:****Sample Input:**

```
calculateAverage(85, 79, 91, 76, 88, 95, 80, 85);
```

**Sample Output:**

84.88

**Note:**

In the sample input, the marks for the 8 semesters are given. The average of these marks is  $(85+79+91+76+88+95+80+85)/8 = 84.88$ . So, the function returns 84.88 as the output. Make sure your function calculates the average correctly to display accurate information on the student portal.

**Question: 8****Problem: The Power of Squares**

You are a software developer at a gaming company. The company is developing a new game called "The Power of Squares". In this game, players have to square the number provided to advance to the next level. Your task is to create a function that will calculate the square of the number provided.

**Function:**

```
public static int squareNumber(int num);
```

**Inputs:**

The function `squareNumber(int num)` will receive one parameter:

- num : an integer which represents the number that the player has to square.

**Outputs:**

The function will return an integer - the square of num.

**Example:**

**Sample Input:**

```
squareNumber(7);
```

**Sample Output:**

49

**Note:**

In the sample input, the player is at a level where the number to square is 7. The square of this number is  $7*7=49$ , so the function returns 49 as the output. The function you develop will be a crucial part of "The Power of Squares" game, ensuring players can progress through levels accurately. Good luck, game developer!

**Question: 9**

**Problem: The Cube Mystery**

You are a software engineer developing an innovative educational game for kids. This game helps kids understand the concept of cubes in a fun and interactive way. In one of the stages, the kids are given a number and they have to find out the cube of that number to solve a mystery. Your task is to create a function that will calculate the cube of a given number.

**Function:**

```
public static int cubeNumber(int num);
```

**Inputs:**

The function `cubeNumber(int num)` will receive one parameter:

- num : an integer which represents the number that the player has to cube.

**Outputs:**

The function will return an integer - the cube of num.

**Example:****Sample Input:**

```
cubeNumber(3);
```

**Sample Output:**

```
27
```

**Note:**

In the sample input, the kid is at a stage where the number to cube is 3. The cube of this number is  $3*3*3=27$ , so the function returns 27 as the output. The function you develop will be essential in helping the kids solve the Cube Mystery. Good luck, game engineer!

**Question:10****Problem: The Secret Message Decoder**

You are a software engineer at a secret spy agency. The agency often receives secret messages encoded in Unicode. Your task is to build a method that accepts a character and displays its Unicode, helping the agents decode the messages quickly and efficiently.

**Class Definition:**

```
public class MessageDecoder {  
    public int decodeCharacter(char ch);  
}
```

**Inputs:**

The method `decodeCharacter(char ch)` will receive one parameter:

- `ch` : a character representing the encoded message.

**Outputs:**

The method will return an integer - the Unicode of the received character.

**Example:****Sample Input:**

```
MessageDecoder decoder = new MessageDecoder();
```

```
decoder.decodeCharacter('A');
```

**Sample Output:**

65

**Note:**

In the sample input, the spy agency has received a message with the character 'A'. The Unicode for 'A' is 65, so the method returns 65 as the output. Your method will play a crucial role in decoding the secret messages and ensuring the success of the agency's missions. Good luck, coder agent!

Question: 11

**\*\*Problem: The Planet Explorer\*\***

You are a scientist at a space research center. The center is currently researching various planets and their properties. One of the properties they are interested in is the surface area of these planets. Considering that a planet can be approximated as a sphere, your task is to create a method that calculates the surface area of a sphere given its radius.

**\*\*Hint:\*\*** The formula to calculate the surface area of a sphere is:

$$A = 4\pi r^2$$

Where:

- A is the surface area of the sphere
- r is the radius of the sphere

**\*\*Class Definition:\*\***

```
public class PlanetExplorer {  
    public double calculateSurfaceArea(double radius);  
}
```

**\*\*Inputs:\*\***

The method calculateSurfaceArea(double radius) will receive one parameter:

- radius : a double representing the radius of the sphere (planet).

**\*\*Outputs:\*\***

The method will return a double - the surface area of the sphere. Round off the result to 2 decimal places.

**\*\*Example:\*\***

**\*\*Sample Input:\*\***

```
PlanetExplorer explorer = new PlanetExplorer();  
explorer.calculateSurfaceArea(3.0);
```

**\*\*Sample Output:\*\***

113.10

**\*\*Note:\*\***

In the sample input, the radius of the planet (sphere) is 3.0 units. The surface area is  $4\pi \cdot 3^2 = 113.10$ , so the method returns 113.10 as the output. Your method will be essential in helping the scientists at the space research center in understanding the properties of various planets. Good luck, scientist!

Question: 12

**\*\*Problem: The Height Converter\*\***

You are part of a sports data management team. The team is developing a new feature for their application where the heights of players, currently recorded in inches, need to be displayed in feet for an international audience. Your task is to create a method that takes a height given in inches and converts it into feet.

**\*\*Hint:\*\*** The conversion factor from inches to feet is 1 foot = 12 inches.

**\*\*Class Definition:\*\***

```
public class HeightConverter {  
    public double convertInchesToFeet(double inches);  
}
```

**\*\*Inputs:\*\***

The method `convertInchesToFeet(double inches)` will receive one parameter:

- inches ( $0 \leq \text{inches} \leq 10^9$ ): a double representing the height in inches.



**\*\*Outputs:\*\***

The method will return a double - the height converted to feet. Round off the result to 2 decimal places.

**\*\*Example:\*\***

**\*\*Sample Input:\*\***

```
HeightConverter converter = new HeightConverter();  
converter.convertInchesToFeet(72.0);
```

**\*\*Sample Output:\*\***

6.00

**\*\*Note:\*\***

In the sample input, the height of the player is 72.0 inches. The height in feet is  $72/12 = 6.00$ , so the method returns 6.00 as the output. Your method will be crucial in helping the sports data management team present the data in a format familiar to the international audience. Good luck, data manager!

Question: 13

**\*\*Problem: The Finance Calculator\*\***

You are a software developer at a financial technology company. The company is building a new feature in their app that calculates the simple interest for users wanting to take out loans. Your

task is to create a method that calculates the simple interest given the principal amount, rate of interest, and time.

**\*\*Hint:\*\*** The formula to calculate simple interest is:

$$I = P * R * T$$

Where:

- I is the simple interest
- P is the principal amount
- R is the rate of interest (in decimal)
- T is the time (in years)

**\*\*Class Definition:\*\***

```
public class FinanceCalculator {  
    public double calculateSimpleInterest(double principal, double rate, double time);  
}
```

**\*\*Inputs:\*\***

The method calculateSimpleInterest(double principal, double rate, double time) will receive three parameters:

- principal ( $1 \leq \text{principal} \leq 10^9$ ): a double representing the principal amount.
- rate ( $0 \leq \text{rate} \leq 1$ ): a double representing the rate of interest in decimal.
- time ( $1 \leq \text{time} \leq 10^5$ ): a double representing the time in years.

**\*\*Outputs:\*\***

The method will return a double - the simple interest.

**\*\*Example:\*\***

**\*\*Sample Input:\*\***

```
FinanceCalculator calculator = new FinanceCalculator();  
calculator.calculateSimpleInterest(1000.0, 0.05, 2.0);
```

**\*\*Sample Output:\*\***

100.00

**\*\*Note:\*\***

In the sample input, the principal amount is 1000.0 units, the rate of interest is 0.05, and the time is 2.0 years. The simple interest is  $1000.0 * 0.05 * 2.0 = 100.00$ , so the method returns 100.00 as the output. Your method will be crucial in helping users plan their finances. Good luck, developer!

Question: 14

**\*\*Problem: Time Converter\*\***

You are developing a time tracking application for a company. The employees log their time in minutes. The management wants to see these durations in hours for better understanding. Your task is to write a function that can convert minutes into hours.

**\*\*Function:\*\***

```
public static double convertToHours(int minutes);
```

**\*\*Inputs:\*\***

The function `convertToHours(int minutes)` will receive one parameter:

- minutes ( $1 \leq \text{minutes} \leq 10^6$ ): an integer which represents the number of minutes to be converted.

**\*\*Outputs:\*\***

The function will return a double - the equivalent number of hours, rounded off to 2 decimal places.

**\*\*Example:\*\***

**\*\*Sample Input:\*\***

`convertToHours(90);`

**\*\*Sample Output:\*\***

1.5

**\*\*Note:\*\***

In the sample input, the number of minutes given to the function is 90. The equivalent in hours is  $90/60=1.5$ , so the function returns 1.5 as the output. Your function should work accurately to provide correct information to the management.

Question: 15

**\*\*Problem: Halve It\*\***

You are helping a friend in developing a financial app. The app has a feature where it calculates half of the entered amount for splitting bills. Your task is to write a function that takes a number and returns its half.

**\*\*Function:\*\***

```
public static double halveTheNumber(double num);
```

**\*\*Inputs:\*\***

The function `halveTheNumber(double num)` will receive one parameter:

- `num` ( $0 \leq \text{num} \leq 10^9$ ): a double which represents the amount entered by the user to be halved.

**\*\*Outputs:\*\***

The function will return a double - the result of halving the `num`. Round off the result till 2 decimal places.

**\*\*Example:\*\***

**\*\*Sample Input:**

```
halveTheNumber(150.00);
```

**Sample Output:**

75.00

**Note:**

In the sample input, the number given to the function is 150.00. The half of this number is  $150.00/2=75.00$ , so the function returns 75.00 as the output. Make sure your function works correctly to split the bills accurately.