Programming Fundamentals

Week 03 - Programming Day

Introduction

Welcome to your favorite day of the week which is programming day🎉. This week, we shall work together to learn and implement new programming concepts.

Skills to be Tested:

- Writing C++ program that converts user input into the required output after doing some processing on it

Let's do some coding.

Task 01(OP): (Polygon Geometry Contest)

In a prestigious mathematics competition called the "Polygon Geometry Contest," brilliant young mathematicians from all over the world gather to showcase their skills in geometry. The contest features a variety of problems related to polygons, and participants need to write code to solve these problems.

The Challenge:

The problem statement for this particular challenge is as follows:

"Given an n-sided regular polygon, calculate and print the total sum of internal angles (in degrees). Use the formula (n - 2) x 180, which gives the sum of all the measures of the angles of an n-sided polygon."

```
G:\Semesters\Programming Fundamentals (Fall 2023)\Week 3\Programming Day Tasks>Task01.exe
Enter the number of sides of the polygon: 40
The sum of internal angles of a 40-sided polygon is: 6840 degrees
```

Task 02(OP): (Video Processing Application)

You are designing a program for a video processing application. The program needs to calculate the total number of frames that will be shown in a given the number of minutes for a certain frame per second (FPS). Take the number of minutes and frames per second as input from the user and calculate the total number of frames.

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```
G:\Semesters\Programming Fundamentals (Fall 2023)\Week 3\Programming Day Tasks>Task02.exe
Number of Minutes: 10
Frames per Second: 25
Total Number of Frames: 15000

G:\Semesters\Programming Fundamentals (Fall 2023)\Week 3\Programming Day Tasks>Task02.exe
Number of Minutes: 1
Frames per Second: 1
Total Number of Frames: 60
```

Task 03(CP): (Cars Velocity Calculation)

A toy car accelerates from initial velocity to final velocity in some time. You have to write the C++ program for calculating the Final Velocity. Take initial velocity, acceleration, and time as input from the user and calculate the final velocity of the car, and display it on the screen.

The formula to Calculate the Acceleration is

Acceleration = (Final velocity - Initial velocity) / Time

Remember: You have to calculate the final velocity

```
G:\Semesters\Programming Fundamentals (Fall 2023)\Week 3\Programming Day Tasks>Task03.exe
Enter Initial Velocity (m/s): 10
Enter Acceleration (m/s^2): 23
Enter Time (s): 2
Final Velocity (m/s): 56

G:\Semesters\Programming Fundamentals (Fall 2023)\Week 3\Programming Day Tasks>Task03.exe
Enter Initial Velocity (m/s): 11
Enter Acceleration (m/s^2): 34
Enter Time (s): 7
Final Velocity (m/s): 249
```

Task 04(CP): (Among Us)

Create a program that calculates the chance of being an imposter in the **AMONG US**  game. The formula for the chances of being an imposter is **100 × (i / p)** where i is the imposter count and p is the player count. Make sure to round the value as integer and print the value as a percentage.

```
G:\Semesters\Programming Fundamentals (Fall 2023)\Week 3\Programming Day Tasks>Task04.exe
Enter Imposter Count: 3
Enter Player Count: 15
Chance of being an imposter: 20%
```

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```
G:\Semesters\Programming Fundamentals (Fall 2023)\Week 3\Programming Day Tasks>Task04.exe
Enter Imposter Count: 2
Enter Player Count: 5
Chance of being an imposter: 40%

G:\Semesters\Programming Fundamentals (Fall 2023)\Week 3\Programming Day Tasks>Task04.exe
Enter Imposter Count: 1
Enter Player Count: 8
Chance of being an imposter: 12%
```

Task 05(CP): (Weight Loss Calculation)

A clinic has hired you to develop a software tool that helps individuals calculate the time it will take to achieve their weight loss goals by following specific recommendations. The clinic wants to provide a user-friendly solution for their clients who are looking to lose weight and improve their health.

The doctor at the clinic has provided the following weight loss recommendations:

- Consume a daily calorie intake of 4000 calories.
- Engage in one hour of walking every day.

The doctor informs clients that by strictly adhering to these suggestions, they can expect to lose 1 kilogram of weight after 15 days. The clinic wants the software to allow users to input their name and calculate the number of days required to lose a specified amount of weight based on these recommendations.

```
G:\Semesters\Programming Fundamentals (Fall 2023)\Week 3\Programming Day Tasks>Task05.exe
Enter the Name of the Person: Amir
Enter the target weight loss in kilograms: 12
Amir will need 180 days to lose 12 kg of weight by following the doctor's suggestions

G:\Semesters\Programming Fundamentals (Fall 2023)\Week 3\Programming Day Tasks>Task05.exe
Enter the Name of the Person: Fatima
Enter the target weight loss in kilograms: 14.5
Fatima will need 217.5 days to lose 14.5 kg of weight by following the doctor's suggestions
```

Task 06(CP): (Summer Project)

During each summer, Ahmad and Fatima grow vegetables in their backyard and buy seeds and fertilizer from a local nursery. The nursery carries different types of vegetable fertilizers in

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various bag sizes. When buying a particular fertilizer, they want to know the price of the fertilizer per pound and the cost of fertilizing per square foot. Write a c++ program that inputs

1. the size of the fertilizer bag in pounds.
2. the cost of the bag.
3. and the area in square feet that can be covered by the bag.

The Algorithm should then output

1. the cost of the fertilizer per pound.
2. the cost of fertilizing the area per square foot.

```
G:\Semesters\Programming Fundamentals (Fall 2023)\Week 3\Programming Day Tasks>Task06.exe
Enter the size of the fertilizer bag in pounds: 5
Enter the cost of the bag: $500
Enter the area in square feet that can be covered by the bag: 10
Cost of fertilizer per pound: $100
Cost of fertilizing per square foot: $50
```

Task 07(CP): (Movie Theater)

A movie in a local theater is in great demand. To help a local charity, the theater owner has decided to donate to the charity a portion of the total amount generated from the movie. Write a c++ program that prompts the user to input the

1. Movie name
2. Adult ticket price
3. Child ticket price
4. The number of adult tickets sold.
5. The number of child tickets sold.
6. Percentage of the amount to be donated to the charity.

First of all, you have to Calculate the total amount generated by the total sold tickets. Then after donating to the charity from the total amount, show the remaining amount achieved from the movie on the Screen.

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```
G:\Semesters\Programming Fundamentals (Fall 2023)\Week 3\Programming Day Tasks>Task07.exe
Enter the movie name: Avengers
Enter the adult ticket price: $20
Enter the child ticket price: $10
Enter the number of adult tickets sold: 1000
Enter the number of child tickets sold: 5000
Enter the percentage of the amount to be donated to charity: 10

Movie: Avengers
Total amount generated from ticket sales: $70000
Donation to charity (10%): $7000
Remaining amount after donation: $63000
```

Task 08(CP): (Harvest Vegetables)

A gardener is selling his harvest on the vegetables market. He is selling vegetables for N coins per kilogram and fruits for M coins per kilogram. Write a program that calculates the earnings of the harvest in Rupees (Rps). Assume the Rps / coin rate is fixed: 1 Rp == 1.94 coins.

Input Data and Output Data:

Four numbers are read from the console, one per line:

- First line: vegetable price per kilogram – a floating-point number.
- Second line: fruit price per kilogram – a floating-point number.
- Third line: total kilograms of vegetables – an integer.
- Fourth line: total kilograms of fruits – an integer.

The output should be the earnings of all fruits and vegetables in Rps on the console.

```
G:\Semesters\Programming Fundamentals (Fall 2023)\Week 3\Programming Day Tasks>Task08.exe
Enter vegetable price per kilogram (in coins): 0.194
Enter fruit price per kilogram (in coins): 19.4
Enter total kilograms of vegetables: 10
Enter total kilograms of fruits: 10
Total earnings in Rupees (Rps): 101
```

Task 09(CP): (4-digit Sum)

Imagine you have a 4-digit number that you want to explore further. You're curious about the individual digits that make up this number and their sum. You know that there's a mathematical operator called the modulus operator, often represented by the symbol '%', which returns the remainder when one number is divided by another.

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Here's a quick example of how the modulus operator works:

- When you take the modulus of 4 with 3, it returns 1 because 4 divided by 3 leaves a remainder of 1.
- If you try 7 % 4, it returns 3 because 7 divided by 4 leaves a remainder of 3.
- If you try 7 % 10, it returns 7 because 7 divided by 10 leaves a remainder of 7.

With this knowledge in mind, create a C++ program to calculate the sum of the individual digits of a 4-digit number. This program will allow you to input any 4-digit number, and it will use the modulus operator to extract each digit and find their sum.

```
G:\Semesters\Programming Fundamentals (Fall 2023)\Week 3\Programming Day Tasks>Task09.exe
Enter a 4-digit number: 1234
Sum of the individual digits: 10


G:\Semesters\Programming Fundamentals (Fall 2023)\Week 3\Programming Day Tasks>Task09.exe
Enter a 4-digit number: 4901
Sum of the individual digits: 14
```

Task 10(CP): (Complex Calculation)

Imagine a program that takes 15 numbers as input, with a specific plan in mind for mathematical operations. The program's goal is to perform various calculations on these numbers in a structured manner.

Here's how the program works:

1. The program prompts the user to enter 15 numbers, one at a time.
2. It then proceeds to execute three distinct mathematical operations:
    - It adds together the first 5 numbers.
    - It multiplies the next 5 numbers.
    - It subtracts the last 5 numbers.
3. After obtaining the results of these three operations, the program continues its mathematical exploration:
    - It adds the results of the addition and multiplication.
    - It subtracts the result of the subtraction.
4. Finally, the program displays the ultimate result on the screen.

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```
G:\Semesters\Programming Fundamentals (Fall 2023)\Week 3\Programming Day Tasks>Task10.exe
Number 1: 1
Number 2: 2
Number 3: 3
Number 4: 4
Number 5: 5
Number 6: 0
Number 7: 57
Number 8: 45
Number 9: 76
Number 10: 345
Number 11: 565
Number 12: 34
Number 13: 23
Number 14: 65
Number 15: 34
The final result is: -394
```

Task 11(CP): (Residence History)

You are tasked with developing a program to analyze a person's residence history and calculate the average duration they've spent living in a single house. This calculation is based on two critical factors: the person's current age and the number of times they've moved from one house to another.

Input Data:

1. The person's age (age) represented as an integer.
2. The number of times they've moved house (moves) also represented as an integer.

The goal is to develop a program that can efficiently calculate the average number of years the person has lived in a single house based on this input.

```
G:\Semesters\Programming Fundamentals (Fall 2023)\Week 3\Programming Day Tasks>Task11.exe
Enter the person's age: 30
Enter the number of times they've moved: 2
Average number of years lived in the same house: 10


G:\Semesters\Programming Fundamentals (Fall 2023)\Week 3\Programming Day Tasks>Task11.exe
Enter the person's age: 41
Enter the number of times they've moved: 1
Average number of years lived in the same house: 20
```

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```
G:\Semesters\Programming Fundamentals (Fall 2023)\Week 3\Programming Day Tasks>Task11.exe
Enter the person's age: 80
Enter the number of times they've moved: 0
Average number of years lived in the same house: 80
```

Task12(CP): (Paint Walls)

I have a bucket containing an amount of navy blue paint and I'd like to paint as many walls as possible. Create a program that prints the number of complete walls that I can paint, before I need to head to the shops to buy more.

- n is the number of square meters I can paint.
- w and h are the widths and heights of a single wall in meters.

Notes

- Don't count a wall if I don't manage to finish painting all of it before I run out of paint.
- All walls will have the same dimensions.
- All numbers will be positive integers.

```
G:\Semesters\Programming Fundamentals (Fall 2023)\Week 3\Programming Day Tasks>Task12.exe
Number of square meters you can paint: 100
Width of the single wall (in meters): 4
Height of the single wall (in meters): 5
Number of walls you can paint: 5
```

```
G:\Semesters\Programming Fundamentals (Fall 2023)\Week 3\Programming Day Tasks>Task12.exe
Number of square meters you can paint: 10
Width of the single wall (in meters): 15
Height of the single wall (in meters): 12
Number of walls you can paint: 0
```

```
G:\Semesters\Programming Fundamentals (Fall 2023)\Week 3\Programming Day Tasks>Task12.exe
Number of square meters you can paint: 41
Width of the single wall (in meters): 3
Height of the single wall (in meters): 6
Number of walls you can paint: 2
```

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Task13(CP): (Food for Thought)

Write a program that takes 5 integers from the user and displays their sum on screen. **But** you can **only use two variables**.

Good Luck and Best Wishes !!

Happy Coding ahead :)

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