Programming Fundamentals

Programming Day - Week 06

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.

Let's do some coding.

Skill: Problem solving using Conditional Statements

Task 01(CP): (decideActivity)

Write a C++ program to print the appropriate activity depending on the variable temperature and humidity value. The table below assumes that the temperature can only be warm and cold, and the humidity can only be dry and humid.

If temperature is	If humidity is	Print this activity
warm	dry	Play tennis
warm	humid	swim
cold	dry	Play basketball
cold	humid	Watch tv

Write a C++ function named **decideActivity** that takes temperature and humidity as input and returns the appropriate activity according to the conditions.

```
G:\Semesters\Programming Fundamentals (Fall 2023)\Week 6\PD Tasks>Task1.exe
Enter temperature (warm or cold): warm
Enter humidity (dry or humid): dry
Recommended activity: Play tennis
G:\Semesters\Programming Fundamentals (Fall 2023)\Week 6\PD Tasks>Task1.exe
Enter temperature (warm or cold): cold
Enter humidity (dry or humid): humid
Recommended activity: Watch TV
G:\Semesters\Programming Fundamentals (Fall 2023)\Week 6\PD Tasks>Task1.exe
Enter temperature (warm or cold): warm
Enter humidity (dry or humid): humid
Recommended activity: Swim
```

Skill: Problem solving using Conditional Statements

Task 02(CP): (calculateGrade)

Jack is a teacher who needs a program that helps him to compile 8th class results. He has five subjects (English, Maths, Chemistry, Social Science, and Biology) marked in detail. Program asks the user to enter five subjects' marks, including student name and displays the total marks, percentage, grade (by percentage), and student name. Every subject has a total of 100 marks. Grading policy details are mentioned below.

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Percentage	Grade
90-100 percentage	A+
80-90 percentage	A
70-80 percentage	B+
60-70 percentage	B
50-60 percentage	C
40-50 percentage	D
Below 40 percentage	F

Your task is to create 2 functions.

1. ```float calculateAverage(float marksEnglish, float marksMaths, float marksChemistry, float marksSocialScience, float marksBiology)```

2. ```string calculateGrade(float average)```

1st function should take all the marks and then return the average of the marks then 2nd function should take the average and then return the grade as string.

Skill: Problem solving using Conditional Statements

```
G:\Semesters\Programming Fundamentals (Fall 2023)\Week 6\PD Tasks>Task2.exe
Enter student name: Asad
Enter marks for English: 40
Enter marks for Maths: 50
Enter marks for Chemistry: 60
Enter marks for Social Science: 70
Enter marks for Biology: 80
Student Name: Asad
Percentage: 60%
Grade: B
G:\Semesters\Programming Fundamentals (Fall 2023)\Week 6\PD Tasks>Task2.exe
Enter student name: Fatima
Enter marks for English: 89
Enter marks for Maths: 87
Enter marks for Chemistry: 76
Enter marks for Social Science: 56
Enter marks for Biology: 76
Student Name: Fatima
Percentage: 76.8%
Grade: B+
```

Task 03(CP): (Zodiac sign)

Write a Program to display an Astrological sign or a Zodiac sign for a given date of birth. Zodiac Signs according to the dates and months are given below.

Zodiac Sign	Dates of Birth	Symbol
Aries	Match 21 - April 19	The Ram
Taurus	April 20 - May 20	The Bull
Gemini	May 21 - June 20	The Twins
Cancer	June 21 - July 22	The Crab
Leo	July 23 - August 22	The Lion
Virgo	August 23 - September 22	The Virgin
Libra	September 23 - October 22	The Scales
Scorpio	October 23 - November 21	The Scorpion
Sagittarius	November 22 - December 21	The Archer
Capricorn	December 22 - January 19	The Goat
Aquarius	January 20 - February 18	The Water Bearer

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Pisces	February 19 - Match 20	The Fishes

The program takes the date and month of birth as input and then displays the astrological sign or Zodiac sign according to that input.

Test Cases:

Input	Output	Explanation
Day = 10 Month = December	Sagittarius	People born on this data have zodiac Sagittarius.
Day = 7 Month = September	Virgo	

Your task is to write the function with the following prototype

1. ```string findZodiacSign(int day, string month)```

```
G:\Semesters\Programming Fundamentals (Fall 2023)\Week 6\PD Tasks>Task3.exe
Enter the day of birth: 21
Enter the month of birth (e.g., January, February): March
Zodiac Sign: Aries

G:\Semesters\Programming Fundamentals (Fall 2023)\Week 6\PD Tasks>Task3.exe
Enter the day of birth: 20
Enter the month of birth (e.g., January, February): May
Zodiac Sign: Taurus

G:\Semesters\Programming Fundamentals (Fall 2023)\Week 6\PD Tasks>Task3.exe
Enter the day of birth: 21
Enter the month of birth (e.g., January, February): May
Zodiac Sign: Gemini
```

Task 04(CP): (CellularCompany)

Write a program that calculates and prints the bill for a cellular telephone company. The company offers two types of service: regular and premium. Its rates vary, depending on the type of service. The rates are computed as follows:

Regular service: $10.00 plus the first 50 minutes are free. Charges for over 50 minutes are $0.20 per minute.

Premium service: $25.00 plus:

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- For calls made during the day., the first 75 minutes are free; charges for more than 75 minutes are $0.10 per minute.
- For calls made during the night, the first 100 minutes are free; charges for more than 100 minutes are $0.05 per minute.

Your program should prompt the user to enter a **service code** (type char), and **the number of minutes** the service was used.

A service code of r or R means regular service; a service code of p or P means premium service. **Treat any other character as an error**. Your program should output the type of service, the number of minutes the telephone service was used, and the amount due from the user.

For the premium service, the customer may be using the service during the day and the night(d or D for day and n or N for the night). Therefore, to calculate the bill, you must ask the user to input the number of minutes the service was used during the day and the number of minutes the service was used during the night.

Test case

```
G:\Semesters\Programming Fundamentals (Fall 2023)\Week 6\PD Tasks>Task4.exe
Enter the service code (R/r for regular, P/p for premium): P
Enter time of the call (D/d for day, N/n for night): N
Enter the number of minutes used: 57
Service Type: Premium
Total Minutes Used: 57 minutes
Amount Due: $25

G:\Semesters\Programming Fundamentals (Fall 2023)\Week 6\PD Tasks>Task4.exe
Enter the service code (R/r for regular, P/p for premium): r
Enter the number of minutes used: 57
Service Type: Regular
Total Minutes Used: 57 minutes
Amount Due: $11.4
```

Skill: Problem solving using Conditional Statements

Task 05(CP): (Fruit Shop)

A fruit shop during weekdays sells at the following prices:

Fruit	Price
banana	2.50
apple	1.20
orange	0.85
grapefruit	1.45
kiwi	2.70
pineapple	5.50
grapes	3.85

During the weekend days the prices are higher:

Fruit	Price
banana	2.70
apple	1.25
orange	0.90
grapefruit	1.60
kiwi	3.00
pineapple	5.60
grapes	4.20

Write a program that reads from the console a fruit (banana/apple / …), a day of the week (Monday / Tuesday / …) and a quantity (a decimal number) and calculates the price according to the prices from the tables above. Print "error" if it is an invalid day of the week or an invalid name of a fruit.

Test Cases:

Input	Output
orange Sunday 3	2.7
kiwi Monday 2.5	6.75

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grapes Saturday 0.5	2.1

Write the function with the following prototype

1. `float calculateFruitPrice(string fruit, string dayOfWeek, double quantity)`

Task 06(CP): (calculateHotelPrices)

A hotel offers two types of rooms: studio and apartment. Prices are in dollars ($). Write a program that calculates the price of the whole stay for a studio and apartment. Prices depend on the month of the stay:

May and October	June and September	July and August
Studio- 50$ / per night	Studio - 75.20$ / per night	Studio 76$ / per night
Apartment - 65$ / per night	Apartment - 68.70$ /per night	Apartment - 77$ / per night

The following discounts are also offered:
- For a studio, in case of more than 7 stays in May and October: 5% discount.
- For a studio, in case of more than 14 stays in May and October: 30% discount.
- For a studio, in case of more than 14 stays in June and September: 20% discount.
- For an apartment, in case of more than 14 stays, no limitation regarding the month: 10% discount.

Input Data

The input data is read from the console and contains exactly two lines:
- The first line contains the month – May, June, July, August, September or October.
- The second line is the number of stays – integer within the range [0 … 200].

Output Data

Print the following two lines on the console:
- On the first line: "Apartment: { price for the whole stay }$."
- On the second line: "Studio: { price for the whole stay }$."

Test Cases:

Input	Output	Comments

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May 15	Apartment: 877.50$. Studio: 525.00$.	In May, in the case of more than 14 stays, the discount for the studio is 30% (50 - 15 = 35), and for the apartment is 10% (65 - 6.5 = 68.5). The whole stay in the apartment: 877.50 lv The whole stay in the studio: 525.00 lv
June 14	Apartment: 961.80$. Studio: 1052.80$.	
August 20	Apartment: 1386.00$. Studio: 1520.00$.	

Function prototype should be:

1. `string calculateHotelPrices(string month, int numberOfStays)`

```
G:\Semesters\Programming Fundamentals (Fall 2023)\Week 6\PD Tasks>Task6.exe
Enter the month (May, June, July, August, September, October): May
Enter the number of stays: 15
Apartment: 877.500000$.
Studio: 525.000000$.
G:\Semesters\Programming Fundamentals (Fall 2023)\Week 6\PD Tasks>Task6.exe
Enter the month (May, June, July, August, September, October): June
Enter the number of stays: 14
Apartment: 961.799927$.
Studio: 1052.799927$.
G:\Semesters\Programming Fundamentals (Fall 2023)\Week 6\PD Tasks>Task6.exe
Enter the month (May, June, July, August, September, October): August
Enter the number of stays: 20
Apartment: 1386.000000$.
Studio: 1520.000000$.
```

Task 07(CP): (checkStudentStatus)

A student has to attend an exam at a particular time (for example, at 9:30 am). They arrive in the exam room at a particular time of arrival (for example 9:40 am). It is considered that the student has arrived on time if they have arrived at the time when the exam starts or up to half an hour earlier. If the student has arrived more than 30 minutes earlier, the student has come too early. If they have arrived after the time when the exam starts, they are late.

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Write a program that inputs the exam starting time and the time of the student's arrival, and prints if the student has arrived on time, if they have arrived early or if they are late, as well as how many hours or minutes the student is early or late.

Input Data

Read the following four integers (one on each line) from the console:

- The first line contains exam starting time (hours) – an integer from 0 to 23.
- The second line contains the exam starting time (minutes) – an integer from 0 to 59.
- The third line contains an hour of arrival – an integer from 0 to 23.
- The fourth line contains minutes of arrival – an integer from 0 to 59.

Output Data

Print the following on the first line on the console:

- "Late", if the student arrives later compared to the exam starting time.
- "On time", if the student arrives exactly at the exam starting time or up to 30 minutes earlier.
- "Early", if the student arrives more than 30 minutes before the exam's starting time.

If the student arrives with more than one minute difference compared to the exam starting time, print on the next line:

- "mm minutes before the start" for arriving less than an hour earlier.
- "hh:mm hours before the start" for arriving 1 hour or earlier. Always print minutes using 2 digits, for example "1:05".
- "mm minutes after the start" for arriving more than an hour late.
- "hh:mm hours after the start" for arriving late by 1 hour or more. Always print minutes using 2 digits, for example, "1:03".

Test Cases

Input	Output
Exam Starting Time (hour): 9 Exam Starting Time (minutes): 30 Student hour of arrival: 9 Student minutes of arrival: 50	Late 20 minutes after the start
Exam Starting Time (hour): 16 Exam Starting Time (minutes): 0 Student hour of arrival: 15 Student minutes of arrival: 0	Early 1:0 hours before the start

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Exam Starting Time (hour): 9 Exam Starting Time (minutes): 0 Student hour of arrival: 8 Student minutes of arrival: 30	On time 30 minutes before the start
Exam Starting Time (hour): 9 Exam Starting Time (minutes): 0 Student hour of arrival: 10 Student minutes of arrival: 30	Late 1:30 hours after the start
Exam Starting Time (hour): 14 Exam Starting Time (minutes): 0 Student hour of arrival: 13 Student minutes of arrival: 55	On time 5 minutes before the start
Exam Starting Time (hour): 11 Exam Starting Time (minutes): 30 Student hour of arrival: 8 Student minutes of arrival: 12	Early 3:18 hours before the start
Exam Starting Time (hour): 11 Exam Starting Time (minutes): 0 Student hour of arrival: 11 Student minutes of arrival: 0	On time
Exam Starting Time (hour): 11 Exam Starting Time (minutes): 30 Student hour of arrival: 10 Student minutes of arrival: 55	Early 35 minutes before the start
Exam Starting Time (hour): 11 Exam Starting Time (minutes): 30 Student hour of arrival: 12 Student minutes of arrival: 29	Late 59 minutes after the start

Write the function with the following prototype

1. `string checkStudentStatus(int examHour, int examMinute, int studentHour, int studentMinute)`

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```
G:\Semesters\Programming Fundamentals (Fall 2023)\Week 6\PD Tasks>Task7.exe
Enter Exam Starting Time (hour): 11
Enter Exam Starting Time (minutes): 30
Enter Student hour of arrival: 8
Enter Student minutes of arrival: 12
Early
Test: 198
3:18 hours before the start

G:\Semesters\Programming Fundamentals (Fall 2023)\Week 6\PD Tasks>Task7.exe
Enter Exam Starting Time (hour): 11
Enter Exam Starting Time (minutes): 0
Enter Student hour of arrival: 11
Enter Student minutes of arrival: 0
On time

G:\Semesters\Programming Fundamentals (Fall 2023)\Week 6\PD Tasks>Task7.exe
Enter Exam Starting Time (hour): 11
Enter Exam Starting Time (minutes): 30
Enter Student hour of arrival: 10
Enter Student minutes of arrival: 55
Early
Test: 35
35 minutes before the start
```

Task 08(CP): (calculateVolleyballGames)

Vladimir is a student, who lives in Sofia, and goes to his hometown from time to time. He is very keen on volleyball, but is busy during **weekdays** and plays volleyball only during **weekends and on holidays**. Vladimir plays in Sofia every Saturday when **he is not working**, and **he is not traveling** to his hometown, and also during **2/3** of the holidays. He travels to his hometown h times a year, where he plays volleyball with his old friends on **Sunday**. Vladimir is not working **3/4** of the weekends, during which he is in Sofia. Furthermore, **during leap years Vladimir plays 15% more volleyball than usual**. We accept that the **year has exactly 48 weekends**, suitable for volleyball. Write a program that calculates how many times Vladimir has played volleyball throughout the year. Round the result down to the nearest whole number (e.g. 2.15 -> 2 || 9.95 -> 9).

The input data is read from the console:

- The first line contains the word "leap" (leap year) or "normal" (a normal year with 365 days).

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- The second line contains the integer p – the count of holidays in the year (which are not Saturday or Sunday).
- The third line contains the integer h – the count of weekends, in which Vladimir travels to his hometown.

Input	Output	Input	Output
leap 5 2	45	normal 3 2	38

Input	Output	Input	Output
normal 11 6	44	leap 0 1	41

Write the function with the following protoptype

```
int calculateVolleyballGames(string yearType, int holidays, int hometownWeekends)
```

```
G:\Semesters\Programming Fundamentals (Fall 2023)\Week 6\PD Tasks>Task8.exe
Enter year type: leap
Enter number of holidays: 0
Enter number of weekends: 1
41

G:\Semesters\Programming Fundamentals (Fall 2023)\Week 6\PD Tasks>Task8.exe
Enter year type: normal
Enter number of holidays: 3
Enter number of weekends: 2
38

G:\Semesters\Programming Fundamentals (Fall 2023)\Week 6\PD Tasks>Task8.exe
Enter year type: leap
Enter number of holidays: 5
Enter number of weekends: 2
45
```

Task 09(CP): (checkPointPosition)

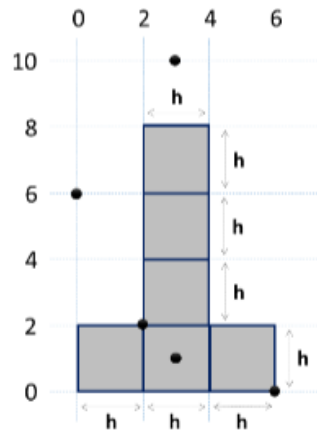**Skill:** Problem solving using Conditional Statements

The figure consists of 6 blocks with size h * h, placed as in the figure below. The lower left angle of the building is at position {0, 0}. The upper right angle of the figure is on position {2*h, 4*h}. The coordinates given in the figure are for h = 2:

Write a program that enters an integer h and the coordinates of a given point {x, y} (integers) and prints whether the point is inside the figure (inside), outside of the figure (outside) or on any of the borders of the figure (border).

Sample Input and Output:

Input	Output
2 3 10	Outside
2 3 1	Inside
2 2 2	Border
2 6 0	Border
2 0 6	Outside
15	Outside

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13 55	
15 29 37	Inside

Function prototype should be:

```
string checkPointPosition(int h, int x, int y)
```

```
G:\Semesters\Programming Fundamentals (Fall 2023)\Week 6\PD Tasks>Task9.exe
Enter height: 15
Enter x coordinate: 29
Enter y coordinate: 37
Inside

G:\Semesters\Programming Fundamentals (Fall 2023)\Week 6\PD Tasks>Task9.exe
Enter height: 15
Enter x coordinate: 35
Enter y coordinate: 59
Outside

G:\Semesters\Programming Fundamentals (Fall 2023)\Week 6\PD Tasks>Task9.exe
Enter height: 2
Enter x coordinate: 6
Enter y coordinate: 0
Outside
```

Skill: Problem solving using Conditional Statements

Skill: Patrolling Objects inside boundaries

Task 10(CP):

Update your game in which there should be 3 enemies now that are patrolling horizontally and vertically and diagonally Also add a Bonus pill in the game, when the player collects it, it increments the game score. Additionally, display the score at all times in the game.

Good Luck and Best Wishes !!

Happy Coding ahead :)