

IT1134 (P) – Fundamental of Programming (P)

Tutorial -01

1. Write a C++ program that calculates the energy needed to heat water from an initial temperature to a final temperature. Your program should prompt the user to enter the amount of water in kilograms and the initial and final temperatures of the water. The formula to compute the energy is

$$Q=M*(\text{finalTemperature}-\text{initialTemperature}) * 4184$$

where M is the weight of water in kilograms, temperatures are in degrees Celsius, and energy Q is measured in joules.

Sample Output

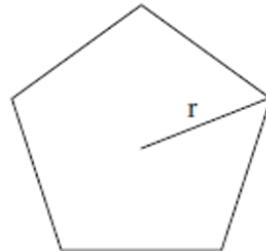
```
Enter the amount of water in kilograms: 55.5
Enter the initial temperature: 3.5
Enter the final temperature: 10.5
The energy needed is 1625484.0
```

2. Body Mass Index (BMI) is a measure of health based on height and weight. You can calculate your BMI by taking your weight in kilograms and dividing it by the square of your height in meters. The interpretation of BMI for people 20 years or older is as follows

BMI	Interpretation
$\text{BMI} < 18.5$	Underweight
$18.5 \leq \text{BMI} < 25.0$	Normal
$25.0 \leq \text{BMI} < 30.0$	Overweight
$30.0 \leq \text{BMI}$	Obese

Write a program that prompts the user to enter a weight in pounds and height in inches and displays the interpretation of the corresponding BMI. Note that one pound is 0.45359237 kilograms and one inch is 0.0254 meters.

3. Write a program that prompts a user to enter the length (r) from the center of a regular pentagon (all the sides are equal in length) to a vertex and computes the perimeter and area of the pentagon, as shown in the following figure:



The formula for computing the area of a pentagon is

$$Area = \frac{5 \times s^2}{4 \times \tan(\pi/5)}$$

where s is the length of a side. The side can be computed using $s = 2r\sin(\pi/5)$, and r is the length from the center of a pentagon to a vertex.

Display the length of a side, perimeter, and area with only two digits after the decimal point.

Note: Define $\pi=314159265$ as a constant.

Here is an example of a test run:

Enter the length from the center to a vertex: 5.5

The length of a side of the pentagon is 6.47

The perimeter of the pentagon is 32.33

The area of the pentagon is 71.92

4. Write a C++ program (With sample input and output) to Read salary of an employee, and Calculate and Display the tax, given the following conditions:

If salary is less than 20000 then no tax.

If salary is in the range of 20000 salary < 30000 then 10% tax.

If salary is in the range of 30000 salary < 50000 then charge 20% tax

If salary 50000 then charge 30% tax

The tax percentage is computed based on the salary.

Sample output of the program is given below:

Please Input Your Salary: 35000

Your Tax Amount is 7000

Please Input Your Salary: 15000

Your Tax Amount is 0

5. Write a program that calculates the monthly salary of a salesperson at a company with the following description:

- **The monthly salary of a salesperson is calculated as:**

salary = base salary + bonus + commission

- **Every salesperson has a base salary. The salesperson also receives a bonus at the end of each month, based on the following criteria:**

If the salesperson has been with the company for five years or less, the bonus is Rs. 1000 for each year that he or she has worked there. If the salesperson has been with the company for more than five years, the bonus is Rs. 2000 for each year that he or she has worked there

- **The salesperson can earn a commission, at the end of each month, based on the following criteria:**

If the total sales made by the salesperson for the month is Rs. 5,000 or more, but less than Rs. 10,000, he or she receives a 3% commission on the total sale.

If the total sales made by the salesperson for the month is at least Rs. 10,000, he or she receives a 6% commission on the total sale.

- To calculate a salespersons monthly salary, you need to know the base salary, the number of years that the salesperson has been with the company, and the total sales made by the salesperson for that month.

Sample runs of the program are given below

Month: August Year:2019

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Enter the Base Salary: 40000

Enter the Number of Years: 4

Enter the Total sales: 7000 Salary: 44120

6. Write a program to determine if three side lengths can make a triangle. The program should ask three lengths from the user.

Hint:

The Triangle Inequality Theorem states that the sum of two side lengths of a triangle is always greater than the third side.