



Purpose:

In this work sheet, you will familiarize yourself with conditional statements, in particular you will exercise if-statements, if-else statements, and switch statements.

Tasks:

1. A phone company bills the customer in a specific policy so that customers with heavy usage pay less per minute. According to this policy, if customer spoke x minutes in total for the month:

- if x is less than or equal to BASE, S/he pays $\text{BASE} \times 0.90$ TL regardless of the value of x .
- if x is between BASE and MIDDLE, S/he pays $x \times 0.90$ TL.
- if x is between MIDDLE and HIGH, S/he pays $x \times 0.75$ TL.
- if x is greater than HIGH, S/he pays $x \times 0.60$ TL.

BASE, MIDDLE and HIGH are defined constants in the program as:

```
#define BASE 30
#define MIDDLE 80
#define HIGH 130
```

a) Write a program assuming x is a double value, and calculate the bill in TL. Format your output to 2 decimal digits after dot.

Sample run (user input is shown in bold):

```
Enter the number of minutes of talk: 100.47
Total amount you need to pay is: 75.25 TL
```

b) Assume instead of x as a double you input three integers hours, minutes and seconds that the user talked. For example input "2 5 45" means 02:05.45, 2 hours 5 minutes 45 seconds. Your multipliers and decisions remains the same, however smallest units that company bills is 8 seconds. That means you should round the talk amount to closest greater value divisible by 8. For example if user spoke 1 minute 2 seconds, it is 62 seconds and you should round it up to 64, first value divisible to 8. Then it is 1 minute 4 seconds, and make your calculations based on that. (note that a minute is 60 seconds, you should make TL per minute calculation based on that).

Sample run:

```
Enter the hours, minutes and seconds of talk: 1 35 2
Total amount you need to pay is: 71.30 TL
```

(01:35:02 is 95 minutes 02 seconds, it is 5702 seconds, you need to round it up to 5704. 95.066 is in MIDDLE to HIGH range, multiplier is 0.75. 95.066×0.75 is 71.30.)

c) Assume government makes your life a little harder to collect taxes from these bills. The tax for the base amount ($\text{BASE} \times 0.90$) is 8% and the tax on the rest of the bill is 18%. That means the tax on small bills is:

$\text{BASE} \times 0.9 \times 0.08$,

The tax on larger bills is:

$(\text{BASE} \times 0.9) \times 0.08 + (x - (\text{BASE} \times 0.9)) \times 0.18$

Taxes are output separately:

Sample Run:

```
Enter the hours, minutes and seconds of talk: 1 35 2
```

Amount for your talks: 71.25TL
Taxes: 12.24TL
You need to pay in total: 83.49TL

2. For a mechanical system, the applied force p is expressed as a function of time t by the following formula:

$$p(t) = \begin{cases} 20 & \text{if } t \leq 3 \\ 4(t+2) & \text{if } t > 3 \leq 6 \\ 4(t^2 + 2t) & \text{if } t > 6 \end{cases}$$

You need to write a program that takes the value of t and returns the value of $p(t)$.

Sample run:

Enter t value: 5
 $p(t)$ is 7.00

3. According to the American Heart Association the formula for calculating the *maximum heart rate* in beats per minute is 220 minus your age in years. Your *target heart rate* is a range that is between 50 - 85 of your maximum heart rate. Write a program that takes the user's birthday and the current day (in terms of day, month and year). Your program should calculate and display person's age (in years), the person's maximum heart rate and also the person's target heart rate.

Sample run:

Enter your birthday: 11/7/2011
Enter current date: 18/3/2021
You are 10 years old
Your maximum heart rate in beats per minute is 210
Your target heart rate is between 105.0 and 178.5

4. "Herd immunity", also known as "population immunity", is the indirect protection from an infectious disease that happens when a population is immune either through vaccination. Experts have estimated that 70 percent of people may need to be immune against the virus to achieve herd immunity. Write a C program that gets the population of a country and the number of vaccinated people, then computes and prints % of people vaccinated. If that percentage (%) is greater than 70% then your program should display "Your country is immune against the virus", otherwise it should display the % of people that should be vaccinated in order to be immune against the virus.

Sample run:

Enter your country population: 200000
Enter the number of people vaccinated: 10000
5% people vaccinated.
65% more people should be vaccinated to be immune against the virus.

Recommended Reading:

Chapter 4

Recommended Programming Exercises:

Exercises 4.1, 4.2, 4.3, 4.4., 4.5