

Practical exercises and finding solutions to problems.

How to find a solution:

1. **Read the task very carefully.** To help wrap your mind around the problem that you are facing, it may help you to say or write it out into your own words.
2. **Think of test data where you know the correct answers.**
 - a. Try to think of an input that would give you an positive/expected result (some random values where you know the outcome and can test the logic).
 - b. Try to think of an input that would give you an false/unexpected result.
 - c. Try to think of values that are on the edge (where a special logic might apply)

For example: finding square root:

1. *Expected result: sqrt of 4 is 2, sqrt of 16 is 4*
2. *Unexpected result: sqrt cannot be taken from negative value so a negative number, for example -4*
3. *Values on the edge: 0, 1*

For example: dividing:

1. *Expected result: 4 divided by 2 is 2, 1000 divided by 4 is 250.*
2. *Unexpected result: you cannot divide by 0*
3. *Values on the edge: the number itself*

For example: testing vending machine:

1. *Expected result: amount of money bigger than cost of drink; for example if the drink costs 75 and money entered is 100 then expected return is 25.*
2. *Unexpected result: any amount smaller than 75*
3. *Values on the edge: the cost of the drink itself, 75*

For example: finding if a word is a palindrome:

1. *Expected result: something that is a palindrome, for example a word 'madam'.*
2. *Unexpected result: a word that is not a palindrome, for example 'word'*
3. *Values on the edge: words with length 1*

3. Simulate the problem and possible solutions based on the sample values

Write out what you need to do in order to get the answer. Make a step-by-step list of the things that you will need to do to solve the problem. This list will help you to stay organized and focused as you solve the problem. You can also use it to estimate the answer to the problem before you actually solve it.

4. Simplify the problem.

Work on an easier problem. If there is an easier problem available that is similar to the one you are trying to solve, work on the easier problem first. Solving an easier problem that requires some of the same steps and formulas will help you to tackle the more difficult problem.

5. Find useful information

Read the task multiple times to sort out the information that is useful. For example if you have a description of the car (color, length, mark, make etc) but only need to make a method for repainting the car then you only need the information about colors and all information is redundant.

Tasks:

For every task:

first think WHAT information you have and what is the goal of the task

CREATE some test data to check the behaviour (positive and negative cases)

SIMULATE the task with real data and try to find the steps to solve it

- 1) During 1 minute, a bowl of soup will cool down 13% from the difference between room temp and soup temperature. (If room temp is 20 degrees and soup temp is 60 degrees the difference is 40 degrees. Soup will cool down then $40 \cdot 0.13 = 5.2$ degrees in one minute).
Write a method that asks soup and room temperature from the user and calculates how much will the soup cool down in 7 minutes.
- 2) Write a method that will return the validity of a car registration number. The method asks user for a car registration number and returns if the value is valid or not.
 - a. Reg number has to always contain 6 characters: 3 numbers and 3 letters
 - b. Letters cannot be 'äöüö'

Tip: check `string.Substring()` method

Help:

'a' - character, represents one letter or sign

"a"-string

--Check if string is numeric:

string a="56";

a.All(char.IsDigit) //is numeric, all characters are digits

--Check if string contains any value of char array:

`a.indexOfAny(charArray)!=-1`

check `indexOfAny()` method and see what it returns!

`IndexOf()` returns an index when the substring is found, but -1 if not. We must test for -1 if no value may exist.

- 3) Write a method for converting temperature from Fahrenheit to Celsius and vice versa. The method asks the user for a value, determines was it Fahrenheit or Celsius and then converts. If the value is not valid, then the program lets the user know.

For example:

'78F' -> „78F is 25.55C“

'30C' -> „30C is 86F “

'tere' -> not a valid value for temperature

- 4) We are hired by a factory that creates small details. They need help with creating a method for labeling the details. The company provides us with the beginning of the codes and we have to complete them. Rules for creating detail codes are:
- Total length of all the codes has to be 6 characters
 - We have to add random numbers in a way, that the code length would be 6.
 - If the beginning of the code contains letter 'x', all numbers we add have to be 0.

For example: 'trr' -> 'trr567'; 't' -> 't12345'; 'tx' -> 'tx0000'

Company gave us an input file with code beginnings; we have to complete the codes and save them to another file.

Codes provided by the company:
rtx
tyro
vff
o
x
kffrt

Tip: try to simplify the task and do it step by step:

- Try to add numeric values to random string: "rtx"->"rtx567"
- Try to add numeric values to a list of strings where strings have different length: rtx->rtx556, Tyro->tyro23, vff->vff531
- Add the reading from file
- Add the writing to file

- 5) Write a method determining whether the entered word is a palindrome or not.

A palindrome is a word, phrase, number, or other sequence of characters which reads the same backward as forward, such as madam or racecar.

- 6) Write a method finding what a number consists of (in the sense of hundredths and tenths etc).

Example:

Input: 43928

Output:

8

20

900

3000

40000

- 7) Write a class representing TV remote.

It has to have properties:

- Volume
- System status (on or off)

Methods for:

- Turning on the system
- Turning off the system
- Changing volume (adds +3 or -3 to previous volume value)

Constraints:

*All methods have to print out what they are doing, for example "Changed volume from 3 to 6"

*Volume can be only changed when the TV is turned on.

*Minimum volume is 0 and max is 15, if maximum or minimum value is reached then display a notification and do not change the value.