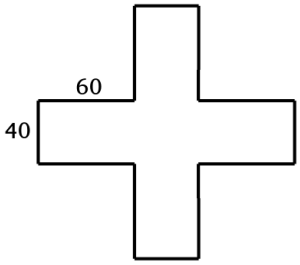
CS101 Lab Quiz 1 - Batch A
12 Feb 2024 - 20:45 hrs to 22:15 hrs
4 Compulsory Questions - 40 Marks

Instructions:

- Keep your ID card on the table for ready reference. If your ID card isn't with you, you won't be allowed to appear for the quiz/exam.
- Keep your phones, tablets, notes, bags, books, etc., near the instructor's platform.
- Rough sheets will be provided to you.
- **Create a folder on your `Desktop` and name it `submission_YourRollNumber`**
  E.g.: If my roll number is `23k1234` then my folder name is `submission_23k1234`
- **Create all four programs in the newly created folder.**
- Name the program files as mentioned in this pdf only.
- No clarifications will be provided for any question by anyone (TAs/Instructor). When in doubt, make suitable assumptions, state them clearly as comments in your program file itself, and proceed to solve the problem.
- Please note that your answers should NOT include any programming concept that hasn't been covered in the class. You are not allowed to use arrays, functions, strings, or any advanced concepts of C/C++. Such solutions will NOT be graded.
- Marks will be given for each hidden test case that passes.

Filename: LQ01_A_Q1.cpp **(8 Marks)**

Write a program to draw the figure given below (**Plus Sign**). The length of the lines is also mentioned in the figure itself (60 for the larger line and 40 for the smaller one). The length should not be drawn; it's just for illustration purposes. The entire figure should be clearly visible on the screen.



Input Format:
There will be no input

Output Format:
Figure corresponding to the image in question

Solution Program:

```
#include <simplecpp>
main_program {
   turtleSim();
   repeat(4) {
       forward(60);
       left(90);
       forward(40);
       left(90);
       forward(60);
       right(90);
   }
   wait(2);
}
```

Rubrics:

- Its ok if the size of the length is not exact. It should look similar to the one above

Filename: LQ01_A_Q2.cpp **(8 Marks)**

Write a C++ program that takes as input, P(principal), R(interest rate per annum), and T(time in years), and **computes SI (Simple Interest)**.

$SI = (P * R * T)/100$

Input Format:

The input consists of **three values separated by a space**: P, R, and T.

P and T are positive integers, and R is a positive floating number.

Output Format:

Print the Simple Interest value for the input

Constraints (Assume)

1 <= P <= 1500000

1 <= R <= 10

1 <= T <= 10

Note:

- Do not write any C++ statements for printing general messages. For example, the following **should NOT** be present in your program:
  a. **cout << "Enter a number:"**,
  b. **cout << "The computed answer is"**, etc.

  In addition, **do not** print unnecessary spaces unless specified in the program.
- You just have to print the final value.

Practice Test Cases (3):

Input	**Output**
10000 10 1	1000
50000 3.5 3	5250
66666 3.35 4	8933.24

Evaluation Test cases

Input	**Output**	**Rubrics**
32545 1.1 6	2147.97	• Each test case carries 2 marks i.e. (2 x 4 = 8 marks)
600000 9.8 1	58800	
450000 5.5 7	173250	
1200000 10.2 7	856800	

Solution Program:

```
#include<simplecpp>
main_program {
   int P, T;
   float R;
   cin >> P >> R >> T;
   float si = (P * R * T) / 100;
   cout << si;
}
```

Filename: LQ01_A_Q3.cpp **(10 Marks)**

In the class, we have looked at how one can store a character in a variable. Recall that character constants are enclosed within single quotes in C++. Assume that we need to initialize the alphabet T in the variable ch; the statement would be **`char ch = 'T';`.**

Write a C++ program that accepts a character (a lowercase or uppercase alphabet) from the user and determines whether the character is a vowel or a consonant. You can assume that only valid letters of the alphabet will be input in uppercase or lowercase.

Input Format:
The input consists of **one character**
Output Format:
Print "vowel" (without quotes) if the character is a vowel, otherwise, print "consonant" (without quotes)
***Note**:*

- Do not write any C++ statements for printing general messages. For example, the following **should NOT** be present in your program:
    a. **cout << "Enter a number:"**,
    b. **cout << "The computed answer is"**, etc.
  In addition, **do not** print unnecessary spaces unless specified in the program.
- You must print "vowel" or "consonant".

Practice Test Cases (3):

Input	**Output**
a	vowel
b	consonant
A	vowel

Evaluate Test case (5)

Input	**Output**	**Rubrics**
Q	consonant	• Each test case carries 2 marks i.e. (2 x 5 = 10 marks) • If there are spelling mistakes, then do not cut marks. Give full marks for that/those test cases
E	vowel	
u	vowel	
i	vowel	
r	consonant	

Solution Program

```
#include <simplecpp>
main_program {
    char character;
    cin>>character;

if(character=='a'||character=='e'||character=='i'||character=='o'||ch
aracter=='u'||character=='A'||character=='E'||character=='I'||charact
er=='O'||character=='U')
    {
        cout<<"vowel";
    }
    else{
        cout<<"consonant";
    }
    return 0;
}
```

Filename: LQ01_A_Q4.cpp **(14 Marks)**

Write a C++ program that accepts an integer **N** from the user and finds all prime factors of N.

Input Format:

The input consists of **one value**: N

Output Format:

Print all the prime factors of N from smallest to largest, each in the same line separated by a space.

Constraints (Assume)

2 <= N <= 10^6

***Note**:*

- Do not write any C++ statements for printing general messages. For example, the following **should NOT** be present in your program:
  a. **cout << "Enter a number:"**,
  b. **cout << "The computed answer is"**, etc.

  In addition, **do not** print unnecessary spaces unless specified in the program.
- You just have to print the numbers.

Practice Test Cases (3):

Input	**Output**
100	2 5
169	13
54	2 3

Explanation:

Consider the number 100. It can be written as 2x2x5x5. So the prime factors are 2 and 5.

Evaluate Test case

Input	**Output**	**Rubrics**
2310	2 3 5 7 11	• Each test case carries 2 marks i.e. (2 x 7 = 14 marks) • If all factors are printed instead of only the prime ones, then give 25% in that test case, i.e. 0.5 marks in that test case
189	3 7	
1805	5 19	
127	127	
243	3	
1225	5 7	
221	13 17	

Solution Program:

```
#include <simplecpp>
main_program {
    int N;
    cin >> N;
    int i=2;
    while(N>=i)
    {
        int prime = 1;
        for(int j=2;j<i;j++)
        {
            if(i%j==0)
            {
                prime=0;
                break;
            }
        }
        if(prime){
            int factor = -1;
            while(N%i==0)
            {
                factor = i;
                N = N/i;
            }
            if(factor!=-1)
                cout<<factor<<" ";
        }
        i++;
    }
    return 0;
}
```