



The Great Computer Challenge

C++

Division IV



Perfect Numbers

The Greeks began an examination of numerology by classifying all positive integers as either *perfect*, *abundant*, or *deficient*. This classification scheme is based on the factors (even divisors) of the number. If the sum of all of the factors of a number (excluding the number itself) equals the number then it is said to be a “perfect”. For example, the factors of 6 are 1, 2, 3, and 6. Therefore, the number 6 is a perfect number. The total of the factors of 6 (excluding the number itself, in this case 6) is $1 + 2 + 3 = 6$. An abundant number is one in which this sum of factors (excluding the number itself) is greater than the number. An example of an abundant number is 12, because the sum of the factors of 12 is greater than 12. ex. $1 + 2 + 3 + 4 + 6 = 16$ which is greater than 12. All numbers that are neither perfect nor abundant are deficient.

Write a program that prompts the user to enter a positive integer (allow integer values between 1 and 500). The program should at this point display the original number, the factors in that number and whether the number is perfect, abundant, or deficient.

EXAMPLE: (bolded values denote user input)

Please enter a positive integer: **6**

The factors of 6 are: 1, 2, 3, 6

The number 6 is perfect

Please enter a positive integer: **12**

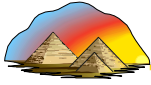
The factors of 12 are: 1, 2, 3, 4, 6, 12

The number 12 is abundant

Please enter a positive integer: **333**

The factors of 333 are: 1, 3, 9, 37, 111

The number 333 is deficient



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Pyramid of Letters

The Pyramid is a structure found in many cultures. This shape is often associated with supernatural power. You are asked to write a program that accepts a single character from “A” through “Z” and produces an output in the shape of a pyramid composed of the letters up to and including the letter that was input. The top letter in the pyramid should be an “A”. and on each level, the next letter in the alphabet should fall between the letter that was introduced in the level above it.

EXAMPLE: (bolded values denote user input)

Please enter the letter of choice:

E

Your pyramid is as follows:

```
  A
 ABA
ABCBA
ABCD CBA
ABCDEDCBA
```

Are there more letters? Enter Yes or No



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Roman Numeral Calculator

The Romans were noted for many significant advances in math, the sciences and fine arts. The numbering system they developed used Roman Numerals to common numeric values. The value of Roman digits are as follows:

I	1
V	5
X	10
L	50
C	100
D	500
M	1,000

Your program should prompt the user to enter Roman numbers and an arithmetic operator. After these have been input the program should perform the appropriate calculation and display the result. The arithmetic operators that your program should recognize are: +, -, *, and /.

EXAMPLE: (bolded values denote user input)

Please enter the first number:

MCCXXVI

Enter the second number:

LXIX

Enter the desired arithmetic operation:

+

The sum of MCCXXVI and LXIX is MCCLXXXV

Are there more number? Enter Yes or No



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Words for Profit

Abracadabra Press specializes in publishing short essays, and articles by fledgling young writers. As a money making enterprise, they charge each writer a fee for publishing their works. This makes it possible for them to make a handsome profit without being concerned about the quality of the material published.

You are asked to write a program to determine the number of words encountered in the input stream. For the sake of simplicity, a word is defined to be any sequence of characters except whitespace (spaces, tabs, and newlines). Words may be separated by any number of whitespace characters. A word may be of any length, from a single character to an entire line of characters.

The user is prompted to enter the text. The end of text should be delimited by the number sign "#". After accepting the input from the console, your program should print out the original text, the number of words, and the amount to be charged for publishing the manuscript. The price charged per word is 1.23.

EXAMPLE: (bolded values denote user input)

Please enter the text:

**This isn't exactly an example of g00d english, but it
does demonstrate that a w0rd is just a se@uence of
characters withou+ any blank\$. #**

Your text consisting of the following:

This isn't exactly an example of g00d english, but it
does demonstrate that a w0rd is just a se@uence of
characters withou+ any blank\$.

Total Number of Words = 24
Cost of Publishing = 29.52