

Programming Assignment - 1

Due Date : Wednesday September 9th 2020 No later than 11:15 PM

Write a C++ program that does the following :

Define a class numberManipulation that has as its single attribute an **integer** variable. The class contains member functions for determining the following information for an object of type numberManipulation:

The program accepts a **positive integer greater than zero and less than 200** from the keyboard. The program then calls the following functions :

1. Assuming that the number represent dollar amount , The function computes the number of quarters, dimes, nickels, and pennies to be displayed.
2. Assuming that the number represents a person's age. The function then calculates and displays statistics about the age. Assuming that there are 365 days in a year , The program displays the following information : -

Number of year , Number of months , numbers of days , number of hours , number of minutes , and number of seconds for the person.

3. A Function that separate the numbers into its individual digits and prints on the screen the digits separated from one another by three spaces each. The function then displays each digit of the integer in English.

For example, if the number is 12 , the output should be :

1 2
One Two

4. A positive integer is called an Armstrong number if the sum of cubes of individual digit is equal to that number itself. For example:

$153 = 1*1*1 + 5*5*5 + 3*3*3$ // 153 is an Armstrong number.
 12 is not equal to $1*1*1 + 2*2*2$ // 12 is not an Armstrong number.

5. Function that indicate whether or not the integer that the digit is a prime number. The function also display all the prime numbers between 1 and that number. For example, if the number is 4, the output should be :

4 is not prime

All primes between 1 and 4 are

2 number is prime
 3 number is prime

6. A function to display all hailstone sequence. Given any positive integer n , the ***hailstone sequence*** starting at n is obtained as follows. You write a sequence of numbers, one after another. Start by writing n . If n is even, then the next number is $n/2$. If n is odd, then the next number is $3n + 1$. Continue in this way until you write the number 1.

For example, The hailstone sequence starting at 7 is (7, 22, 11, 34, 17, 52, 26, 13, 40, 20, 10, 5, 16, 8, 4, 2, 1), and it contains 17 numbers. The hailstone sequence starting at 6 is (6, 3, 10, 5, 16, 8, 4, 2, 1), and the hailstone sequence starting at 1 is (1).

Note : The program must be running until the user decides to terminated it by entering n or N

Style Guidelines :

At the beginning of your program (and **before** the #include statement), include the following :

Header comments (file documentation block) should be at the top of each file and should contain: Author / s, Due Date, Assignment Number, Course number and section, Instructor, and a brief description of the purpose of the code in the file. For example :

```
//      Author / s : (Your name here!!)
//      Due Date :
//      Programming Assignment Number 1
//      Fall 2020 - CS 3358 - Section Number
//
//      Instructor: Husain Gholoom.
//
//      <Brief description of the purpose of the program>
```

Variable names :

- Must be meaningful.
- The initial letter should be lowercase, following words should be capitalized, no other caps or punctuation (i.e. `weightInPounds`).
- Each variable must be declared on a separate line with a descriptive comment.

Named constants :

- Use for most numeric literals.
- All capitals with underscores (i.e. `TX_STATE_SALES_TAX`)
- Should occur at top of function, or global (only if necessary)

Line length of source code should be no longer than 80 characters (no wrapping of lines).

Indentation :

- Use 2-4 spaces (but be consistent throughout your program).
- Indent blocks, within blocks, etc.
- Use blank lines to separate sections.

Comments for variables :

All variable definitions should be commented as follows:

```
int  gender;    // integer value for the gender,
                // 1 = Male , 2 = Female ,
```

Rules :

1. Your program **must compile** and run. The program will be tested using 17.12 version of Codeblocks for windows.
2. Your program must be properly **documented according the style above** . **See the website for the sample programming style program.**
3. Must **use a class with at least 6 functions** . You must also use **repetitions , control structures , and switch statements**. You are **not allowed** to use arrays .
4. You must use the appropriate libraries in writing this program.
5. Must properly format the output by use the appropriate library. See the output below. Also, **Replace my first / last name with your own first / last name.**
6. You must name your program as:
 - 3358_007_LastName_FirstName_PG1.cpp

Where LastName is your Last Name and FirstName is your First Name. For example , the file name should look something like : 3358_007_Gholoom_Husain_PG1.cpp (**not .cbp**)

7. You must upload your programs no later than the starting of class time on the due date. **No late assignments will be accepted.**

Use Canvas to upload your program .

The following points will be deducted if :

- Incorrect file format such as uploading .cbp instead of .cpp , missing electronic copy, not using classes (- 10 points)
- Compilation Errors (- 10 points)
- Logical Errors (at least - 1 point)
- Other (0.25 points) if any of the following takes a place :
 - Incorrect number of functions, missing switch statements .. etc
 - Incorrect Output format.
 - Incorrect program file name.
 - Incorrect Style **such as but not limited to** Missing Header / footer, missing comments or program documentations missing or incorrect section number ... etc

Sample Run

Welcome to My APP.

This APP accepts an integer from the keyboard.

The APP Calculates and Displays the Following :

1. Assuming that The integer represents a \$\$ amount, then the number of quarters, dimes, nickels, and pennies will be calculated and displayed
2. Assuming that the integer represents person's Age in years then, Number of months, days, hours, minutes, and seconds for the person will be calculated and displayed
3. The numbers will be separated into its individual digits. Then each digit of the integer will be displayed in English.
4. Indicate whether or not the integer is an arm strong number.
5. Indicate whether or not the integer is prime. Then, All the prime numbers between 1 and that number will also be displayed.
6. The hailstone sequence starting at n will be calculated and displayed

Enter a Positive integer Number > 0 and < 200 ---> 12

Currency Calculation

\$12 is equivalent to:

48	quarter/s
120	dime/s
240	nickel/s
1200	cent/s

Age Calculation

Assuming that you are 12 year's old, then

You are 144 months old

You are 4380 days old

You are approximately 105120 hours old

You are approximately 6307200 minutes old

You are approximately 378432000 seconds old

Separating digits for the integer 12

1 2

one two

12 is NOT an Armstrong Number

12 number is not prime

All prime numbers between 1 and 12 are

2 number is prime

3 number is prime

5 number is prime

7 number is prime

11 number is prime

The sequence of hailstone starting at 12 is

12 6 3 10 5 16 8 4 2 1

Would like to try for another number ?

Enter y || Y for yes or n || N for no ---> Y

Enter a Positive integer Number > 0 and < 200 ---> -10

Error *** Number must be > 0 and < 200

Would like to try for another number?
Enter y || Y for yes or n || N for no ---> y

Enter a Positive integer Number > 0 and < 200 ---> 300

Error *** Number must be > 0 and < 200

Would like to try for another number ?
Enter y || Y for yes or n || N for no ---> Y

Enter a Positive integer Number > 0 and < 200 ---> P

Error *** Incorrect input - You entered a character
Enter a Positive Integer

Would like to try for another number ?
Enter y || Y for yes or n || N for no ---> B

Error *** Invalid choice - Must be Y || y || N || n

Would like to try for another number ?
Enter y || Y for yes or n || N for no ---> n

9 - 9 – 2020 Implemented by Husain Gholoom