- Question:

The International Mobile Station Equipment Identity or IMEI is a number, usually unique, to identify mobile phones, as well as some satellite phones. It is usually found printed inside the battery compartment of the phone.

The IMEI number is used by a GSM network to identify valid devices and therefore can be used for stopping a stolen phone from accessing that network.

The IMEI (15 decimal digits: 14 digits plus a check digit) includes information on the origin, model, and serial number of the device.

The IMEI is validated in three steps:

Starting from the right, double every other digit (e.g., 7 becomes 14).
Sum the digits (e.g., 14 → 1 + 4).
Check if the sum is divisible by 10.
For Example:

If input is IMEI = 490154203237518

IMEI	4	9	0	1	5	4	2	0	3	2	3	7	5	1	8
Double every other digits	4	18	0	2	5	8	2	0	3	4	3	14	5	2	8
Sum digits	4 + (1 + 8) + 0 + 2 + 5 + 8 + 2 + 0 + 3 + 4 + 3 + (1 + 4) + 5 + 2 + 8 = 60														

Since, 60 is divisible by 10, hence the given IMEI number is Valid.

Design a program to accept a fifteen digit number from the user and check whether it is a valid IMEI number or not. For an invalid input, display an appropriate message.

Sample Output:

1. Enter a 15 digit IMEI code : 654122487458946
Output : Sum = 80
Valid IMEI Code

2. Enter a 15 digit IMEI code : 799273987135461
Output : Sum = 79
Invalid IMEI Code

3. Enter a 15 digit IMEI code : 79927398713
Output : Invalid Input

- Question:

A special two-digit number is such that when the sum of the digits is added to the product of its digits, the result is equal to the original two-digit number.

Example:
Consider the number 59.Sum of digits = 5+9=14
Product of its digits = 5 x 9 = 45
Sum of the digits and product of digits = 14 + 45 = 59

Write a program to accept a two-digit number. Add the sum of its digits to the product of its digits. If the value is equal to the number input, output the message “special-two digit number” otherwise, output the message “Not a special two-digit number”.

- Question:

An ISBN (International Standard Book Number) is a ten digit code which uniquely identifies a book.

The first nine digits represent the Group, Publisher and Title of the book and the last digit is used to check whether ISBN is correct or not.

Each of the first nine digits of the code can take a value between 0 and 9. Sometimes it is necessary to make the last digit equal to ten; this is done by writing the last digit of the code as X.

To verify an ISBN, calculate 10 times the first digit, plus 9 times the second digit, plus 8 times the third and so on until we add 1 time the last digit. If the final number leaves no remainder when divided by 11, the code is a valid ISBN.

For Example:

1. 0201103311 = 10*0 + 9*2 + 8*0 + 7*1 + 6*1 + 5*0 + 4*3 + 3*3 + 2*1 + 1*1 = 55

Since 55 leaves no remainder when divided by 11, hence it is a valid ISBN.

2. 007462542X = 10*0 + 9*0 + 8*7 + 7*4 + 6*6 + 5*2 + 4*5 + 3*4 + 2*2 + 1*10 = 176

Since 176 leaves no remainder when divided by 11, hence it is a valid ISBN.

3. 0112112425 = 10*0 + 9*1 + 8*1 + 7*2 + 6*1 + 5*1 + 4*1 + 3*4 + 2*2 + 1*5 = 71

Since 71 leaves no remainder when divided by 11, hence it is not a valid ISBN.

Design a program to accept a ten digit code from the user. For an invalid input, display an appropriate message. Verify the code for its validity in the
format specified below:

Test your program with the sample data and some random data:

Example 1

INPUT CODE: 0201530821
OUTPUT : SUM = 99
LEAVES NO REMAINDER – VALID ISBN CODE

Example 2

INPUT CODE: 035680324
OUTPUT : INVALID INPUT

Example 3
INPUT CODE: 0231428031

OUTPUT : SUM = 122
LEAVES REMAINDER – INVALID ISBN CODE

- Question:

  Write a Program in Java to input a number and check whether it is a Kaprekar number or not.

  Note: A positive whole number ‘n’ that has ‘d’ number of digits is squared and split into two pieces, a right-hand piece that has ‘d’ digits and a left-hand piece that has remaining ‘d’ or ‘d-1’ digits.

  If the sum of the two pieces is equal to the number, then ‘n’ is a Kaprekar number. The first few Kaprekar numbers are: 9, 45, 297 ……..

  Example 1: 9

  92 = 81, right-hand piece of 81 = 1 and left hand piece of 81 = 8

  Sum = 1 + 8 = 9, i.e. equal to the number. Hence, 9 is a Kaprekar number.

  Example 2: 45
  452 = 2025, right-hand piece of 2025 = 25 and left hand piece of 2025 = 20
  Sum = 25 + 20 = 45, i.e. equal to the number. Hence, 45 is a Kaprekar number.
  Example 3: 297
  2972 = 88209, right-hand piece of 88209 = 209 and left hand piece of 88209 = 88
  Sum = 209 + 88 = 297, i.e. equal to the number. Hence, 297 is a Kaprekar number.

- Question:

Write a Program in Java to input a number and check whether it is a Harshad Number or Niven Number or not..

Harshad Number : In recreational mathematics, a Harshad number (or Niven number), is an integer (in base 10) that is divisible by the sum of its digits.

Let’s understand the concept of Harshad Number through the following example:

The number 18 is a Harshad number in base 10, because the sum of the digits 1 and 8 is 9 (1 + 8 = 9), and 18 is divisible by 9 (since 18 % 9 = 0)
The number 1729 is a Harshad number in base 10, because the sum of the digits 1 ,7, 2 and 9 is 19 (1 + 7 + 2 + 9 = 19), and 1729 is divisible by 19 (1729 = 19 * 91)
The number 19 is not a Harshad number in base 10, because the sum of the digits 1 and 9 is 10 (1 + 9 = 10), and 19 is not divisible by 10 (since 19 % 10 = 9)
The first few Harshad numbers in base 10 are:
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 18, 20, 21, 24, 27, 30, 36, 40, 42, 45, 48, 50, 54, 60, 63, 70, 72, 80, 81, 84, 90, 100, 102, 108, 110, 111, 112, 114, 117, 120, 126, 132, 133, 135, 140, 144, 150, 152, 153, 156, 162, 171, 180, 190, 192, 195, 198, 200 etc.

- Question:

A Smith number is a composite number, the sum of whose digits is the sum of the digits of its prime factors obtained as a result of prime factorization (excluding 1). The first few such numbers are 4, 22, 27, 58, 85, 94, 121 ………………..

Examples:

1. 666

Prime factors are 2, 3, 3, and 37

Sum of the digits are (6+6+6) = 18

Sum of the digits of the factors (2+3+3+(3+7)) = 18

2. 4937775

Prime factors are 3, 5, 5, 65837

Sum of the digits are (4+9+3+7+7+7+5) = 42

Sum of the digits of the factors (3+5+5+(6+5+8+3+7)) = 42

Write a program to input a number and display whether the number is a Smith number or not.

Sample data:

Input	94	Output	SMITH Number
Input	102	Output	NOT SMITH Number
Input	666	Output	SMITH Number
Input	999	Output	NOT SMITH Number

- Question:

A positive natural number, (for e.g. 27), can be represented as follows:

2+3+4+5+6+7

8+9+10

13+14

where every row represents a combination of consecutive natural numbers, which add up to 27.

Write a program which inputs a positive natural number N and prints the possible consecutive number combinations, which when added give N.

Test your program for the following data and some random data.

SAMPLE DATA

INPUT:

N = 9

OUTPUT:

4 + 5

2 + 3+ 4

INPUT:

N = 15

OUTPUT:

7 +8

1 +2+ 3+ 4+ 5

4 +5+ 6

INPUT:

N = 21

OUTPUT:

10+ 11

1+ 2+ 3+ 4+ 5+ 6

6+ 7+ 8

- Question:

A Composite Magic number is a positive integer which is composite as well as a magic number.

Composite number:
A composite number is a number that has more than two factors.
For example: 10
Factors are: 1, 2, 5, 10

Magic number:
A magic number is a number in which the eventual sum of the digits is equal to 1
For example: 28=2+8=10=1+0=1
Accept two positive integers m and n, where m is less than n as user input. Display the number of Composite magic integers that are in the range between m and n (both inclusive) and output them along with the frequency, in the format specified below.
Test your program with the sample data and some random data:
Example 1:
INPUT:
m = 10
n = 100
OUTPUT:
THE COMPOSITE MAGIC INTEGERS ARE:
10, 28, 46, 55, 64, 82, 91, 100
FREQUENCY OF COMPOSITE MAGIC INTEGERS IS: 8
Example 2:
INPUT:
m = 1200
n = 1300
OUTPUT:

THE COMPOSITE MAGIC INTEGERS ARE:
1207, 1216, 1225, 1234, 1243, 1252, 1261, 1270, 1288
FREQUENCY OF COMPOSITE MAGIC INTEGERS IS: 9

Example 3:

INPUT: m = 120 n = 99
OUTPUT: INVALID INPUT

- Question 1

A prime palindrome integer is a positive integer (without leading zeros) which is prime as well as a palindrome. Given two positive integers m and n, where m < n, write a program to determine how many prime-palindrome integers are there in the range between m and n (both inclusive) and output them.

The input contains two positive integers m and n where m < 3000 and n < 3000. Display the number of prime-palindrome integers in the specified range along with their values in the format specified below:

Test your program with the sample data and some random data:

Example 1

INPUT:

m = 100

n = 1000

OUTPUT:

THE PRIME PALINDROME INTEGERS ARE:

101, 131, 151, 181, 191, 313, 353, 373, 383, 727, 757, 787, 797, 919, 929

FREQUENCY OF PRIME PALINDROME INTEGERS : 15

Example 2

INPUT:

m = 100

n = 5000

OUTPUT: OUT OF RANGE

- Question:

  Write a program to declare a square matrix A[ ][ ] of order MxM where 'M' is the number of rows and the number of columns, such that M must be greater than 2 and less than 10. Accept the value of M as user input. Display an appropriate message for an invalid input. Allow the user to input integers into this matrix. Perform the following tasks:

  (a) Display the original matrix.

  (b) Rotate the matrix 90° clockwise as shown below:

$$\text{Original Matrix} \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix} \text{Rotated Matrix} \begin{bmatrix} 7 & 4 & 1 \\ 8 & 5 & 2 \\ 9 & 6 & 2 \end{bmatrix}$$

- Write a program to take input as decimal number and convert into binary, hexa decimal, octal numbers
- Write a program to take input as octal number and convert to decimal

- A happy number is a number in which the eventual sum of the square of the digits of the number is equal to 1.

  Example:

  28 = (2)^2 + (8)^2 = 4 + 64 = 68

  68 = (6)^2 + (8)^2 = 36 + 64 = 100

  100 = (1)^2 + (0)^2 + (0)^2= 1 + 0 + 0 = 1

  Hence, 28 is a happy number.

  Example: 12 = (1)^2 + (2)^2 = 1 + 4 = 5

  Hence, 12 is not a happy number.

  Design a class happy to check if a given number is a happy number. Some of the members of the class are given below:

- Question:

  Write a program to assign a full path and file name as given below. Using library functions, extract and output the file path, file name and file extension separately as shown.

  Input: C:Users\admin\Pictures\flowers.jpg

  Output:

  Path: C:Users\admin\Pictures

  File name: flower

  Extension: jpg

- Question:

  A sequence of Fibonacci Strings is generated as follows:

  S0 = “a”, S1 = “b”, Sn = S(n-1) + S(n-2) where ‘+’ denotes concatenation. Thus the sequence is:

  a, b, ba, bab, babba, babbabab, ………. n terms.

  Output:

  1) Enter the number of terms : 2

  The Fibonacci String Series is : a, b

  2) Enter the number of terms : 5

  The Fibonacci String Series is : a, b, ba, bab, babba

- Question:

  Write a Program in Java to input a number and check whether it is an Automorphic Number or not.

  Note: An automorphic number is a number which is present in the last digit(s) of its square.

  Example: 25 is an automorphic number as its square is 625 and 25 is present as the last digits

- Question:

  Write a Program in Java to input a number and check whether it is a Fascinating Number or not..

  Fascinating Numbers : Some numbers of 3 digits or more exhibit a very interesting property. The property is such that, when the number is multiplied by 2 and 3, and both these products are concatenated with the original number, all digits from 1 to 9 are present exactly once, regardless of the number of zeroes.

Let’s understand the concept of Fascinating Number through the following example:

Consider the number 192,

192 x 1 = 192

192 x 2 = 384

192 x 3 = 576

Concatenating the results : 192384576

It could be observed that ‘192384576’ consists of all digits from 1 to 9 exactly once. Hence, it could be concluded that 192 is a Fascinating Number.

Some examples of fascinating Numbers are : 192, 219, 273, 327, 1902, 1920, 2019 etc.

- Question:

  Write a Program in Java to input a number and check whether it is a Duck Number or not.

  Note: A Duck number is a number which has zeroes present in it, but there should be no zero present in the beginning of the number. For example 3210, 7056, 8430709 are all duck numbers whereas 08237, 04309 are not.

- Question:

  A bank intends to design a program to display the denomination of an input amount, up to 5 digits. The available denomination with the bank are of rupees 1000 , 500 , 100 , 50 , 20 , 10 , 5 , 2 , and 1.

Design a program to accept the amount from the user and display the break-up in descending order of denomination. (i.e. preference should be given to the highest denomination available) along with the total number of notes. [Note: Only the denomination used, should be displayed].

Example:

INPUT: 14788

OUTPUT:

DENOMINATIONS:

1000 x 14 = 14000

500 x 1 = 500

100 x 2 = 200

50 x 1 = 50

20 x 1 = 20

10 x 1 = 10

5 x 1 = 5

2 x 1 = 2

1 x 1 = 1

——————————————

TOTAL = 14788

——————————————

Total Number of Notes = 23

- Question:

Write a program in Java to find the Roman equivalent of any Decimal number entered by the user. [The number entered should be within the Range 1-3999]

Brief Note on Roman Numerals:

The Roman numerals follow this basic pattern,

1000 = M, 900 = CM, 500 = D, 400 = CD, 100 = C, 90 = XC, 50 = L, 40 = XL, 10 = X, 9 = IX, 5 = V, 4 = IV, 1 = I

The symbols “I”, “X”, “C”, and “M” can be repeated three times in succession, but no more. i.e. 234 can be represented as CCXXXIV, but 244 cannot be written as CCXXXXIV [Since we cannot repeat X more than 3 times successively].

(They may only appear more than three times if they appear non-sequentially, such as XXXIX.) “D”, “L”, and “V” can never be repeated.

- Question:

Write a Program in Java to input a number and check whether it is a Pronic Number or Heteromecic Number or not.

Pronic Number : A pronic number, oblong number, rectangular number or heteromecic number, is a number which is the product of two consecutive integers, that is, n (n + 1).

The first few pronic numbers are:

0, 2, 6, 12, 20, 30, 42, 56, 72, 90, 110, 132, 156, 182, 210, 240, 272, 306, 342, 380, 420, 462 … etc.

- Question:

Write a Program in Java to input a number and check whether it is an Evil Number or not.

Evil Number : An Evil number is a positive whole number which has even number of 1’s in its binary equivalent.

Example: Binary equivalent of 9 is 1001, which contains even number of 1’s.

A few evil numbers are 3, 5, 6, 9….

- Question

A prime palindrome integer is a positive integer (without leading zeros) which is prime as well as a palindrome. Given two positive integers m and n, where m < n, write a program to determine how many prime-palindrome integers are there in the range between m and n (both inclusive) and output them.

Test your program with the sample data and some random data:

Example 1

INPUT:

m = 100

n = 1000

OUTPUT:

THE PRIME PALINDROME INTEGERS ARE:

101, 131, 151, 181, 191, 313, 353, 373, 383, 727, 757, 787, 797, 919, 929

FREQUENCY OF PRIME PALINDROME INTEGERS : 15

- Question:

Write a program in JAVA to find the Prime factors of a number.

Prime factors of a number are those factors which are prime in nature and by which the number itself is completely divisible (1 will not be taken as prime number).

Few such numbers are:

Prime Factors of 24 are 2, 2, 2, 3

Prime Factors of 6 are 2, 3

- Question:

Write a program in Java to find the Least Common Multiple (L.C.M.) of two numbers entered by the user.

Output:

Enter the 1st number : 336

Enter the 2nd number : 224

L.C.M. = 672

- Question:

Write a Program in Java to input 2 numbers and find their Highest Common Factor (HCF).

Note: If the 2 numbers are 54 and 24, then the divisors (factors) of 54 are: 1, 2, 3, 6, 9, 18, 27, 54.

Similarly the divisors (factors) of 24 are: 1, 2, 3, 4, 6, 8, 12, 24.

The numbers that these two lists share in common are the common divisors (factors) of 54 and 24: 1, 2, 3, 6.

The greatest (highest) of these is 6. That is the greatest common divisor or the highest common factor of 54 and 24.