Numbers Programming Exercise

1. Write a Java program to print all the possible **Abundant numbers** (integers) between M and N (where M,N >1 and M,N<100000) .

   In number theory, an abundant number is a number for which the sum of its proper divisors is greater than the number itself.

   The first few abundant numbers are:
   12, 18, 20, 24, 30, 36, 40, 42, 48, 54, 56, 60, 66, 70, 72, 78, 80, 84, 88, 90, 96, 100, 102,…

   The integer 12 is the first abundant number. Its proper divisors are 1, 2, 3, 4 and 6 for a total of 16.

2. Write a Java program to display first **N Lucas numbers**. (3>N>100)
   The Lucas numbers or series are an integer sequence named after the mathematician François Édouard Anatole Lucas, who studied both that sequence and the closely related Fibonacci numbers. Lucas numbers and Fibonacci numbers form complementary instances of Lucas sequences.
   The sequence of Lucas numbers is: 2, 1, 3, 4, 7, 11, 18, 29, ….

3. Write a Java program to find and print the first 10 **Happy numbers**.
   Happy number: Starting with any positive integer, replace the number by the sum of the squares of its digits, and repeat the process until the number equals 1, or it loops endlessly in a cycle which does not include 1.
   Example: 19 is a happy number
   $1^2 + 9^2=82$
   $8^2 + 2^2=68$
   $6^2 + 8^2=100$
   $1^2 + 0^2 + 0^2=1$

   Expected Output : First 10 Happy numbers:

   1, 7, 10, 13, 19, 23, 28, 31

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4. Write a Java program check whether a number is an **Automorphic number** or not.
In mathematics, an automorphic number is a number whose square "ends" in the same digits as the number itself. For example, $5^2 = 25$, $6^2 = 36$, $76^2 = 5776$, and $890625^2 = 793212890625$, so 5, 6, 76 and 890625 are all automorphic numbers.
Expected Output

Input a number : 76
Automorphic Number.

5. Write a Java program to check whether a given number is an **Ugly number**.
In number system, ugly numbers are positive numbers whose only prime factors are 2, 3 or 5. First 10 ugly numbers are 1, 2, 3, 4, 5, 6, 8, 9, 10, 12. By convention, 1 is included.
Test Data : Enter a positive number: 235
Expected Output : It is not an ugly number.

6. Write a Java program to check whether a given number is a **Disarium number** or **Unhappy number**.
A Disarium number is a number defined by the following process :
Sum of its digits powered with their respective position is equal to the original number.
For example 175 is a Disarium number :
As $1^1+3^2+5^3 = 135$
Some other DISARIUM are 89, 175, 518 etc.
A number will be called Disarium if the sum of its digits powered with their respective position is equal with the number itself. Sample Input: 135.

7. Write a Java program to check whether a number is a **Harshad Number** or not.
In recreational mathematics, a harshad number in a given number base, is an integer that is divisible by the sum of its digits when written in that base.
Example: Number 200 is a Harshad Number because the sum of digits 2 and 0 and 0 is 2(2+0+0) and 200 is divisible by 2. Number 171 is a Harshad Number because the sum of digits 1 and 7 and 1 is 9(1+7+1) and 171 is divisible by 9.

Input a number : 353
Expected Output : 353 is not a Harshad Number.

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8. Write a Java program to check whether a number 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.
   Expected Output

   Input a number : 3210
   Duck number

9. Write a Java program to check two numbers are **Amicable numbers** or not.
   Amicable numbers are two different numbers so related that the sum of the proper divisors of each is equal to the other number.
   The first ten amicable pairs are: (220, 284), (1184, 1210), (2620, 2924), (5020, 5564), (6232, 6368), (10744, 10856), (12285, 14595), (17296, 18416), (63020, 76084), and (66928, 66992).
   Expected Output

   Input the first number: 220
   Input the second number: 284
   These numbers are amicable.

10. Write a Java program to check whether a number is a **Pronic Number** or **Heteromecic Number** or not.
    A pronic number is a number which is the product of two consecutive integers, that is, a number of the form 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.

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