package lab0;

/\*\*

\* <b>Title:</b> Lab 0:<br>

\* <b>Filename:</b> SieveOfEratosthenes.java<br>

\* <b>Date Written:</b> January 31, 2018<br>

\* <b>Due Date:</b> February 5, 2018<br>

\* <p>

\* <b>Description:</b><br>

\* Displays prime numbers using The Sieve of Eratosthenes.

\* </p>

\* <p>

\* The user is permitted to enter a value for n, and then all prime numbers

\* in the range 2 to n are displayed.

\* </p>

\* <p><b>Algorithm:</b></p>

\* <p>

\* We start with a table of numbers (e.g., 2, 3, 4, 5, . . ., n) and progressively

\* cross off numbers in the table until the only numbers left are primes. </p>

\* <p>Specifically, we begin with the first number, p, in the table, and<br>

\* 1. Declare p to be prime, then display it<br>

\* 2. Cross off all the multiples of that number in the table, starting from p^2<br>

\* 3. Find the next number in the table after p that is not yet crossed off and

\* set p to that number; and then repeat steps 1 to 3.

\*</p>

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\*/

import java.util.Scanner;

public class SieveOfEratosthenes

{

public static void main (String [] args)

{

System.out.println ("Enter the last number to identify prime numbers");

Scanner keyboard= new Scanner (System.in);

int n= keyboard.nextInt();

boolean [] array = new boolean [n+1];

//Initializing the boolean array to true;

System.out.println ("Initial List:");

for (int i=2; i<=n; i++) array[i]=true;

//Displaying the initial list

for (int i=2; i<=n; i++)

System.out.print (i+" ");

int p=2;

int t=2;

System.out.println();

while (p<=Math.pow(n,0.5))

{

//Displaying the new prime to check

System.out.println ();

System.out.println ("p= "+p);

int count=p\*p;

//Setting the multiples to false

while (count<=n)

{

if (count%p==0){array[count]=false;}

count++;

}

//Print out the remaining number

System.out.println ("Displaying the number after crossing out multiples of "+p+":");

for (int i=2; i<=n; i++)

{

if (array[i]!=false)System.out.print (i+" ");

}

//Updating the p

t++;

while (t<=n)

{

if (array [t]!=false) {p=t; break;}

else t++;

}

}

System.out.println ();

System.out.println ("The prime numbers within "+n+": ");

for (int i=2; i<=n; i++)

{

if (array [i]!=false) System.out.print (i+" ");

}

keyboard.close();

}

}