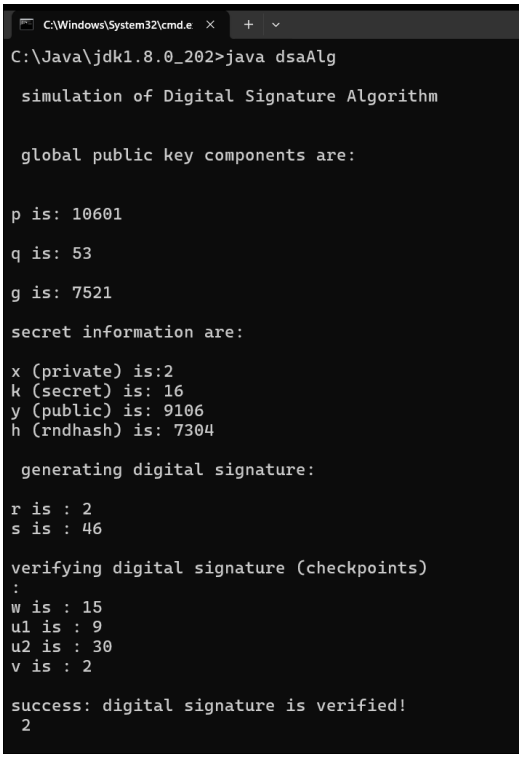
PROGRAM:

```
import java.util.*;
import java.math.BigInteger;
class dsaAlg {
 final static BigInteger one = new BigInteger("1");
 final static BigInteger zero = new BigInteger("0");
 public static BigInteger getNextPrime(String ans)
 {
  BigInteger test = new BigInteger(ans);
  while (!test.isProbablePrime(99))
  e:
  {
   test = test.add(one);
  }
  return test;
 }
 public static BigInteger findQ(BigInteger n)
 {
  BigInteger start = new BigInteger("2");
  while (!n.isProbablePrime(99))
  {
   while (!((n.mod(start)).equals(zero)))
   {
    start = start.add(one);
   }
   n = n.divide(start);
  }
  return n;
 }
 public static BigInteger getGen(BigInteger p, BigInteger q,Random r)
 {
  BigInteger h = new BigInteger(p.bitLength(), r);
  h = h.mod(p);
  return h.modPow((p.subtract(one)).divide(q), p);
 }
 public static void main (String[] args) throws java.lang.Exception
{
  Random randObj = new Random();
  BigInteger p = getNextPrime("10600"); /* approximate prime */
  BigInteger q = findQ(p.subtract(one));
  BigInteger g = getGen(p,q,randObj);
  System.out.println(" \n simulation of Digital Signature Algorithm \n");
  System.out.println(" \n global public key components are:\n");
  System.out.println("\np is: " + p);
```

```
  System.out.println("\nq is: " + q);
  System.out.println("\ng is: " + g);
  BigInteger x = new BigInteger(q.bitLength(), randObj);
  x = x.mod(q);
  BigInteger y= g.modPow(x,p);
  BigInteger k = new BigInteger(q.bitLength(), randObj);
  k = k.mod(q);
  BigInteger r = (g.modPow(k,p)).mod(q);
  BigInteger hashVal = new BigInteger(p.bitLength(),randObj);
  BigInteger kInv = k.modInverse(q);
  BigInteger s = kInv.multiply(hashVal.add(x.multiply(r)));
  s = s.mod(q);
  System.out.println("\nsecret information are:\n");
  System.out.println("x (private) is:" + x);
  System.out.println("k (secret) is: " + k);
  System.out.println("y (public) is: " + y);
  System.out.println("h (rndhash) is: " + hashVal);
  System.out.println("\n generating digital signature:\n");
  System.out.println("r is : " + r);
  System.out.println("s is : " + s);
  BigInteger w = s.modInverse(q);
  BigInteger u1 = (hashVal.multiply(w)).mod(q);
  BigInteger u2 = (r.multiply(w)).mod(q);
  BigInteger v = (g.modPow(u1,p)).multiply(y.modPow(u2,p));
  v = (v.mod(p)).mod(q);
  System.out.println("\nverifying digital signature (checkpoints)\n:");
  System.out.println("w is : " + w);
  System.out.println("u1 is : " + u1);
  System.out.println("u2 is : " + u2);
  System.out.println("v is : " + v);
  if (v.equals(r))
  {
    System.out.println("\nsuccess: digital signature is verified!\n " + r);
  }
  else
  {
    System.out.println("\n error: incorrect digitalsignature\n ");
  }
 }
}
```

OUTPUT:


C:\Windows\System32\cmd.e
C:\Java\jdk1.8.0_202>java dsaAlg
simulation of Digital Signature Algorithm
global public key components are:
p is: 10601
q is: 53
g is: 7521
secret information are:
x (private) is:2
k (secret) is: 16
y (public) is: 9106
h (rndhash) is: 7304
generating digital signature:
r is : 2
s is : 46
verifying digital signature (checkpoints)
:
w is : 15
u1 is : 9
u2 is : 30
v is : 2
success: digital signature is verified!
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