```java
public class sam{

        public static long verify2(long S, long v, long p, long q)
        {

            long answer =1;
            for(long i=1; i <=v;i++ )
                {
                    answer*=S;
                    answer = answer % (p* q);
                }
            return answer;

        }



    public static long  gcd (long a, long b)
    {
        long answer = 1;
        if(b <=a){
            long g = a;
            a=b;
            b=g;
        }
        for (long i = 1; i <=a;i++)
            {
                if((a %i == 0) && (b % i) ==0)
                    {
                        answer = i;
                    }
            }
        return answer;
    }

    public static long  verify (long v, long p, long q)
    {
        long x = (p-1)*(q-1);
            return(  gcd (x,v));


    }

    public static  long sign(long s, long D, long p, long q)
    {long answer =1;
            for(long i=1; i <=s;i++ )
                {
                    answer*=D;
                    answer = answer % (p* q);
                }
            return answer;
    }

    public static    boolean isprime(long a)
    {
        for(int b=2 ;b < a; b++)
            {
                if(a %b ==0) return false;
            }
        return true;
    }



    public static  long  samsolve(long v, long p, long q)
    {
        for(long i = 1; i < p*q;i++)
            {
```

```java
                if (((i*v) %((p-1)*(q-1)))==1)
                    {
                        return i;
                    }
            }
        return -1;
        // student
    }

    public static void main(String a[])
    {
        long p = 1223; long q =1987;
        long v=948047;
        if(isprime(p) && isprime(q))  //1
            {
                long N = 1223*1987;
                if (verify(v,p,q) !=1) //2
                    {
                        System.out.println("Error !");
                        System.exit(0);
                    }

                long  s =samsolve(v,p,q); // 3
        System.out.println("sams signature " + s);
        long D = 1070777;
        long S = sign(s, D,p,q);   // 4
        System.out.println("Signed Document " + S);
         long ver = verify2(S,v,p,q); //5
         System.out.println("Is it verified D = " + D + " Verified "+ ver);
        System.out.println("Id the above two numbers match - we are done!");

            }

    }


}
```