#include<bits/stdc++.h>

using namespace std;

int prime[10000001];

int prime1[10000001];

int a1[10000001];

int k = 10000000;

int lastnumber;

void sieve(){

for(int i = 0 ; i <= k ; i++){

prime[i] = 1;

}

prime[0] = prime[1] = 0;

for(int i = 2 ; i <= sqrt(k) ; i++){

if(prime[i] == 1){

for(int j = i \* i ; j <= k ; j += i){

prime[j] = 0;

}

}

}

}

void congdonprime(){

for(int i = 2 ; i <= k ; i++){

prime1[i] = prime[i] + prime1[i - 1];

}

}

void Bai1(int n){

// for(int i = 1 ; i < n ; i++){

// cout << a1[i] << ' ';

// }

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

if(prime[i]){

while(n % i == 0){

a1[i]++;

n /= i;

lastnumber = i;

}

}

}

if(n > 1){

a1[n]++;

lastnumber = n;

}

}

void Bai2(int n){

int cnt = 2;

priority\_queue<int, std::vector<int>, std::greater<int> > queue;

queue.push(1);

queue.push(n);

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

if(n % i == 0){

queue.push(i);

if(i != n / i) queue.push(n / i );

}

}

long long sum = 0;

long long p = 1;

cout << "So uoc cach 1: " << queue.size() << endl;

cout << "Liet ke cac uoc: ";

while(!queue.empty()){

sum += queue.top();

p \*= queue.top();

cout << queue.top() << " ";

queue.pop();

}

cout << endl;

// Bai1(n);

long long res1 = 1;

long long res2 = 1;

long long res3 = 1;

for(int i = 1 ; i <= n ; i++){

if(a1[i] != 0){

res1 \*= (a1[i] + 1);

res2 \*= 1ll \* ((pow(i, a1[i] + 1) - 1) / (i - 1));

}

}

long long tmp = res1 / 2;

res3 = 1ll \* pow(n, tmp);

cout << "So uoc cach 2: " << res1 << endl;

cout << "Sum cach 1 = " << sum << " - Sum cach 2" << res2 << endl;

cout << "Tich cach 1 = " << p << " - Tich cach 2 " << res3 << endl;

if(n + n == res2) cout << "Cach 2: n is perfect number\n";

else cout << "Cach 2: n is not perfect number\n";

}

void Bai5(int n){

int sum = 1;

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

if(n % i == 0){

sum += i;

if(i != n / i) sum += n / i;

}

}

if(n == sum) cout << "Cach 1: Perfect number\n";

else cout << "Cach 1: Not perfect number\n";

}

void Bai6(int n){

congdonprime();

cout << "Density of " << n << " : " << "Cach 1 " << prime1[n] - prime1[1] << " - Cach 2 " << (int)(n / log(n)) << endl;

}

void Bai7(int a, int n){

if(a > n) return;

for(int i = a ; i <= n ; i++){

if(prime[i]) cout << i << ' ';

}

}

int main(){

int n; cout << "Nhap n = "; cin >> n;

sieve();

Bai1(n);

cout << "Phan ra thua so nguyen to : ";

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

if(a1[i]){

cout << i << "^" << a1[i];

if(i != lastnumber) cout << "\*";

}

}

cout << endl;

Bai2(n);

Bai5(n);

Bai6(n);

int a; cout << "Nhap a = "; cin >> a;

Bai7(a, n);

}

