

# this Maple code is a procedure to find the proper divisors of a given positive whole number.

# Very exciting

```
ProperDivisors := proc(n);
```

```
  local d, count;
```

```
  count := 0 :
```

```
  for d from 1 to  $\frac{n}{2}$  do
```

```
    if mod(n, d) = 0 then count := count + 1 : print(" One proper divisor of ", n, " is the number ", d);
```

```
      end if;
```

```
  end do;
```

```
  print(" and that is all of them. ");
```

```
  print(" count of proper divisors is ", count);
```

```
end proc;
```

```
proc(n)
```

(1)

```
  local d, count;
```

```
  count := 0;
```

```
  for d to 1/2 * n do
```

```
    if mod(n, d) = 0 then
```

```
      count := count + 1; print(" One proper divisor of ", n, " is the number ", d)
```

```
    end if
```

```
  end do;
```

```
  print(" and that is all of them. ");
```

```
  print(" count of proper divisors is ", count)
```

```
end proc
```

```
# Yeah compiles
```

```
ProperDivisors(3)
```

```
  " One proper divisor of ", 3, " is the number ", 1
```

```
    " and that is all of them. "
```

```
    " count of proper divisors is ", 1
```

(2)

```
ProperDivisors(9)
```

```
  " One proper divisor of ", 9, " is the number ", 1
```

```
  " One proper divisor of ", 9, " is the number ", 3
```

```
    " and that is all of them. "
```

```
    " count of proper divisors is ", 2
```

(3)

```
ProperDivisors(4)
```

```
  " One proper divisor of ", 4, " is the number ", 1
```

```
  " One proper divisor of ", 4, " is the number ", 2
```

```
    " and that is all of them. "
```

```
    " count of proper divisors is ", 2
```

(4)

# and now for some two digit inputs

*ProperDivisors*(15)

" One proper divisor of ", 15, " is the number ", 1  
" One proper divisor of ", 15, " is the number ", 3  
" One proper divisor of ", 15, " is the number ", 5  
" and that is all of them. "  
" count of proper divisors is ", 3

(5)

*ProperDivisors*(17)

" One proper divisor of ", 17, " is the number ", 1  
" and that is all of them. "  
" count of proper divisors is ", 1

(6)

*ProperDivisors*(24)

" One proper divisor of ", 24, " is the number ", 1  
" One proper divisor of ", 24, " is the number ", 2  
" One proper divisor of ", 24, " is the number ", 3  
" One proper divisor of ", 24, " is the number ", 4  
" One proper divisor of ", 24, " is the number ", 6  
" One proper divisor of ", 24, " is the number ", 8  
" One proper divisor of ", 24, " is the number ", 12  
" and that is all of them. "  
" count of proper divisors is ", 7

(7)

*ProperDivisors*(31)

" One proper divisor of ", 31, " is the number ", 1  
" and that is all of them. "  
" count of proper divisors is ", 1

(8)

*ProperDivisors*(66)

" One proper divisor of ", 66, " is the number ", 1  
" One proper divisor of ", 66, " is the number ", 2  
" One proper divisor of ", 66, " is the number ", 3  
" One proper divisor of ", 66, " is the number ", 6  
" One proper divisor of ", 66, " is the number ", 11  
" One proper divisor of ", 66, " is the number ", 22  
" One proper divisor of ", 66, " is the number ", 33  
" and that is all of them. "  
" count of proper divisors is ", 7

(9)

*ProperDivisors*(67)

" One proper divisor of ", 67, " is the number ", 1  
" and that is all of them. "

" count of proper divisors is ", 1 **(10)**

*ProperDivisors(92)*

" One proper divisor of ", 92, " is the number ", 1  
" One proper divisor of ", 92, " is the number ", 2  
" One proper divisor of ", 92, " is the number ", 4  
" One proper divisor of ", 92, " is the number ", 23  
" One proper divisor of ", 92, " is the number ", 46  
" and that is all of them. "

" count of proper divisors is ", 5 **(11)**

*# and now some three digit examples still having fun*

*ProperDivisors(100)*

" One proper divisor of ", 100, " is the number ", 1  
" One proper divisor of ", 100, " is the number ", 2  
" One proper divisor of ", 100, " is the number ", 4  
" One proper divisor of ", 100, " is the number ", 5  
" One proper divisor of ", 100, " is the number ", 10  
" One proper divisor of ", 100, " is the number ", 20  
" One proper divisor of ", 100, " is the number ", 25  
" One proper divisor of ", 100, " is the number ", 50  
" and that is all of them. "

" count of proper divisors is ", 8 **(12)**

*ProperDivisors(101)*

" One proper divisor of ", 101, " is the number ", 1  
" and that is all of them. "

" count of proper divisors is ", 1 **(13)**

*ProperDivisors(102)*

" One proper divisor of ", 102, " is the number ", 1  
" One proper divisor of ", 102, " is the number ", 2  
" One proper divisor of ", 102, " is the number ", 3  
" One proper divisor of ", 102, " is the number ", 6  
" One proper divisor of ", 102, " is the number ", 17  
" One proper divisor of ", 102, " is the number ", 34  
" One proper divisor of ", 102, " is the number ", 51  
" and that is all of them. "

" count of proper divisors is ", 7 **(14)**

*ProperDivisors(103)*

" One proper divisor of ", 103, " is the number ", 1

" and that is all of them. "  
" count of proper divisors is ", 1 **(15)**

*ProperDivisors(104)*

" One proper divisor of ", 104, " is the number ", 1  
" One proper divisor of ", 104, " is the number ", 2  
" One proper divisor of ", 104, " is the number ", 4  
" One proper divisor of ", 104, " is the number ", 8  
" One proper divisor of ", 104, " is the number ", 13  
" One proper divisor of ", 104, " is the number ", 26  
" One proper divisor of ", 104, " is the number ", 52  
" and that is all of them. "

" count of proper divisors is ", 7 **(16)**

*ProperDivisors(105)*

" One proper divisor of ", 105, " is the number ", 1  
" One proper divisor of ", 105, " is the number ", 3  
" One proper divisor of ", 105, " is the number ", 5  
" One proper divisor of ", 105, " is the number ", 7  
" One proper divisor of ", 105, " is the number ", 15  
" One proper divisor of ", 105, " is the number ", 21  
" One proper divisor of ", 105, " is the number ", 35  
" and that is all of them. "

" count of proper divisors is ", 7 **(17)**

*ProperDivisors(106)*

" One proper divisor of ", 106, " is the number ", 1  
" One proper divisor of ", 106, " is the number ", 2  
" One proper divisor of ", 106, " is the number ", 53  
" and that is all of them. "

" count of proper divisors is ", 3 **(18)**

# *We know that 1001 factors nicely*

*ifactor(1001)*

(7) (11) (13) **(19)**

*ProperDivisors(1001)*

" One proper divisor of ", 1001, " is the number ", 1  
" One proper divisor of ", 1001, " is the number ", 7  
" One proper divisor of ", 1001, " is the number ", 11  
" One proper divisor of ", 1001, " is the number ", 13  
" One proper divisor of ", 1001, " is the number ", 77  
" One proper divisor of ", 1001, " is the number ", 91

```
" One proper divisor of ", 1001, " is the number ", 143
" and that is all of them. "
" count of proper divisors is ", 7
```

11·11·7

```
847
```

*ProperDivisors(847)*

```
" One proper divisor of ", 847, " is the number ", 1
" One proper divisor of ", 847, " is the number ", 7
" One proper divisor of ", 847, " is the number ", 11
" One proper divisor of ", 847, " is the number ", 77
" One proper divisor of ", 847, " is the number ", 121
" and that is all of them. "
" count of proper divisors is ", 5
```

*# We are just trying to get a feel for ProperDivisors(n).*

7·7·5

```
245
```

*ProperDivisors(245)*

```
" One proper divisor of ", 245, " is the number ", 1
" One proper divisor of ", 245, " is the number ", 5
" One proper divisor of ", 245, " is the number ", 7
" One proper divisor of ", 245, " is the number ", 35
" One proper divisor of ", 245, " is the number ", 49
" and that is all of them. "
" count of proper divisors is ", 5
```

*# suppose n is a semi-prime. That is, let n be the product of two distinct prime numbers*

*ProperDivisors(2·3)*

```
" One proper divisor of ", 6, " is the number ", 1
" One proper divisor of ", 6, " is the number ", 2
" One proper divisor of ", 6, " is the number ", 3
" and that is all of them. "
" count of proper divisors is ", 3
```

*ProperDivisors(19·23)*

```
" One proper divisor of ", 437, " is the number ", 1
" One proper divisor of ", 437, " is the number ", 19
" One proper divisor of ", 437, " is the number ", 23
" and that is all of them. "
" count of proper divisors is ", 3
```

*# It looks like if  $n = p \cdot q$  and  $n$  is a semi-prime, then the count of its proper divisors is three.  
# I am tired now. Away from keyboard.*