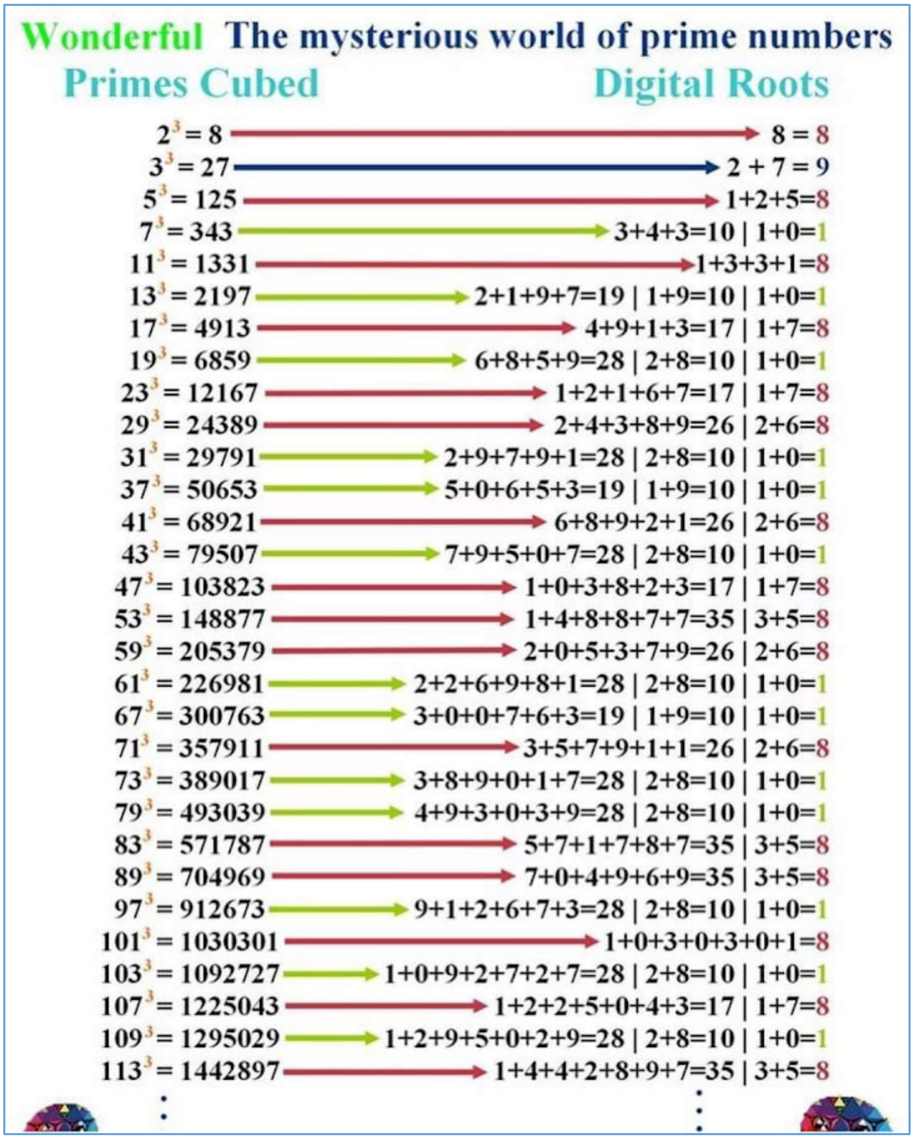
Problem: Cubes of prime numbers pattern



The above pattern was shared online.

It shows that for every prime number from 5 onwards, that the cube of the number, will have its digits sum to either 1 or 8.

Problem: For how many prime numbers does the pattern hold true? Write a computer program to calculate and find out.

```python
def is_prime(n):
    # check all numbers from 2 upto (square root of n) + 1
    for num in range(2, int(n ** 0.5) + 1):
        # if the number is divisible with no remainder, it is not prime
        if n % num == 0:
            return False
    # it must be a prime
    return True

def sum_digits(n):
    total = 0
    while n > 9:
        total = total + (n % 10)
        n = n // 10
    total = total + n
    # if we summed the digits to a new total >9, then sum the digits of the new number
    if total > 9:
        total = sum_digits(total)
    return total

n = 5                 # start with the number 5
summation = 8         # the digits of 5^3 sum to 8
prime_count = 3       # 5 is the 3rd prime

# stop if the summation is ever something other than 1 or 8
while summation == 1 or summation == 8:
    if is_prime(n):
        cubed = n*n*n
        summation = sum_digits(cubed)
        # print an update every 1000 numbers
        if prime_count % 1000 == 0:
            print(f"The {prime_count}th prime is {n}. Cubed is {cubed}. Digit summation is
 {summation}")
        prime_count += 1
    n += 1
```