

How to Solve: Prime Numbers

By [BrushMyQuant](#)



YouTube Video Link to this Post is [Here](#)

Following is Covered in the Video

Theory

- ✧ What is a Prime Number?
- ✧ Generic form of a Prime Number
- ✧ How to check if a number is prime?
- ✧ Sample Problems

What is a Prime Number?

Prime numbers are the numbers which have only two factors

- ✧ The number itself
- ✧ And 1

Example of Prime numbers are : 2, 3, 5, 7, 11, 13

2 is the only even prime number

Only positive numbers can be prime numbers

Generic Form of Prime Numbers

All Prime Numbers (apart from 2 and 3) can be written as

- ✧ $6n + 1$ or
- ✧ $6n - 1$

Example

$$7 = 6 + 1 \text{ (of the form } 6n+1)$$

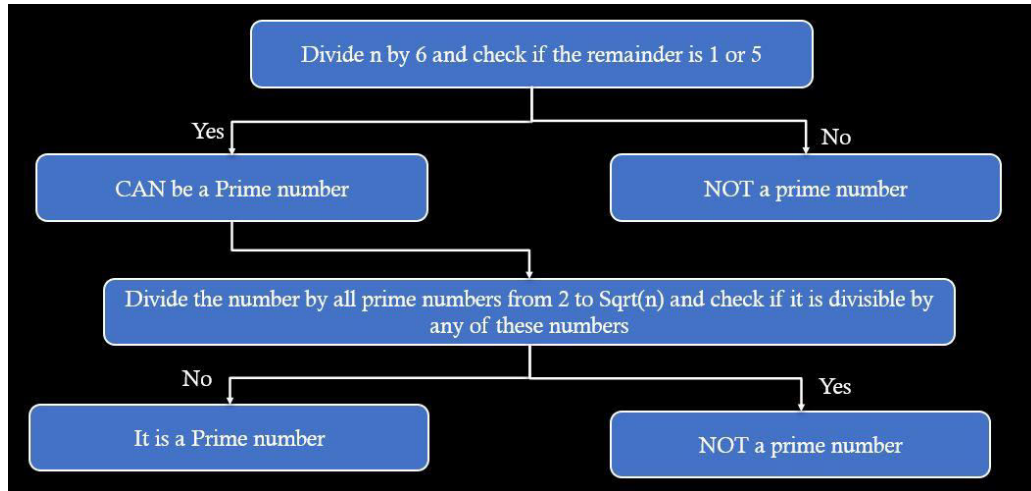
$$11 = 12 - 1 \text{ (of the form } 6n-1)$$

$$13 = 12 + 1 \text{ (of the form } 6n+1)$$

$$17 = 18 - 1 \text{ (of the form } 6n-1)$$

How to check if a number (n) is prime?

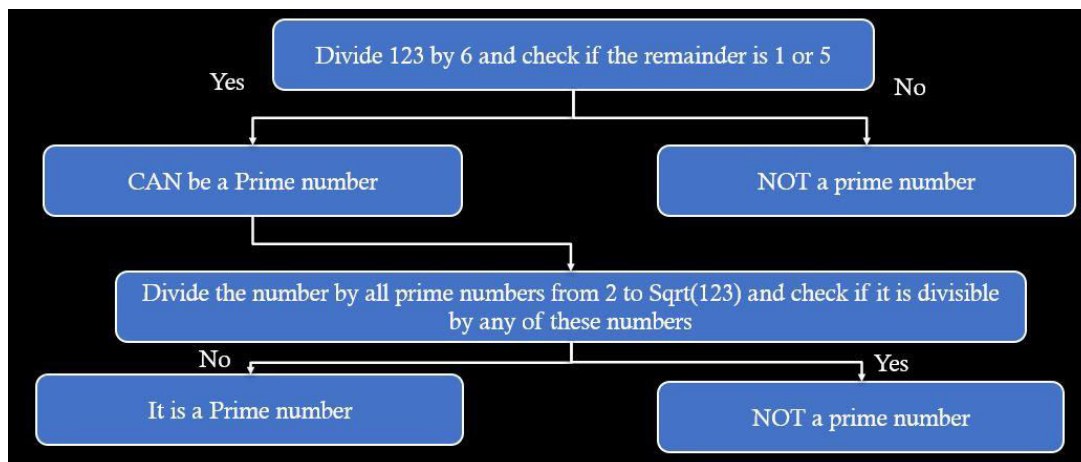
- ✧ Divide the number by 6 and check if the remainder is 1 or 5
- ✧ If the remainder is not 1 or 5 then it is NOT a prime number
- ✧ If the remainder is 1 or 5 then it CAN be a prime number
- ✧ Divide the number by all prime numbers from 2 to $\text{Sqrt}(n)$ and check if it is divisible by any of these numbers
- ✧ If the number is divisible by ANY of the prime numbers from 2 to $\text{Sqrt}(n)$ then it is NOT a prime number
- ✧ If the number is NOT divisible by ALL the prime numbers from 2 to $\text{Sqrt}(n)$ then it is a prime number



Sample Problems

Q1. Check if a 123 is prime number or not

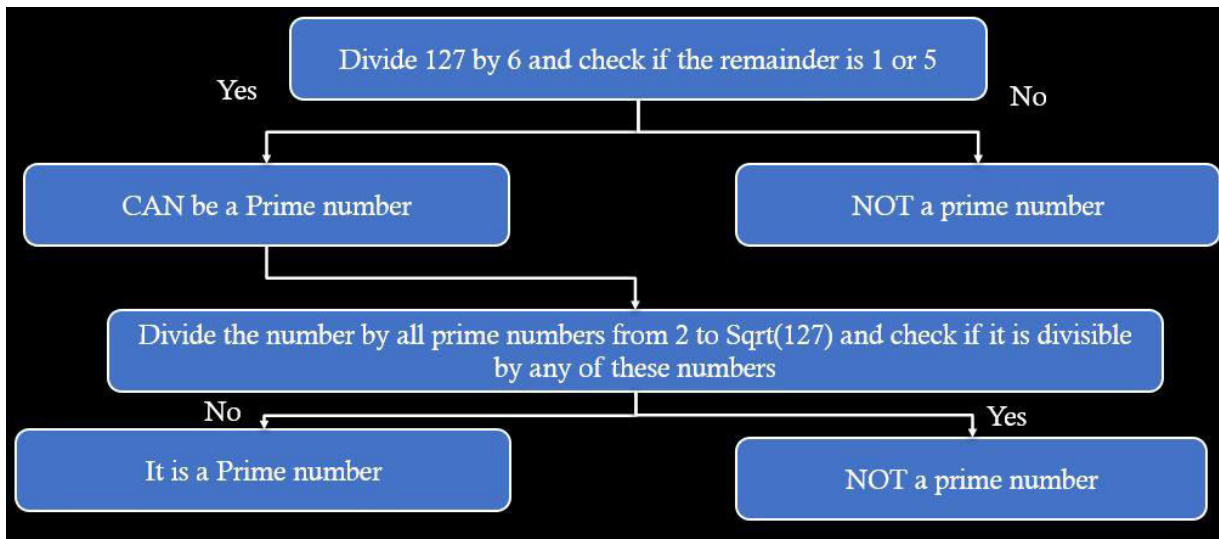
Solution:



- ✧ 123 divided by 6 gives 3 as remainder which is NOT 1 or 5
- ✧ 123 is NOT a prime number

Q2. Check if a 127 is prime number or not

Solution:



- ✧ 127 divided by 6 gives 1 as remainder
- ✧ 127 CAN be a prime number
- ✧ We need to divide 127 by all prime numbers from 2 to $\text{Sqrt}(127)$ and check if it is divisible by any of these numbers
- ✧ Closest integer to $\text{Sqrt}(127)$ is $\text{Sqrt}(121) = 11$. So prime numbers from 2 to 11. 2,3,5,7,11
- ✧ 127 is NOT divisible by ALL the prime numbers 2,3,5,7,11.
- ✧ 127 is a prime number

Hope it Helps!