This session was held online due to rains in Chennai.

We divided the students into two groups in breakout rooms; and two different topics were conducted in parallel - one with the returning students and one with the new batch of students.

With new batch of students in math circle, we introduced the definitions of prime and composite numbers and explored how to determine whether a number is prime through logical reasoning and case-by-case analysis. Using 103 as our main example, students tested divisibility by small primes and discussed an important logical observation: if a number n is divisible by a number a, then it must also be divisible by every factor of a; therefore, if n is not divisible by a factor of a, it cannot be divisible by a itself. We provided proof of this fact and used it to reduce unnecessary checks when determining primality. Students also learned that to check whether a number n is prime, it suffices to test divisibility only by prime numbers less than or equal to the smallest integer greater than $\sqrt{n}$. Applying these ideas, we confirmed that 103 is prime, and students were given following practice problems:

1. How many two-digit prime numbers are there?

2. How many three-digit prime numbers are there?

3. Is 237421 a prime number?

The senior students continued to work on the following problems from the worksheet shared with them on November 23rd.

1. Suppose $(d, n) = 1$. Then for the set $S = \{a, a + d, a + 2d, \ldots, a + (n-1)d\}$, number of numbers in S coprime to n is $\phi(n)$.

2. Suppose $(m, n) = 1$. What can you say about $\phi(mn)$?

Most of the session was spent in discussing the meaning of the first problem, exploring it with examples and through different cases such as n being prime, composite etc. A solution for the second problem was proposed and discussed, an we concluded by agreeing to discuss more about it in the next in-person session.