**🎓 Gauss's Sum Formula**Gauss's method is designed to **quickly and efficiently calculate the sum of a sequence of consecutive numbers**, especially from **1 to n**, **without having to add each number one by one**.

**🔷 Problem:**  
Find the sum of all whole numbers from 1 to **n**.

**✅ Formula:**  
Sum = n(n + 1) ÷ 2

**🔷 Example:**  
Find the sum from 1 to 300:

Sum = 300 × (300 + 1) ÷ 2  
Sum = 300 × 301 ÷ 2  
Sum = 45,150

**📝 Why it works (in plain language):**

* Pair numbers from opposite ends: (1 + n), (2 + n−1), (3 + n−2), etc.
* Each pair adds to the same total.
* There are n ÷ 2 such pairs (if n is even).

**🧩 Tips to Remember:**

* "n(n + 1) ÷ 2" is your shortcut.
* Works for any sequence starting at 1.
* To sum numbers from **a to b**, use:  
  Sum = [b(b + 1) ÷ 2] − [(a − 1)a ÷ 2]

**Set Formulas**

1. **Union of Two Sets:**  
   n(A ∪ B) = n(A) + n(B) − n(A ∩ B)
2. **Union of Disjoint Sets:**  
   If A ∩ B = ∅, then  
   n(A ∪ B) = n(A) + n(B)
3. **Union of Three Sets (Inclusion-Exclusion Principle):**  
   n(A ∪ B ∪ C) = n(A) + n(B) + n(C) − n(A ∩ B) − n(B ∩ C) − n(A ∩ C) + n(A ∩ B ∩ C)
4. **Intersection of Two Sets (using union):**  
   n(A ∩ B) = n(A) + n(B) − n(A ∪ B)
5. **Union in terms of set differences:**  
   n(A ∪ B) = n(A − B) + n(B − A) + n(A ∩ B)

**The number of subsets of a set with nelements is 2n.**

For any set A, the empty set (∅) is one of its subsets.  
So, when counting the number of subsets, always include the empty set.

**Example:**  
If A = {w, y}, its subsets are:

* ∅
* {w}
* {y}
* {w, y}

That makes a total of 4 subsets, including the empty set.

**How to Find All Natural Number Factors of 63**

1. **Start with 1 and the number itself:**  
   1 and 63 are always factors of 63.
2. **Test each whole number from 2 up to the square root of 63:**
   * The square root of 63 is about 7.94, so test up to 7.
3. **For each number, check if it divides 63 evenly:**
   * If 63 divided by the number gives a whole number (no remainder), both the number and the result are factors.
4. **List all factor pairs:**
   * 1 × 63 = 63
   * 3 × 21 = 63
   * 7 × 9 = 63
5. **Write all unique factors in ascending order:**  
   1, 3, 7, 9, 21, 63

**Divisibility Rules**

**2**  
A number is divisible by 2 if its last digit is even (0, 2, 4, 6, or 8).

**3**  
A number is divisible by 3 if the sum of its digits is divisible by 3.

**4**  
A number is divisible by 4 if the number formed by its last two digits is divisible by 4.

**5**  
A number is divisible by 5 if its last digit is 0 or 5.

**6**  
A number is divisible by 6 if it is divisible by both 2 and 3.

**8**  
A number is divisible by 8 if the number formed by its last three digits is divisible by 8.

**9**  
A number is divisible by 9 if the sum of its digits is divisible by 9.

**10**  
A number is divisible by 10 if its last digit is 0.

**No, it is not divisible by 10 because it ends in 9.**

**12**  
A number is divisible by 12 if it is divisible by both 3 and 4.

What are the two primes that are consecutive natural​ numbers?

2,3

Can there be any other primes that are consecutive natural​ numbers?

No, because every pair of consecutive natural numbers will include at least one even number, and the only even prime is 2.