An Unsolved Mystery: The Collatz Conjecture

Palindromes in Mathematics

A palindrome is a number that remains the same when its digits are reversed.

These numbers read the same forward and backward.

Examples of Palindromic Numbers

121, 454, 1331, 9999 are palindromes.

Example:

- Reverse 121 → 121 (Same, so it's a palindrome)
- Reverse 567 → 765 (Not the same, so not a palindrome)

1. Finding a Palindrome Using Addition

If a number is not a palindrome, you can try making it one by reversing and adding.

Keep adding until you get a palindrome.

Example: Start with 68

i. Reverse 68 → 86

ii. **Add:** 68 + 86 = 154 (Not a palindrome)

iii. Reverse 154 → 451

iv. **Add:** 154 + 451 = 605 (Not a palindrome)

v. Reverse 605 → 506

vi. **Add:** 605 + 506 = 1111 ✅ (Palindrome found!)

2. Palindromes in Addition and Multiplication

Adding two palindromes often gives a palindrome.

Example:

121 + 232 = 353 (Palindrome)

Multiplying a palindrome with another number can still result in a palindrome.

Example:

11 × 11 = 121

Properties of Palindromic Numbers

i. **Reversible Symmetry:** The number looks the same when reversed.

ii. **Exists in Different Number Systems:** Found in binary (11011), decimal (121), etc.

iii. **Can be Generated:** Any number can become a palindrome using the reverse and add method.