The Magic Number of Kaprekar

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Kaprekar's Constant (6174) is a special number in mathematics.

It was discovered by D. R. Kaprekar, an Indian mathematician.

When a 4-digit number (not all digits the same) goes through a specific process, it always reaches 6174 in a few steps.

Kaprekar's Process (Kaprekar Routine)

- i. Pick any 4-digit number (where not all digits are the same).
- ii. Arrange its digits in descending order (biggest to smallest).
- iii. Arrange its digits in ascending order (smallest to biggest).
- iv. Subtract the smaller number from the larger number.
- v. Repeat the process until you reach 6174.

Example of Kaprekar's Constant

Let's start with 3524

- i. Descending: 5432, Ascending: 2345
- ii. Subtract: 5432 2345 = 3087
- iii. Descending: 8730, Ascending: 0378
- iv. Subtract: 8730 0378 = 8352
- v. Descending: 8532, Ascending: 2358
- vi. Subtract: 8532 2358 = 6174

No matter which number you start with (except repeated-digit numbers like 1111 or 2222), you will always reach 6174 in a few steps!

Properties of Kaprekar's Constant

- i. Fixed Point: Once you reach 6174, the process repeats (6174 4176 = 6174).
- ii. Works for 4-digit numbers: This rule applies to any 4-digit number (except samedigit numbers).
- iii. Takes at most 7 steps: Any eligible number reaches 6174 in 7 steps or fewer.
- iv. Kaprekar Numbers Exist in Other Digits Too:
 - For 3-digit numbers, 495 is the Kaprekar constant.