

6,174, the Kaprekar number

The **Kaprekar** number is quite an amazing number and very useful in ordering digits from largest to smallest, vice versa, and as additional classwork/homework practice for students that may need to brush up on their subtraction!

Here are the steps to find the **Kaprekar** number:

1. Pick ANY 4-digit number except one that has the same four digits (i.e. 5555)
2. Arrange the four digits in descending order (from largest to smallest)
3. Below that new number, arrange the digits from smallest to largest (ascending)
4. Steps 2 and 3 give the students practice with ordering digits!
5. Subtract the smaller number from the larger number
6. This will give students plenty of practice with... regrouping or borrowing (?)
7. Take the answer (the difference) and repeat steps 2 and 3.
8. Repeat step 7 (which is essentially steps 2 & 3) until you arrive at **6,174**.
9. When you come up with the **Kaprekar** number, count how many steps (times you subtracted the smaller number from the larger one) it took to get there and also notice what number (digits) was right before the **Kaprekar** number!!!

Example:

$$\begin{array}{r}
 2534 \quad \gg \gg \quad 5432 \\
 \quad - 2345 \\
 \hline
 \quad 3087 \quad \gg \gg \gg \quad 8730 \\
 \quad - 0378 \\
 \hline
 \quad 8352 \quad \gg \gg \gg \quad 8532 \\
 \quad - 2358 \\
 \hline
 \quad 6174 \quad (3 \text{ steps})
 \end{array}$$

Questions:

- A) How many steps did it take to get to the **Kaprekar** number? _____
- B) What was the number you started with? _____
- C) Can you find a number(s) that takes:
- | | |
|-----------------------|--|
| a) 1 step | Number(s): _____ |
| b) 2 steps | Number(s): _____ |
| c) 3 steps | Number(s): _____ |
| d) 4 steps | Number(s): _____ |
| e) 5 steps | Number(s): _____ |
| f) 6 steps | Number(s): _____ |
| g) 7 steps | Number(s): _____ |
| h) More than 7 steps? | Number: <i>There are NO numbers that take more than 7 steps!</i> |