

Strong Arm Iteration

NAME _____

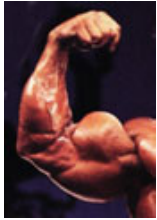
Do the following: Take a three-digit number, cube its digits, and add them. Then, do the same with the result. Continue until you notice a pattern.

Here's an example:

Begin with 123.

$$1^3 + 2^3 + 3^3 = 36 \rightarrow 3^3 + 6^3 = 243 \rightarrow 2^3 + 4^3 + 3^3 = 99 \rightarrow 9^3 + 9^3 = 1458 \rightarrow$$

$$1^3 + 4^3 + 5^3 + 8^3 = 702 \rightarrow 7^3 + 0^3 + 2^3 = 351 \rightarrow 3^3 + 5^3 + 1^3 = 153 \rightarrow 1^3 + 5^3 + 3^3 = 153$$



Note that when the sequence reaches 153, it begins to repeat.
That is, $1^3 + 5^3 + 3^3 = 153$.

1. What other three-digit numbers will eventually reach 153 and begin to repeat? Is there a pattern to the numbers that reach 153?
2. Other than 153, what other numbers are reached when this process is applied?
3. Note anything interesting that you found while doing this investigation. If possible, explain why these interesting things happened.