FINAL FOUR

Counter With A Strong Defense

TEAM NAME_____

TEAM MEMBERS_____

- THE FINAL FOUR IS TIMED. YOUR TEAM WILL HAVE FIFTEEN MINUTES.
- YOUR TEAM WILL HAVE ONE CALCULATOR AVAILABLE; NO OTHER ELECTRONIC DEVICES ARE ALLOWED.
- ***DO NOT OPEN TEST BOOKLET UNTIL THE ROUND STARTS!***
- IN THE FINAL FOUR, IT IS MORE LIKELY YOUR TEAM WON'T BE ABLE TO ANSWER ALL QUESTIONS THOROUGHLY AND/OR CORRECTLY. THIS MEANS IT IS MORE IMPORTANT THAN EVER THAT YOU SUPPORT YOUR ANSWERS WITH EASY-TO-FOLLOW EXPLANATIONS AND SOLUTIONS.
- THE RUBRIC FOR THE FINAL FOUR IS ON THE BACK SIDE OF THIS COVER SHEET.
- THE FINAL FOUR CONSISTS OF TWO DIFFERENT EXERCISES. FEEL FREE TO STRATEGIZE HOW BEST TO MEET THE SPECIFICATIONS DEFINED ON THE RUBRIC.
- WHEN YOUR TEAM IS FINISHED, ***WALK*** YOUR PAPER TO THE SCORING TABLE AND PLACE IT ON THE TOP OF THE STACK IN THE BASKET. (ONE POINT PENALTY MAY BE ASSESSED FOR DISORDERLY CONDUCT.) TIE SCORES WILL BE BROKEN BY ORDER OF TURN IN.

TURN IN ORDER:_____ SCORE:_____

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FINAL FOUR

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OUTSTANDING = 3	PROFICIENT = 2	DEVELOPING = 1	NO EVIDENCE = 0

CATEGORY	UNDERSTANDING OF THE PROBLEMS	TENDS TO PRECISION	COMMUNICATES CLEARLY	RESOURCEFUL	TOTAL
JUDGE 1	/3	/3	/3	/3	
JUDGE 2	/3	/3	/3	/3	
JUDGE 3	/3	/3	/3	/3	
AVERAGE	/9	/9	/9	/9	/36

[1A] Choose any four-digit number, and feel free to place zeros *anywhere*. (0873, for instance.) Write your number here:

[1B] Rewrite your number in both *descending order* and *ascending order*, and subtract the ascending version from the descending version. (See example below left.)

$$\begin{array}{r} 8730 \\ -0378 \\ \hline 8352 \end{array}$$

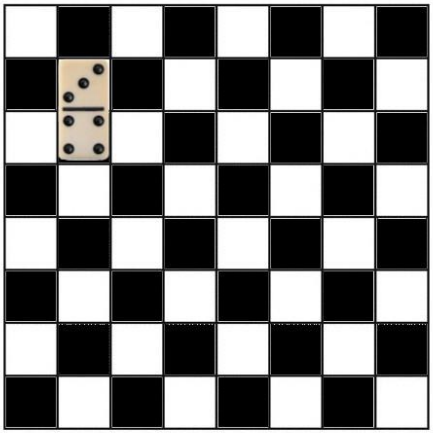
Using your previous result, repeat no more than eight times.

[1C] Choose at least two new starting numbers and carry out the process described in [1B] with those new numbers.

[1D] What do you notice about this process?

[1E] Do you think the same result will always happen, or can you think of any situations under which it won't happen?

[2A] Suppose you had a collection of dominos that were the right size to perfectly cover adjacent squares of a chess board, like the one shown here. What is the minimum number of dominoes needed to cover the entire board with no gaps or overlaps? (One domino is shown only to clarify how you might place one on the board. You're free to move it.)



[2B] A *mutilated chess board* is one with the opposite corners removed, like the one shown below. Two spaces have been removed from the board, so is it possible to cover the mutilated chess board entirely with no gaps or overlaps *if you had one domino fewer* than the number you reported in the previous part? Why or why not? (One domino is shown only to clarify how you might be able to place it on the board.)