12 Days of ChrisMATH — Day 10

For today's puzzles, all you have to do is follow the instructions. Start with the first instruction and follow them in order. Here is an example:

(1) Begin with the number 8. (Current number: 8)

(2) Add 16. (Current number: 24)

(3) Put the digit 3 between the second-last and last digits. (Current number: 234)

(4) Double only the first digit. (Current number: 434)

(5) Repeat step (2) then move to step (6). (Current number: 1302)

(6) Reverse the digits. (Current number: 2031)

(7) Remove the second digit. (Current number: 231)

(8) Replace the first digit with 1 more than the second digit. (Current number: 431)

What is your final number? (Answer: 431)

(Notice the word "put" means to insert a digit or digits, rather than "replace," while "add" means to use addition.)

Level 1:

(1) Begin with the number 25.

(2) Add the digits of the number and put this digit at the end.

(3) Reverse the digits.

(4) Take 1 away from the first digit.

(5) Remove the digit in the tens place.

What is your final number?

Level 2:

(1) Write the number 23.

(2) Multiply by 11.

(3) Move the last digit to the beginning of the number.

(4) Find the remainder when dividing the number by 37.

(5) Add 16.

(6) Put 7 between the first and second digits.

(7) Take the sum of the last two digits and put the resulting number at the start.

(8) Swap the second digit and the second-last digit.

(9) Double your number.

(10) Remove any digit which equals the second digit of your number.

(11) Repeat steps (5) through (9), then move to step (12).

(12) If the number of digits in your number is even, put 1 at the end of the number. Otherwise, put 2 at the end of your number.

What is your final number?

Level 3:

(1) Write the number 24.

(2) Put 7 at the start of the number.

(3) Reverse the digits.

(4) Put the number of prime factors of this number at the end of the number.

(5) Take the product of 6 and the sum of the digits, and put this at the start of the number.

(6) Remove every other digit, starting with the first digit on the right.

(7) Multiply by 18.

(8) Take the third digit, and put that many copies of the digit 7 at the start.

(9) If the number is less than 1000, multiply by 17. Otherwise, if the digit in the thousands place is at least as large as than the digit in the tens place, replace both with their positive difference. Otherwise, replace both with the digit 9.

(10) If the number of even digits is even, put 7 between the second-last and last digits. If the number of even digits is odd, put 7 between the first and second digits.

(11) If the number is not divisible by 2, double it. Otherwise, halve it.

(12) Replace every digit which is prime with 1 more than the digit.

(13) Subtract the sum of the digits from the number.

(14) Add the product of the digits to the number.

(15) If any two consecutive digits form a two-digit square, replace the two digits with the 1- or 2-digit square root.

(16) If any digit is a perfect square, replace the digit with its square root.

(17) Starting with the left-hand side and with the longest number possible, if any number formed by consecutive digits is divisible by the next digit in the number, replace all of the associated digits with this quotient, but stop this step if such an operation occurs.

(18) Perform steps (12), (11), (14), and (7), in that order, then move to step (19).

(19) Put the number of odd digits between every pair of consecutive even digits and put the number of even digits between every pair of consecutive odd digits. All changes should be made simultaneously, so they do not affect one another.

What is your final number?