

Problem of the Week

Problem B and Solution

An ‘Annual’ Problem

Problem

I am a 4-digit number, identity unknown.

1. My thousands digit is twice my tens digit.
2. My hundreds digit is 1 less than my tens digit.
3. My ones digit is not 0.
4. The sum of my digits is 11.
5. All of my digits are different.



What number am I?

CHALLENGE: Make up another riddle with a unique solution.

Solution

Only the doubles of digits 1, 2, 3, and 4 are single digits. Thus the first clue permits only numbers of the form

$$2_1_ , \quad 4_2_ , \quad 6_3_ , \quad \text{and} \quad 8_4_$$

The second clue tells us that the hundreds digit must be 1 less than the tens digit. That limits the choices further to

$$201_ , \quad 412_ , \quad 623_ , \quad \text{and} \quad 834_$$

But clues 3 and 4 eliminate 623, since the ones digit would have to be 0 to achieve a sum of 11.

Also, any number of the form 834 already has a digit sum of 15, and hence violates clue 4.

So we are left with numbers of the form 201 and 412.

But for a sum of 11, since $4 + 1 + 2 + 4 = 11$, the last choice would need the ones digit to equal 4, violating clue 5.

Since $2 + 0 + 1 + 8 = 11$, the only solution is 2018.

