

Have a Cracking New Year! by Thomas Snyder

Rules: Classic Sudoku Rules. Some arrow shapes are in the grid; the sum of the digits along the path of each arrow must equal the digit in the circled cell (digits can repeat on an arrow). Some thermometer shapes are in the grid; the digits along the thermometer must be strictly increasing from the round bulb to the flat end. Some rectangular cages are in the grid marked by dashed lines; the sum or product of the digits in these cages must be either 20 or 21. Finally, some arrows are given outside the grid; the sum or product of the digits along these marked diagonals must be either 20 or 21 (digits can repeat on a diagonal).



The puzzle is a 10x10 grid with a 3x3 sub-grid in the top-left corner. The grid contains several constraints:

- Arrows:**
 - Top row: A right-pointing arrow in (1,2), a thermometer with bulb at (1,3) and flat end at (1,4), a thermometer with bulb at (1,5) and flat end at (1,6), and a thermometer with bulb at (1,7) and flat end at (1,8).
 - Second row: A thermometer with bulb at (2,3) and flat end at (2,4), a thermometer with bulb at (2,5) and flat end at (2,6), and a thermometer with bulb at (2,7) and flat end at (2,8).
 - Third row: A thermometer with bulb at (3,3) and flat end at (3,4), a thermometer with bulb at (3,5) and flat end at (3,6), and a thermometer with bulb at (3,7) and flat end at (3,8).
 - Fourth row: A thermometer with bulb at (4,3) and flat end at (4,4), a thermometer with bulb at (4,5) and flat end at (4,6), and a thermometer with bulb at (4,7) and flat end at (4,8).
 - Fifth row: A thermometer with bulb at (5,3) and flat end at (5,4), a thermometer with bulb at (5,5) and flat end at (5,6), and a thermometer with bulb at (5,7) and flat end at (5,8).
 - Sixth row: A thermometer with bulb at (6,3) and flat end at (6,4), a thermometer with bulb at (6,5) and flat end at (6,6), and a thermometer with bulb at (6,7) and flat end at (6,8).
 - Seventh row: A thermometer with bulb at (7,3) and flat end at (7,4), a thermometer with bulb at (7,5) and flat end at (7,6), and a thermometer with bulb at (7,7) and flat end at (7,8).
 - Eighth row: A thermometer with bulb at (8,3) and flat end at (8,4), a thermometer with bulb at (8,5) and flat end at (8,6), and a thermometer with bulb at (8,7) and flat end at (8,8).
 - Ninth row: A thermometer with bulb at (9,3) and flat end at (9,4), a thermometer with bulb at (9,5) and flat end at (9,6), and a thermometer with bulb at (9,7) and flat end at (9,8).
 - Tenth row: A thermometer with bulb at (10,3) and flat end at (10,4), a thermometer with bulb at (10,5) and flat end at (10,6), and a thermometer with bulb at (10,7) and flat end at (10,8).
- Dashed Rectangles (Cages):**
 - (1,1) to (1,2)
 - (1,3) to (1,4)
 - (1,5) to (1,6)
 - (1,7) to (1,8)
 - (2,3) to (2,4)
 - (2,5) to (2,6)
 - (2,7) to (2,8)
 - (3,3) to (3,4)
 - (3,5) to (3,6)
 - (3,7) to (3,8)
 - (4,3) to (4,4)
 - (4,5) to (4,6)
 - (4,7) to (4,8)
 - (5,3) to (5,4)
 - (5,5) to (5,6)
 - (5,7) to (5,8)
 - (6,3) to (6,4)
 - (6,5) to (6,6)
 - (6,7) to (6,8)
 - (7,3) to (7,4)
 - (7,5) to (7,6)
 - (7,7) to (7,8)
 - (8,3) to (8,4)
 - (8,5) to (8,6)
 - (8,7) to (8,8)
 - (9,3) to (9,4)
 - (9,5) to (9,6)
 - (9,7) to (9,8)
 - (10,3) to (10,4)
 - (10,5) to (10,6)
 - (10,7) to (10,8)
- External Arrows:**
 - Left side: Two arrows pointing right towards the grid at rows 4 and 5.
 - Right side: Two arrows pointing left towards the grid at rows 4 and 5.
 - Bottom: Two arrows pointing up towards the grid at columns 4 and 5.