Express Riddler

10 July 2020

Riddle:

The 24 Game is a fun test of mathematical fluency. In the Riddler version of the game, your goal is to make a numerical expression that equals 24, using each of four given numbers once, along with parentheses, addition, subtraction, multiplication, division and exponentiation.

For example, if I gave you the numbers 1, 2, 3 and 8, then valid solutions would be $8 \times 3 \times (2-1)$ and $(3+1) \times (8-2)$, since they both equal 24. However, concatenation is not an allowed operation, which means $(32-8) \times 1$ is *not* a solution—that is, you can't smush the 3 and the 2 together to get 32.

Given the four numbers 2, 3, 3 and 4, how can you make 24?

Extra credit: Can you find *another* way to make 24?

Solution:

I found these two solutions to the riddle. There might be more.

$$4\left(3^2-3\right)=24$$
$$3\left(\frac{4}{2}\right)^3=24$$