
*This brainteaser was written by Derrick Niederman.*

It's not too hard to form the number 9 using three 3's and any of the four standard mathematical operations +, −, × and ÷. But can you come up with four different solutions, each of which uses only one of the four operations? (Other standard mathematical symbols can be used as needed.)

$$9 = 3 + 3 + 3$$

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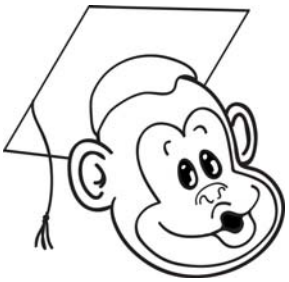

**Solution:** $9 = 3 + 3 + 3$; $9 = 3^3 \div 3$, $9 = \sqrt{3^3 \times 3}$, $9 = 3^{3!} - (3!)!$.

The easiest solution is the one using only addition, which is shown with the puzzle itself.

The solutions using division and multiplication both require introducing one extra operation—an exponent for the division solution, and two square roots for the multiplication solution.

The solution using only subtraction is the most difficult of the four, because it requires an exponent as well as three factorial symbols, not to mention a fair bit of imagination. The calculations below show that it yields the correct result.

$$\begin{aligned} 3^{3!} - (3!)! &= 3^6 - 6! \\ &= 729 - 720 \\ &= 9 \end{aligned}$$

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