

Puzzle of the Week

Fractions – 9

THE CHALLENGE: Use the numbers 2 to 9 at most once each to fill in these boxes. There are a lot of answers that are essentially the same, so organize them with increasing numerators and denominators.

$$\frac{\square}{\square} \times \frac{\square}{\square} = 1$$

2 3 4 5 6 7 8 9

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Fractions – 9 – Notes

THE CHALLENGE & EXPLORATION: Write the equation with variables to make it easier to talk about:
 $A/B \times C/D = 1$. Multiplying both sides by B and D turns this into $A \times C = B \times D$.

As there is only one 5 and one 7, they cannot be put into this equation. Thinking in terms of primes helps a lot. We need to balance the number of 2's and 3's on both sides of this equation using the remaining six numbers: 2, 3, 4, 6, 8, and 9.

The 3's are more limited, so there are only three possibilities.

- There are no multiples of 3. This only leaves three numbers, which is not enough.
- 3 is on one side and 6 is on the other side. We will need to use two of the three remaining numbers.
 - $3 \times 4 = 6 \times 2$; $3 \times 8 = 6 \times 4$
- 9 is on one side and 3 and 6 are on the other side.
 - $9 \times 2 = 3 \times 6$

So, there are three solutions (plus three more if you flip the fractions):

- $(3 \times 4) / (2 \times 6)$
- $(3 \times 8) / (4 \times 6)$
- $(2 \times 9) / (3 \times 6)$