



Harmonic Triangles

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$$\frac{1}{1}$$

Can you see what the rules for making the next line are?

$$\frac{1}{2} \quad \frac{1}{2}$$

Can you work out the next two rows?

$$\frac{1}{3} \quad \frac{1}{6} \quad \frac{1}{3}$$

We can continue the first diagonal ($\frac{1}{1}$, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, and so on) using the rule.

$$\frac{1}{4} \quad \frac{1}{12} \quad \frac{1}{12} \quad \frac{1}{4}$$

Can we be sure that the second diagonal ($\frac{1}{2}$, $\frac{1}{6}$, $\frac{1}{12}$, $\frac{1}{20}$, and so on) can always be continued?

$$\frac{1}{5} \quad \frac{1}{20} \quad \frac{1}{30} \quad \frac{1}{20} \quad \frac{1}{5}$$

If not, try to find an example where it can't.

$$\frac{1}{6} \quad \frac{1}{30} \quad \frac{1}{60} \quad \frac{1}{60} \quad \frac{1}{30} \quad \frac{1}{6}$$

If we can, will it always contain unit fractions (that is, fractions where the number on top is 1)?

Can you prove it?

Thousands more problems can be found on the Nrich website

www.nrich.maths.org