

Which of these can I reach?  $\frac{1}{2}, \frac{1}{7}, \frac{2}{7}, \frac{5}{9}, \frac{11}{13}, \frac{17}{16}, \frac{19}{8}, \frac{2}{1}$

What is the biggest / smallest fraction you can make?

What is the biggest/smallest numerator?

Is it true that the numerators never decrease?

Can I make a fraction for which the numerator and denominator have a common factor?

Can I make a closed loop of fractions: a sequence of transformations ending back where I started?

Can you make sense of the process of working backwards from different fractions?

This challenge involves building up a set  $F$  of fractions using a starting fraction and two operations which you use to generate new fractions from any member of  $F$

Rule 1:  $F$  contains the fraction  $\frac{1}{2}$

Rule 2: If  $\frac{p}{q}$  is in F then  $\frac{p}{p+q}$  is also in F

Rule 3: If  $\frac{p}{q}$  is in F then  $\frac{q}{p+q}$  is also in F

Invent an interesting final challenge related to this structure