

## My Solution

1.  $\frac{1}{10} + \frac{1}{2} + \frac{2}{5} = 20$   
 $\frac{1}{10} + \frac{1}{4} + \frac{1}{2} + \frac{3}{20} = 20$

$\frac{3}{5} + \frac{1}{5} + \frac{1}{5} = 20$   $\frac{3}{5} + \frac{2}{5} = 20$   
 $\frac{1}{4} + \frac{1}{4} + \frac{1}{2} = 20$   $\frac{1}{4} + \frac{1}{5} + \frac{1}{10} + \frac{9}{20} = 20$

$\frac{1}{10} + \frac{1}{10} + \frac{3}{10} + \frac{1}{2} = 20$   $\frac{3}{5} + \frac{1}{10} + \frac{3}{10} = 20$   
 $\frac{9}{20} + \frac{2}{5} + \frac{3}{20} = 20$

$\frac{3}{20} + \frac{3}{20} + \frac{1}{5} + \frac{1}{2} = 20$   $\frac{2}{5} + \frac{1}{10} + \frac{3}{10} + \frac{1}{5} = 20$   
 $\frac{1}{2} + \frac{1}{5} + \frac{3}{10} = 20$

$\frac{1}{5} + \frac{1}{5} + \frac{1}{10} + \frac{1}{2} = 20$   $\frac{1}{4} + \frac{3}{5} + \frac{3}{20} = 20$   
 $\frac{3}{10} + \frac{3}{10} + \frac{2}{5} = 20$   $\frac{5}{20} + \frac{3}{10} + \frac{1}{4} = 20$

$\frac{3}{20} + \frac{3}{20} + \frac{2}{5} + \frac{3}{10} = 20$   $\frac{1}{10} + \frac{3}{20} + \frac{9}{20} + \frac{3}{10} = 20$   
 $\frac{3}{10} = 20$  (rest of solutions)

24 link

2.  $\frac{1}{2} + \frac{3}{8} + \frac{1}{8} = 24$   
 $\frac{1}{2} + \frac{5}{12} + \frac{1}{2} = 24$   
 $\frac{9}{24} + \frac{1}{3} + \frac{1}{4} + \frac{1}{12} + \frac{1}{8} = 24$   
 $\frac{3}{8} + \frac{1}{6} + \frac{1}{3} + \frac{1}{8} = 24$   
 $\frac{1}{2} + \frac{1}{3} + \frac{1}{6} = 24$

$\frac{1}{2} + \frac{1}{12} + \frac{1}{3} + \frac{1}{12} = 24$

$\frac{1}{2} + \frac{1}{2} = 24$

solutions on  
back)

$\frac{1}{12} + \frac{1}{12} + \frac{1}{6} + \frac{5}{24} + \frac{1}{12} + \frac{3}{8} = 24$

$\frac{1}{4} + \frac{1}{4} + \frac{1}{2} = 24$

$\frac{1}{12} + \frac{1}{4} + \frac{1}{3} + \frac{1}{3} = 24$

$\frac{1}{2} + \frac{1}{4} + \frac{1}{12} + \frac{1}{12} + \frac{1}{12} = 24$

$\frac{5}{12} + \frac{5}{12} + \frac{1}{6} = 24$

$\frac{3}{20} + \frac{3}{20} + \frac{3}{20} + \frac{1}{5} + \frac{1}{5} + \frac{3}{20} = 20$

$\frac{3}{20} + \frac{3}{10} + \frac{3}{20} + \frac{3}{20} + \frac{1}{4} = 20$

$\frac{3}{10} + \frac{3}{10} + \frac{3}{10} + \frac{1}{10} = 20$

$\frac{3}{10} + \frac{3}{10} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10} = 20$

$\frac{9}{20} + \frac{3}{20} + \frac{1}{10} + \frac{1}{5} + \frac{1}{10} = 20$

$\frac{2}{5} + \frac{1}{10} + \frac{3}{20} + \frac{1}{5} + \frac{3}{20} = 20$

## Haruka

First, I tried the smallest chain which is 2.  $20 - 2 = 18$  so I had to find a variety of chains that have the sum of 18. I did that for all of the different chains until I got to the point when I might have repeated solutions. For example, when I got to 12, I had 8 left. I already used the 3 chain and the 5 chain so I found another way which was the 2 chain and the 6 chain.

$\frac{1}{10} + \frac{1}{10} + \frac{1}{10} + \frac{3}{10} + \frac{2}{5} = 20$

$\frac{1}{10} + \frac{3}{20} + \frac{3}{20} + \frac{3}{20} + \frac{9}{20} = 20$

$\frac{1}{5} + \frac{1}{5} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10} + \frac{6}{20} = 20$

$\frac{3}{5} + \frac{1}{10} + \frac{3}{20} + \frac{3}{10} = 20$

$\frac{3}{5} + \frac{1}{5} + \frac{1}{10} + \frac{1}{10} = 20$

$\frac{3}{20} + \frac{1}{10} + \frac{1}{10} + \frac{3}{20} + \frac{1}{10} + \frac{1}{5} + \frac{1}{5} = 20$

$\frac{9}{20} + \frac{9}{20} + \frac{1}{10} = 20$

$\frac{2}{5} + \frac{1}{10} + \frac{3}{20} + \frac{1}{10} + \frac{1}{10} + \frac{3}{20} = 20$

$\frac{1}{10} + \frac{3}{10} + \frac{3}{10} + \frac{3}{20} + \frac{3}{20} = 20$

$\frac{3}{20} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10} + \frac{3}{20} + \frac{1}{5} = 20$

$\frac{9}{20} + \frac{1}{10} + \frac{3}{20} + \frac{3}{20} + \frac{3}{20} = 20$

$\frac{1}{5} + \frac{1}{5} + \frac{1}{5} + \frac{1}{5} + \frac{1}{10} + \frac{1}{10} = 20$

$\frac{1}{5} + \frac{1}{5} + \frac{1}{5} + \frac{3}{20} + \frac{3}{20} + \frac{1}{10} = 20$

$\frac{1}{5} + \frac{1}{5} + \frac{1}{5} + \frac{1}{10} + \frac{3}{20} + \frac{1}{5} = 20$

$\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{10} + \frac{3}{20} = 20$

$\frac{1}{4} + \frac{1}{4} + \frac{2}{5} + \frac{1}{10} = 20$

24 link

$$\begin{aligned} &1/12 + 1/12 + 1/12 + 1/12 + 1/3 + 1/3 = 24 \\ &1/12 + 1/12 + 1/8 + 1/8 + 1/8 + 1/8 + 1/6 = 24 \\ &1/8 + 1/8 + 1/8 + 1/8 + 1/8 + 1/8 + 1/4 = 24 \\ &1/12 + 1/12 + 1/12 + 1/8 + 1/6 + 1/12 + 1/6 = 24 \\ &1/12 + 1/12 + 1/2 + 1/8 + 5/24 = 24 \\ &5/24 + 5/24 + 5/24 + 1/12 + 1/12 + 1/12 + 1/8 = 24 \\ &5/12 + 5/12 + 1/12 + 1/12 = 24 \\ &1/6 + 1/6 + 1/6 + 1/6 + 1/6 + 1/12 + 1/8 = 24 \\ &1/6 + 1/6 + 1/6 + 5/24 + 5/24 + 1/12 = 24 \\ &3/8 + 3/8 + 1/12 + 1/6 = 24 \\ &3/8 + 3/8 + 1/8 + 1/8 = 24 \\ &1/3 + 1/3 + 1/6 + 1/12 + 1/12 = 24 \\ &1/3 + 1/3 + 1/3 = 24 \\ &1/3 + 1/3 + 1/4 + 1/12 = 24 \\ &1/4 + 1/4 + 1/4 + 1/4 = 24 \\ &1/4 + 1/4 + 1/4 + 1/12 + 1/12 + 1/12 = 24 \\ &1/4 + 1/4 + 1/4 + 1/6 + 1/12 = 24 \\ &1/4 + 1/4 + 1/6 + 1/12 + 1/8 + 1/8 = 24 \\ &1/6 + 1/6 + 1/8 + 5/24 + 1/12 + 1/12 + 1/12 + 1/12 = 24 \\ &1/6 + 1/6 + 1/8 + 1/8 + 5/24 + 5/24 = 24 \\ &5/24 + 5/24 + 5/12 + 1/12 + 1/12 = 24 \\ &5/24 + 5/24 + 1/6 + 5/12 = 24 \\ &5/24 + 5/24 + 1/2 + 1/12 = 24 \\ &5/24 + 5/24 + 5/24 + 1/6 + 1/12 + 1/8 = 24 \\ &5/24 + 5/24 + 5/24 + 1/8 + 1/8 + 1/8 = 24 \\ &1/6 + 1/6 + 1/6 + 1/12 + 1/12 + 1/4 + 1/12 = 24 \\ &1/6 + 1/6 + 1/6 + 1/6 + 5/24 + 1/8 = 24 \\ &1/6 + 1/6 + 1/6 + 1/6 + 1/8 + 1/8 + 1/12 = 24 \end{aligned}$$

27 link

$$\begin{aligned} &4/9 + 4/9 + 1/9 = 27 \\ &4/9 + 10/27 + 5/27 = 27 \\ &4/9 + 1/3 + 2/9 = 27 \\ &4/9 + 1/3 + 1/9 + 1/9 = 27 \\ &4/9 + 1/3 + 4/27 + 2/27 = 27 \\ &4/9 + 8/27 + 2/27 + 5/27 = 27 \\ &4/9 + 8/27 + 1/9 + 4/27 = 27 \\ &4/9 + 2/9 + 5/27 + 4/27 = 27 \\ &4/9 + 2/9 + 2/27 + 2/27 + 2/27 + 1/9 = 27 \\ &4/9 + 2/9 + 1/9 + 3/27 + 4/27 = 27 \\ &4/9 + 2/9 + 4/27 + 1/9 + 2/27 = 27 \\ &10/27 + 10/27 + 1/9 + 4/27 = 27 \\ &10/27 + 10/27 + 2/27 + 2/27 + 1/9 = 27 \\ &1/3 + 1/3 + 1/3 = 27 \\ &1/3 + 1/3 + 2/9 + 1/9 = 27 \\ &1/3 + 1/3 + 4/27 + 5/27 = 27 \\ &1/3 + 1/3 + 1/9 + 1/9 + 1/9 = 27 \\ &1/3 + 1/3 + 4/27 + 1/9 + 2/27 \\ &1/3 + 1/3 + 2/27 + 2/27 + 2/27 + 1/9 = 27 \\ &8/27 + 8/27 + 8/27 + 1/9 = 27 \\ &8/27 + 8/27 + 4/27 + 5/27 + 2/27 = 27 \\ &8/27 + 8/27 + 2/27 + 2/27 + 2/27 + 5/27 = 27 \\ &8/27 + 8/27 + 2/9 + 5/27 = 27 \\ &2/9 + 2/9 + 2/9 + 2/9 + 1/9 = 27 \\ &2/9 + 2/9 + 2/9 + 5/27 + 4/27 = 27 \\ &2/9 + 2/9 + 2/9 + 2/27 + 2/27 + 5/27 = 27 \\ &2/9 + 2/9 + 2/9 + 1/9 + 2/27 + 2/27 + 2/27 = 27 \\ &5/27 + 5/27 + 5/27 + 5/27 + 5/27 + 2/27 = 27 \end{aligned}$$

chain link 27 continued

$$\begin{aligned} &4/27 + 4/27 + 4/27 + 4/27 + 4/27 + 5/27 + 2/27 = 27 \\ &4/27 + 4/27 + 4/27 + 4/27 + 5/27 + 2/9 = 27 \\ &4/27 + 4/27 + 4/27 + 10/27 + 2/27 + 1/9 = 27 \\ &1/9 + 1/9 + 1/9 + 1/9 + 1/9 + 1/9 + 1/9 + 1/9 + 1/9 = 27 \\ &1/9 + 1/9 + 1/9 + 1/9 + 1/9 + 1/9 + 1/9 + 2/9 = 27 \end{aligned}$$