Here are the full, or partial solutions.

Year 8 and below

You have 10 L of nard oil in a 10 L alabaster jar, which you need to divide into two equal volumes. You have an empty 7 L jar and an empty 3 L jar. Using only the jars, measure out two jars of 5 L each. (This puzzle first appeared in a book in Japan in 1631.)

Solution

Let's set up our three jars with the starting conditions at Step 0:

Step	10 L jar	7 L jar	3 L jar	
0	10	0	0	
1	3	7	0	Fill the 7 L jar from the 10 L jar
2	3	4	3	Fill the 3 L jar from the 7 L jar
3	6	4	0	Pour the 3 L jar into the 10 L jar
4	6	1	3	⋮
5	9	1	0	
6	9	0	1	
7	2	7	1	
8	2	5	3	
9	5	5	0	

Now we have divided the 10 L, 5 L in the 10 L jar, and 5 L in the 7 L jar.

Year 9 and above

Without calculating the answer, is

$$15.99 \div 3.99$$

more than 4, less than 4 or exactly 4?

Solution

If we think of this quotient as being

$$\begin{aligned}\frac{15.99}{3.99} &= \frac{4+4+4+3.99}{3.99}\\ &= \frac{4}{3.99}+\frac{4}{3.99}+\frac{4}{3.99}+\frac{3.99}{3.99}\\ &= \textit{slightly} > 4 + \textit{slightly} > 4 + \textit{slightly} > 4 + 1\end{aligned}$$

So the answer must be a bit larger than 4.

Or, we might start with $\frac{16}{4}$ and note that to get $\frac{15.99}{3.99}$ the numerator and the denominator have each been decreased by the same amount, 0.01. But proportionally the denominator has been decreased by more than the numerator (because it is smaller than the numerator) so the quotient must increase.