Chains of Ratios

RP08-V1 · storyboard · RP08 Chain ratios. Read each picture with its sentences.

Picture 1

$\frac{x}{y} = \frac{2}{3}$ and $\frac{y}{z} = \frac{7}{5}$. Find $\frac{z}{x}$.

$$\frac{x}{y} \cdot \frac{y}{z} = \frac{x}{z}$$ the y cancels

$$\frac{2}{3} \cdot \frac{7}{5} = \frac{14}{15}$$

$$\boxed{\frac{z}{x} = \frac{15}{14}}$$ upside down

1. x over y is two thirds, and y over z is seven fifths.
2. Find z over x.
3. Multiply: x over y times y over z is x over z.
4. The y cancels.
5. Two thirds times seven fifths is fourteen fifteenths.
6. The question asks for z over x, so turn it upside down: fifteen fourteenths.

Picture 2

$x : y = 2 : 3$ and $y : z = 7 : 5$. Write $x : y : z$.

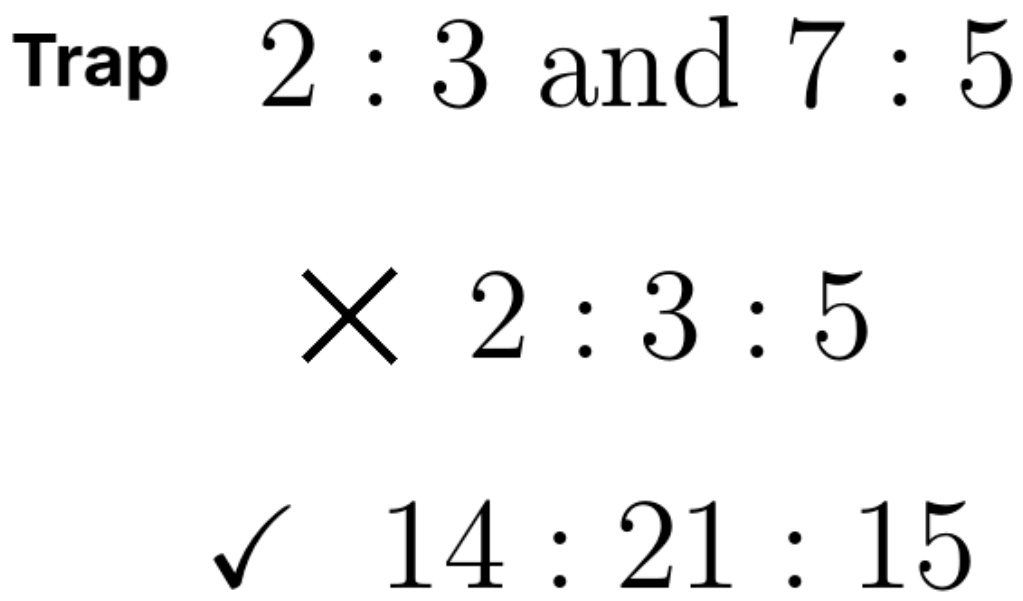
$$y: \quad 3 \text{ and } 7 \rightarrow 21 \quad \text{make } y \text{ match}$$

$$x : y = 14 : 21, \quad y : z = 21 : 15$$

$$\boxed{x : y : z = 14 : 21 : 15}$$

7. x to y is 2 to 3, and y to z is 7 to 5.
8. Write x to y to z.
9. In one ratio y is 3, and in the other it is 7.
10. Make it 21 in both.
11. Scale both: 14 to 21, and 21 to 15.
12. So x to y to z is 14 to 21 to 15.

Picture 3



13. Watch for the trap: joining without matching.
14. In 2 to 3 to 5, y to z would be 3 to 5, not 7 to 5.
15. Make the shared part match first.

Picture 4

Trap $\frac{a}{b} = \frac{3}{4}, \quad \frac{a}{c} = 5$

$$\times \frac{a}{b} \cdot \frac{a}{c}$$

$$\checkmark \quad \frac{a}{c} \div \frac{a}{b} = \frac{b}{c}$$

16. And when the shared letter is on top in both, multiplying doesn't cancel it.
17. Divide instead: a over c, divided by a over b, is b over c.