

Display Master: Key Idea: Determine Proportionality

- 2 ratios are proportional if the equivalent ratios resulting from finding a common denominator have the same numerator.

Display Master: Boys to Girls A

In Math Club, there are 6 boys and 9 girls. In Book Club, there are 4 boys and 6 girls. Are the ratios of boys to girls in each club proportional?

6 Boys	4 Boys
9 Girls	6 Girls

$$9 \times 6 = 54$$

Therefore, our common denominator is 54.

Display Master: Boys to Girls B

$$\frac{6 \text{ Boys}}{9 \text{ Girls}} = \frac{x \text{ Boys}}{54 \text{ Girls}}$$


Display Master: Boys to Girls C

$$\frac{6 \text{ Boys}}{9 \text{ Girls}} = \frac{x \text{ Boys}}{54 \text{ Girls}}$$

Times what?

Display Master: Boys to Girls D

$$\frac{6 \text{ Boys}}{9 \text{ Girls}} = \frac{x \text{ Boys}}{54 \text{ Girls}}$$



 x 6

There are 6 times more girls.

Display Master: Boys to Girls E

$$\frac{6 \text{ Boys}}{9 \text{ Girls}} = \frac{x \text{ Boys}}{54 \text{ Girls}}$$

$\times 6$ $\times 6$

Display Master: Boys to Girls F

$$\frac{6 \text{ Boys}}{9 \text{ Girls}} = \frac{\boxed{36} \text{ Boys}}{54 \text{ Girls}}$$

Therefore, $x = 36$ boys

Display Master: Boys to Girls G

$$\frac{4 \text{ Boys}}{6 \text{ Girls}} = \frac{x \text{ Boys}}{54 \text{ Girls}}$$

Display Master: Boys to Girls H

$$\frac{4 \text{ Boys}}{6 \text{ Girls}} = \frac{\boxed{36} \text{ Boys}}{54 \text{ Girls}}$$

$\times 9$ (from 4 Boys to 36 Boys)
 $\times 9$ (from 6 Girls to 54 Girls)

Therefore, $x = 36$ boys

Display Master: Boys to Girls I

Since

$$\frac{6 \text{ Boys}}{9 \text{ Girls}} = \frac{6 \times 6}{9 \times 6} = \frac{36 \text{ Boys}}{54 \text{ Girls}}$$

And

$$\frac{4 \text{ Boys}}{6 \text{ Girls}} = \frac{4 \times 9}{6 \times 9} = \frac{36 \text{ Boys}}{54 \text{ Girls}}$$

Then

$$\frac{6 \text{ Boys}}{9 \text{ Girls}} = \frac{4 \text{ Boys}}{6 \text{ Girls}}$$

The ratios are proportional.

Display Master: Tootsie Rolls to Smarties A

Juan and Olivia both had birthday parties this weekend. Each person gave away candy bags to all of their guests. In each of Juan's candy bags, he put 2 Tootsie Rolls for every 3 Smarties. In each of Olivia's bags, she put 5 Tootsie Rolls for every 8 Smarties. Are the ratios of Tootsie Rolls to Smarties in Juan and Olivia's bags proportional?

$$\frac{2 \text{ Tootsie rolls}}{3 \text{ Smarties}} = \frac{5 \text{ Tootsie rolls}}{8 \text{ Smarties}}$$

$$3 \times 8 = 24$$

Therefore, our common denominator is 24.

Display Master: Tootsie Rolls to Smarties B

$$\frac{2 \text{ Tootsie rolls}}{3 \text{ Smarties}} = \frac{x \text{ Tootsie rolls}}{24 \text{ Smarties}}$$

Display Master: Tootsie Rolls to Smarties C

$$\frac{2 \text{ Tootsie rolls}}{3 \text{ Smarties}} = \frac{\boxed{16} \text{ Tootsie rolls}}{24 \text{ Smarties}}$$

$\times 8$ (curved arrow from 3 to 24)
 $\times 8$ (curved arrow from 2 to 16)

Therefore, $x = 16$ Tootsie rolls

Display Master: Tootsie Rolls to Smarties D

$$\frac{5 \text{ Tootsie rolls}}{8 \text{ Smarties}} = \frac{x \text{ Tootsie rolls}}{24 \text{ Smarties}}$$

Display Master: Tootsie Rolls to Smarties E

$$\frac{5 \text{ Tootsie rolls}}{8 \text{ Smarties}} = \frac{\boxed{15} \text{ Tootsie rolls}}{24 \text{ Smarties}}$$

$\times 3$ (curved arrow from 8 to 24)
 $\times 3$ (curved arrow from 5 to 15)

Therefore, $x = 15$ Tootsie rolls

Display Master: Tootsie Rolls to Smarties F

Since

$$\frac{2 \text{ Tootsie rolls}}{3 \text{ Smarties}} = \frac{2 \times 8}{3 \times 8} = \frac{16 \text{ Tootsie rolls}}{24 \text{ Smarties}}$$

And

$$\frac{5 \text{ Tootsie rolls}}{8 \text{ Smarties}} = \frac{5 \times 3}{8 \times 3} = \frac{15 \text{ Tootsie rolls}}{24 \text{ Smarties}}$$

Then

$$\frac{2 \text{ Tootsie rolls}}{3 \text{ Smarties}} \neq \frac{5 \text{ Tootsie rolls}}{8 \text{ Smarties}} \quad \text{The ratios are not proportional.}$$