Ratios and Proportions TEKS 8.3.B

A **ratio** uses division to compare two quantities.

You can write a ratio of two quantities a and b, where b is not equal to 0, in three ways.

You should write ratios in simplest form.

Three Ways to Write the Ratio of a to b

| a to b | $a:b$ | $\dfrac{a}{b}$ |

EXAMPLE Write the ratio of 12 boys to 16 girls in three ways.

First write the ratio as a fraction in simplest form: $\dfrac{\text{Boys}}{\text{Girls}} = \dfrac{12}{16} = \dfrac{12 \div 4}{16 \div 4} = \dfrac{3}{4}$

▶ Three ways to write the ratio of boys to girls are 3 to 4, 3:4, and $\dfrac{3}{4}$.

A **proportion** is an equation stating that two ratios are equal.

You can use cross multiplication to solve a proportion.

Using Cross Multiplication to Solve Proportions

If $\dfrac{a}{b} = \dfrac{c}{d}$, where $b \neq 0$ and $d \neq 0$, then $ad = bc$.

EXAMPLE Solve the proportion.

a. $\dfrac{5}{9} = \dfrac{n}{54}$

$5 \cdot 54 = 9 \cdot n$ **Cross multiply.**

$270 = 9n$ **Simplify.**

$30 = n$ **Solve for n.**

b. $\dfrac{x}{40} = \dfrac{3}{8}$

$x \cdot 8 = 40 \cdot 3$ **Cross multiply.**

$8x = 120$ **Simplify.**

$x = 15$ **Solve for x.**

PRACTICE

Write the ratio in simplest form. Express the answer in three ways.

1. 3 to 9

2. 16 to 24

3. 10 to 8

4. 6 to 2

5. 25 to 30

6. 60 to 10

7. 4 to 4

8. 8 to 20

9. 32 to 72

10. 42 to 15

11. 14 to 2

12. 12 to 15

Solve the proportion.

13. $\dfrac{x}{14} = \dfrac{12}{24}$

14. $\dfrac{8}{24} = \dfrac{d}{36}$

15. $\dfrac{15}{n} = \dfrac{3}{4}$

16. $\dfrac{9}{45} = \dfrac{5}{h}$

17. $\dfrac{a}{6} = \dfrac{4}{12}$

18. $\dfrac{13}{t} = \dfrac{91}{7}$

19. $\dfrac{75}{120} = \dfrac{r}{8}$

20. $\dfrac{b}{90} = \dfrac{2}{3}$

21. $\dfrac{4}{11} = \dfrac{n}{110}$

22. $\dfrac{5}{z} = \dfrac{150}{90}$

23. $\dfrac{9}{8} = \dfrac{x}{6}$

24. $\dfrac{72}{105} = \dfrac{24}{m}$

25. $\dfrac{17}{33} = \dfrac{51}{a}$

26. $\dfrac{20}{125} = \dfrac{24}{n}$

27. $\dfrac{16}{144} = \dfrac{8}{x}$

28. $\dfrac{96}{6} = \dfrac{t}{3}$