



SKILL 5: Cross Products in Proportions

In a proportion, the **cross products** are equal. The cross products are the results of multiplying the numbers in the proportion as shown at the right.

$$\begin{array}{r} 5 \quad 15 \\ \diagdown \quad \diagup \\ = \\ \diagup \quad \diagdown \\ 6 \quad 18 \end{array} \quad \begin{array}{l} 5 \times 18 = 90 \\ 6 \times 15 = 90 \end{array}$$

Since the cross products are equal, we know that $\frac{5}{6} = \frac{15}{18}$.

Example 1

Do the ratios form a proportion?

$$\frac{3}{5} \stackrel{?}{=} \frac{12}{20}$$

$$3 \times 20 = 60$$

$$5 \times 12 = 60$$

The cross products are equal,

$$\text{so } \frac{3}{5} = \frac{12}{20}.$$

Example 2

Do the ratios form a proportion?

$$\frac{40}{60} \stackrel{?}{=} \frac{8}{10}$$

$$40 \times 10 = 400$$

$$60 \times 8 = 480$$

The cross products are not equal, so

$$\frac{40}{60} \neq \frac{8}{10}. \text{ (Recall that the symbol } \neq \text{ means } \textit{is not equal to}.)$$

Guided Practice

Use the cross products to decide whether the ratios form a proportion. Write = or \neq .

1. $\frac{4}{5} \stackrel{?}{=} \frac{2}{3}$

$$4 \times 3 = 12$$

$$5 \times 2 = 10$$

$$\frac{4}{5} \bigcirc \frac{2}{3}$$

2. $\frac{10}{50} \stackrel{?}{=} \frac{2}{10}$

$$10 \times 10 = 100$$

$$50 \times 2 = 100$$

$$\frac{10}{50} \bigcirc \frac{2}{10}$$

3. $\frac{9}{12} \stackrel{?}{=} \frac{6}{8}$

$$9 \times 8 = 72$$

$$12 \times 6 = 72$$

$$\frac{9}{12} \bigcirc \frac{6}{8}$$

Use the table at the right.

4. For which two teachers are the ratios of boys to girls equal?

Class Enrollment		
Teacher	Boys	Girls
Ms. Hong	14	16
Mr. Muñoz	18	12
Mrs. Bruno	12	8
Mr. Ryan	15	8

SKILL 5: Practice

Do the ratios form a proportion? Write yes or no.

1. $\frac{12}{6} = \frac{14}{12}$ _____

2. $\frac{20}{3} = \frac{10}{2}$ _____

3. $\frac{12}{20} = \frac{15}{25}$ _____

4. $\frac{27}{6} = \frac{8}{36}$ _____

5. $\frac{11}{13} = \frac{20}{24}$ _____

6. $\frac{4}{3} = \frac{20}{15}$ _____

7. $\frac{4}{10} = \frac{20}{45}$ _____

8. $\frac{10}{15} = \frac{2}{3}$ _____

9. $\frac{12}{21} = \frac{16}{28}$ _____

10. $\frac{3}{24} = \frac{4}{32}$ _____

11. $\frac{12}{20} = \frac{7}{4}$ _____

12. $\frac{2}{9} = \frac{22}{5}$ _____

13. $\frac{2 \text{ tsp}}{7 \text{ gal}} = \frac{6 \text{ tsp}}{21 \text{ gal}}$ _____

14. $\frac{12 \text{ cm}}{20 \text{ g}} = \frac{15 \text{ g}}{25 \text{ cm}}$ _____

15. $\frac{\$14}{3 \text{ hr}} = \frac{\$84}{18 \text{ hr}}$ _____

16. $\frac{27 \text{ lb}}{\$21} = \frac{14 \text{ lb}}{\$18}$ _____

17. $\frac{15 \text{ sec}}{21 \text{ in.}} = \frac{10 \text{ in.}}{15 \text{ in.}}$ _____

18. $\frac{6 \text{ ft}}{13 \text{ gal}} = \frac{7 \text{ ft}}{14 \text{ gal}}$ _____

Use the data given in the table.

19. Which two students ran at the same rate?

20. Larry ran 200 meters in 16 seconds. Did he run 200 meters at the same rate that he ran 500 meters?

21. At the rate given for 10 meters, how long would it take Tanya to run 100 meters?



22. What is the cross product for this proportion: $\frac{5}{8} = \frac{24}{15}$?

- A 120
- B 75
- C 192
- D 110

Skill 5

23. Which shows a true proportion?

- F $\frac{5}{7} = \frac{15}{10}$
- G $\frac{3}{4} = \frac{12}{16}$
- H $\frac{22}{6} = \frac{11}{2}$
- J $\frac{12}{18} = \frac{2}{3}$

Skill 4

Runner	Distance	Time
Joyce	100 m	12 sec
Larry	500 m	55 sec
Tanya	10 m	1 sec
Alan	200 m	24 sec