SKILL 6: Solving Proportions Using Cross Products

To **solve a proportion**, you must find the missing number that makes the proportion true. You can use cross products to find this missing value.

Example 1

Use cross products to find the missing number: $\dfrac{\square}{21} = \dfrac{3}{7}$

$\square \times 7 = 21 \times 3$	If the proportion is true, its cross products must be equal.
$\square \times 7 = 63$	Multiply: $21 \times 3 = 63$.
$63 \div 7 = 9$	Use division to undo multiplication.

So, the value of the missing number is 9.

Example 2

Find the unit rate equal to $12 for 4 pounds.

$\dfrac{12 \text{ dollars}}{4 \text{ pounds}} = \dfrac{n \text{ dollars}}{1 \text{ pound}}$	The unit rate is an equal ratio that compares the cost, n dollars, to one pound.
$12 \times 1 = 4 \times n$	Write the cross products.
$12 = 4 \times n$	Multiply: 12×1.
$\dfrac{12}{4} = \dfrac{4 \times n}{4}$	Use division to undo multiplication.
$3 = n$	So, $\dfrac{12}{4} = \dfrac{3}{1}$.

The unit rate, or unit price, is 3 dollars for 1 pound.

Guided Practice

Use cross products to solve each proportion.

1. $\dfrac{2}{8} = \dfrac{1.5}{n}$

   $2 \times n = \underline{\quad} \times \underline{\quad}$

   $2 \times n = \underline{\quad}$

   $n = \underline{\quad}$

2. $\dfrac{6}{10} = \dfrac{n}{12}$

   $\underline{\quad} \times \underline{\quad} = 10 \times n$

   $\underline{\quad} = \underline{\quad}$

   $n = \underline{\quad}$

3. $\dfrac{5}{n} = \dfrac{6}{36}$

   $6 \times n = \underline{\quad} \times \underline{\quad}$

   $\underline{\quad} = \underline{\quad}$

   $n = \underline{\quad}$

4. Write a proportion to find the unit rate for 35 miles on 10 liters of gasoline.

   miles $\rightarrow$ $\dfrac{\square}{\square} = \dfrac{n}{1}$ $\leftarrow$ liters

   Write cross products. $\underline{\quad} \times \underline{\quad} = \underline{\quad} \times \underline{\quad}$

   Solve the proportion. $n = \underline{\quad}$

   Write the unit rate. _____

SKILL 6: Practice

Solve each proportion.

1. $\frac{2}{8} = \frac{n}{20}$ 2. $\frac{15}{5} = \frac{6}{n}$ 3. $\frac{n}{4} = \frac{6}{3}$

_____ = _____   _____ = _____   _____ = _____

_____ = _____   _____ = _____   _____ = _____

$n =$ _____ $n =$ _____ $n =$ _____

4. $\frac{4}{5} = \frac{8}{n}$ 5. $\frac{12}{8} = \frac{6}{n}$ 6. $\frac{n}{8} = \frac{3}{4}$ 7. $\frac{20}{8} = \frac{n}{2}$

_____   _____   _____   _____

8. $\frac{4}{n} = \frac{2}{7}$ 9. $\frac{n}{15} = \frac{2}{6}$ 10. $\frac{2}{n} = \frac{8}{4}$ 11. $\frac{n}{8} = \frac{20}{40}$

_____   _____   _____   _____

12. $\frac{8}{36} = \frac{n}{9}$ 13. $\frac{30}{3} = \frac{n}{2}$ 14. $\frac{3}{7} = \frac{12}{n}$ 15. $\frac{n}{9} = \frac{5}{4.5}$

_____   _____   _____   _____

Find the unit price.

16. $1.20 for 24 ounces of juice.   _____ **per ounce**

17. $12 for 8 pounds of peanuts.   _____ **per pound**

18. 4 quarts of milk cost $3.88.   _____ **per quart**

TEST PREP

19. Find n: $\frac{3}{9} = \frac{4}{n}$

Skill 6

   A 1.3   **C** 3

   B 12   **D** 6.75

20. Give the ratio of As to all letters.
A B B C A A C C

Skill 1

   F $\frac{8}{3}$ **H** $\frac{3}{8}$

   G $\frac{3}{5}$ **J** $\frac{5}{3}$