3.6 Solve Proportions Using Cross Products

TEKS A.3.A, A.4.A

Before You solved proportions using the multiplication property of equality.

Now You will solve proportions using cross products.

Why? So you can find the height of a scale model, as in Ex. 39.

Key Vocabulary
- **cross product**
- **scale drawing**
- **scale model**
- **scale**

In a proportion, a **cross product** is the product of the numerator of one ratio and the denominator of the other ratio. The following property involving cross products can be used to solve proportions.

KEY CONCEPT *For Your Notebook*

Cross Products Property

Words The cross products of a proportion are equal.

Example $\frac{3}{4} = \frac{6}{8}$ $\quad 4 \cdot 6 = 24$, $\quad 3 \cdot 8 = 24$

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

The proportion $\frac{3}{4} = \frac{6}{8}$ can be written as $3:4 = 6:8$. In this form, 4 and 6 are called the *means* of the proportion, and 3 and 8 are called the *extremes* of the proportion. This is why the cross products property is also called the *means-extremes property*.

EXAMPLE 1 Use the cross products property

Solve the proportion $\frac{8}{x} = \frac{6}{15}$.

$\frac{8}{x} = \frac{6}{15}$ — Write original proportion.

$8 \cdot 15 = x \cdot 6$ — Cross products property

$120 = 6x$ — Simplify.

$20 = x$ — Divide each side by 6.

▶ The solution is 20. Check by substituting 20 for x in the original proportion.

CHECK $\frac{8}{20} \stackrel{?}{=} \frac{6}{15}$ — Substitute 20 for x.

$8 \cdot 15 \stackrel{?}{=} 20 \cdot 6$ — Cross products property

$120 = 120$ ✓ — Simplify. Solution checks.