

Section Overview

Ratio and Proportion

Lesson 7-1

Why? Ratio and proportions are the basis for proportional reasoning, which is necessary in a variety of real-world situations.

A **ratio** compares two numbers by division. a to b , $a:b$, or $\frac{a}{b}$, with $b \neq 0$.

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

$$\frac{a}{b} = \frac{c}{d}$$

Cross Products Property

If $\frac{a}{b} = \frac{c}{d}$, then $ad = bc$

Properties of Proportions

$$\frac{a}{b} = \frac{c}{d} \Leftrightarrow \frac{b}{a} = \frac{d}{c} \Leftrightarrow \frac{a}{c} = \frac{b}{d}$$

The ratio of the angle measures in a triangle is $7:8:15$.

$$\begin{aligned} 7x + 8x + 15x &= 180 \\ 30x &= 180 \\ x &= 6 \end{aligned}$$

The angle measures are as follows:

$$7x = 42^\circ \quad 8x = 48^\circ \quad 15x = 90^\circ$$

Given $\frac{9}{x} = \frac{54}{66}$, use the Cross Products Property to find x .

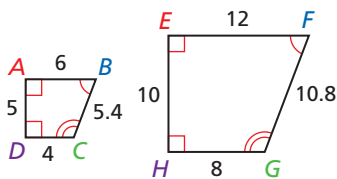
$$\begin{aligned} 9(66) &= 54x \\ 594 &= 54x \\ x &= 11 \end{aligned}$$

Ratios in Similar Polygons and Triangle Similarity

Lessons 7-2, 7-3

Why? Similar polygons are used in building models of real objects and in the design of bridges and towers.

quadrilateral $ABCD \sim$ quadrilateral $EFGH$



$$\frac{AB}{EF} = \frac{BC}{FG} = \frac{CD}{GH} = \frac{DA}{HE}$$

Similarity ratio $\frac{6}{12} = \frac{5.4}{10.8} = \frac{4}{8} = \frac{5}{10} = \frac{1}{2}$

Similar Polygons

- Corresponding angles are congruent.
- Corresponding sides are proportional.

Properties of Similarity

- Reflexive** $\triangle ABC \sim \triangle ABC$
- Symmetric** If $\triangle ABC \sim \triangle DEF$, then $\triangle DEF \sim \triangle ABC$.
- Transitive** If $\triangle ABC \sim \triangle DEF$ and $\triangle DEF \sim \triangle XYZ$, then $\triangle ABC \sim \triangle XYZ$.

Triangle Similarity

