CHAPTER 7

Study Guide and Review

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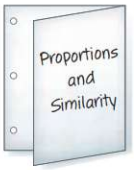
FOLDABLES Study Organizer

GET READY to Study

Be sure the following Key Concepts are noted in your Foldable.



Key Concepts

Proportions (Lesson 7-1)

- For any numbers a and c and any nonzero numbers b and d, $\frac{a}{b} = \frac{c}{d}$ if and only if $ad = bc$.

Similar Polygons and Triangles (Lessons 7-2 and 7-3)

- Two polygons are similar if and only if their corresponding angles are congruent and the measures of their corresponding sides are proportional.
- Two triangles are similar if:
  AA: the two angles of one triangle are congruent to two angles of another triangle

  SSS: the measures of the corresponding sides of two triangles are proportional

  SAS: the measures of two sides of a triangle are proportional to the measures of two corresponding sides of another triangle and the included angles are congruent

Proportional Parts (Lesson 7-4)

- If a line is parallel to one side of a triangle and intersects the other two sides in two distinct points, then it separates these sides into segments of proportional length.
- A midsegment of a triangle is parallel to one side of the triangle, and its length is one-half the length of that side.

Parts of Similar Triangles (Lesson 7-5)

- If two triangles are similar, then each of the following are proportional: the perimeters, the measures of the corresponding altitudes, the measures of the corresponding angle bisectors of the triangles, and the measures of the corresponding medians.

Key Vocabulary

cross products (p. 381)
extremes (p. 381)
means (p. 381)
midsegment (p. 406)
proportion (p. 381)
ratio (p. 380)
scale factor (p. 389)
similar polygons (p. 388)

Vocabulary Check

State whether each sentence is *true* or *false*. If *false*, replace the underlined word or number to make a true sentence.

1. The symbol ~ means "is congruent to."
2. A midsegment of a triangle is a segment with endpoints that are the midpoints of two sides of the triangle.
3. Two polygons are similar if and only if their corresponding angles are congruent and the measures of the corresponding sides are equal.
4. AA (Angle-Angle) is a congruence postulate.
5. A proportion is a comparison of two quantities by division.
6. If two triangles are similar, then the perimeters are proportional to the measures of the corresponding angles.
7. A midsegment of a triangle is parallel to one side of the triangle, and its length is twice the length of that side.
8. If a line intersects two sides of a triangle and separates the sides into corresponding segments of proportional length, then the line is one-half the length of the third side.

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Mixed Problem Solving
For mixed problem-solving practice, see page 834.

Lesson-by-Lesson Review

7-1 Proportions (pp. 380–386)

Solve each proportion.

9. $\frac{x-12}{6} = \frac{x+7}{-4}$ **10.** $\frac{18}{7w+5} = \frac{9}{4w-1}$

11. BABIES The average length and weight of a newborn is 20.16 inches and 7.63 pounds, respectively. If length and weight remained proportional over time, what would be the average weight for an adult who is 71 inches tall? Do length and weight remain proportional as children grow? Explain.

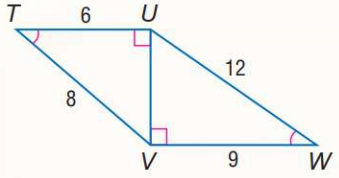
Example 1 Solve $\frac{m-13}{m+13} = \frac{21}{34}$.

$\frac{m-13}{m+13} = \frac{21}{34}$	Original proportion
$34(m-13) = 21(m+13)$	Cross Products
$34m - 442 = 21m + 273$	Distributive Property
$13m - 442 = 273$	Subtract.
$13m = 715$	Add.
$m = 55$	Divide.

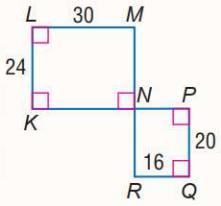
7-2 Similar Polygons (pp. 388–396)

Determine whether each pair of figures is similar. Justify your answer.

12.

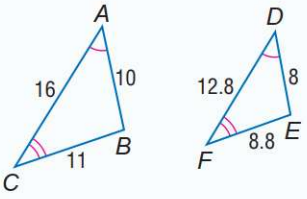


13.



14. SOLAR SYSTEM In creating an accurate scale model of our solar system, Lana placed Earth 1 foot from the Sun. The actual distance from Earth to the Sun is 93,000,000 miles. If the actual distance from Pluto to the Sun is 3,695,950,000 miles, how far from the Sun would Lana need to place Pluto in her model?

Example 2 **Determine whether the pair of triangles is similar. Justify your answer.**



$\angle A \cong \angle D$ and $\angle C \cong \angle F$, so by the Third Angle Theorem, $\angle B \cong \angle E$. All of the corresponding angles are congruent.

Next check the corresponding sides.

$\frac{AB}{DE} = \frac{10}{8} = \frac{5}{4}$ or 1.25 $\frac{BC}{EF} = \frac{11}{8.8} = \frac{5}{4}$ or 1.25

$\frac{CA}{FD} = \frac{16}{12.8} = \frac{5}{4}$ or 1.25

Since the corresponding angles are congruent and the ratios of the measures of the corresponding sides are equal, $\triangle ABC \sim \triangle DEF$.

CHAPTER 7

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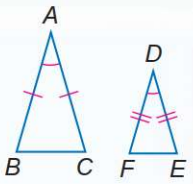
7-3 Similar Triangles (pp. 397–403)

15. INDIRECT MEASUREMENT To estimate the height of a flagpole, Sonia sights the top of the pole in a mirror on the ground that is facing upward 21 feet from the pole. Sonia is 3 feet from the mirror, and the distance from her eyes to the ground is 5.8 feet. How tall is the flagpole?

Example 3 **Determine whether the pair of triangles is similar. Justify your answer.**



$\triangle ABC \sim \triangle DFE$ by SAS Similarity.

7-4 Parallel Lines and Proportional Parts (pp. 405–414)

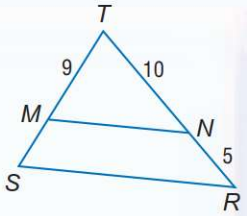
Use the figure in Example 4 to determine whether $\overline{MN} \parallel \overline{SR}$. Justify your answer.

16. $TM = 21$, $MS = 14$, $RN = 9$, $NT = 15$

17. $SM = 10$, $MT = 35$, $TN = 28$, $TR = 36$

18. HOUSES In an A-frame house, the roof slopes to the ground. Find the width x of the second floor.

Example 4 **In $\triangle TRS$, $TS = 12$. Determine whether $\overline{MN} \parallel \overline{SR}$.**



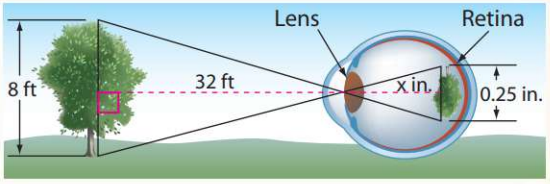
If $TS = 12$, then $MS = 12 - 9$ or 3. Compare the measures of the segments.

$$\frac{TM}{MS} = \frac{9}{3} = 3 \qquad \frac{TN}{NR} = \frac{10}{5} = 2$$

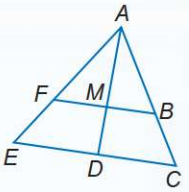
Since $\frac{TM}{MS} \neq \frac{TN}{NR}$, $\overline{MN} \nparallel \overline{SR}$.

7-5 Parts of Similar Triangles (pp. 415–422)

19. HUMAN EYE The human eye uses similar triangles to invert and reduce an object as it passes through the lens onto the retina. What is the length from your lens to your retina?



Example 5 **If $\overline{FB} \parallel \overline{ED}$, AD is an angle bisector of $\angle A$, $BF = 6$, $CE = 10$, and $AD = 5$, find AM.**



Since $\angle ACE \cong \angle ABF$ and $\angle EAC \cong \angle FAB$, $\triangle ABF \sim \triangle ACE$ by AA Similarity.

$\frac{AM}{AD} = \frac{BF}{CE}$ ~ △s have corr. ∠ bisectors proportional to the corr. sides.

$\frac{x}{5} = \frac{6}{10}$ $AD = 5$, $BF = 6$, $CE = 4$, $AM = x$

$10x = 30$ Cross products

$x = 3$ Divide. Thus, $AM = 3$.