7-2 Similar Polygons

Vocabulary

Review

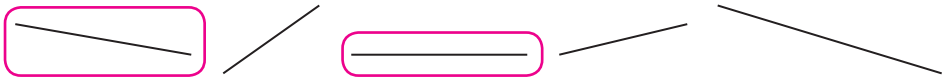
1. What does it mean when two segments are *congruent*?

They have the same length.

2. What does it mean when two angles are *congruent*?

They have the same measure.

3. Measure each segment. Then circle the congruent segments.



Vocabulary Builder

similar (adjective) SIM uh lur

Other Word Forms: similarity (noun), similarly (adverb)

Definition: Things that are **similar** are alike, but not identical.

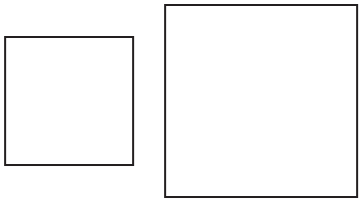
Math Usage: Figures that have the same shape but not necessarily the same size are **similar.**

The symbol for **similar** is ≈.

Use Your Vocabulary Answers may vary. Samples are given.

4. How are the two squares at the right *similar*?

They have the same shape.



5. How are the two squares NOT *similar*?

They are not the same size.

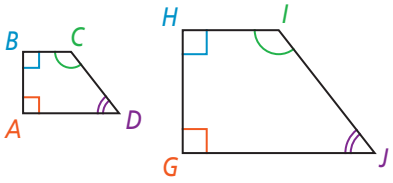
take note

Key Concept Similar Polygons

Two polygons are **similar polygons** if corresponding angles are congruent and if the lengths of corresponding sides are proportional.

ABCD $\sim$ ***GHIJ*****. Draw a line from each angle in Column A to its corresponding angle in Column B.**

Column A	Column B
6. $\angle A$	$\angle H$
7. $\angle B$	$\angle J$
8. $\angle C$	$\angle G$
9. $\angle D$	$\angle I$



10. Complete the extended proportion to show that corresponding sides of *ABCD* and *GHIJ* are proportional.

$$\frac{AB}{GH} = \frac{BC}{\textbf{HI}} = \frac{\textbf{CD}}{IJ} = \frac{AD}{\textbf{GJ}}$$

Problem 1 Understanding Similarity

Got It? ***DEFG*** $\sim$ ***HJKL*****. What are the pairs of congruent angles? What is the extended proportion for the ratios of the lengths of corresponding sides?**

11. Complete each congruence statement.

$\angle D \cong \angle$ **H**

$\angle E \cong \angle$ **J**

$\angle K \cong \angle$ **F**

$\angle L \cong \angle$ **G**

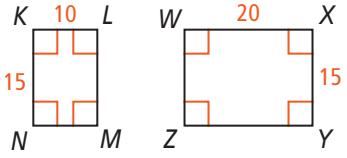
12. Complete the extended proportion.

$$\frac{DE}{HJ} = \frac{EF}{\textbf{JK}} = \frac{\textbf{FG}}{KL} = \frac{\textbf{DG}}{\textbf{HL}}$$

A *scale factor* is the ratio of the lengths of corresponding sides of similar triangles.

Problem 2 Determining Similarity

Got It? **Are the polygons similar? If they are, write a similarity statement and give the scale factor.**



13. Circle the short sides of each rectangle. Underline the long sides.

$\overline{KL}$ $\overline{LM}$ $\overline{MN}$ $\overline{NK}$

$\overline{WX}$ $\overline{XY}$ $\overline{YZ}$ $\overline{ZW}$

14. Write the ratios of corresponding sides in simplest form.

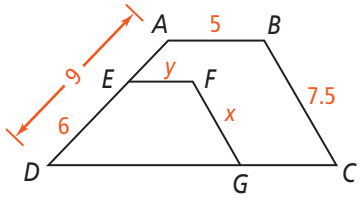
$$\frac{KL}{XY} = \frac{10}{15} = \frac{\textbf{2}}{\textbf{3}} \qquad \frac{LM}{YZ} = \frac{15}{\textbf{20}} = \frac{\textbf{3}}{\textbf{4}} \qquad \frac{MN}{ZW} = \frac{\textbf{10}}{15} = \frac{\textbf{2}}{\textbf{3}} \qquad \frac{NK}{WX} = \frac{\textbf{15}}{\textbf{20}} = \frac{\textbf{3}}{\textbf{4}}$$

15. Place a ✓ in the box if the statement is correct. Place an ✗ if it is incorrect.

- ✗ $KLMN \sim XYZW$ and the scale factor is $\frac{2}{3}$.
- ✗ $KLMN \sim XYZW$ and the scale factor is $\frac{3}{4}$.
- ✓ The polygons are not similar.

Problem 3 Using Similar Polygons

Got It? ***ABCD*** **$\sim$** ***EFGD*****. What is the value of *y*?**



16. Circle the side of *ABCD* that corresponds to $\overline{EF}$.

$\overline{AB}$ $\overline{BC}$ $\overline{CD}$ $\overline{AD}$

17. Use the justifications at the right to find the value of *y*.

$\frac{EF}{AB} = \frac{ED}{AD}$ — Corresponding sides of similar polygons are proportional.

$\frac{y}{5} = \frac{6}{9}$ — Substitute.

$9y =$ 30 — Cross Products Property

$y =$ $3\frac{1}{3}$ — Divide each side by 9.

Problem 4 Using Similarity

Got It? **A rectangular poster's design is 6 in. high by 10 in. wide. What are the dimensions of the largest complete poster that will fit in a space 3 ft high by 4 ft wide?**

18. Determine how many times the design can be enlarged.

Height: 3 ft = 36 in.

36 in. ÷ 6 in. = 6

Width: 4 ft = 48 in.

48 in. ÷ 10 in. = 4.8

The design can be enlarged at most 4.8 times.

19. Let *x* represent the height of the poster. Write a proportion and solve for *x*.

$\frac{10}{48} = \frac{6}{x}$

$10x = 288$

$x = 28.8$

20. The largest complete poster that will fit is 28.8 in. by 48 in.

Problem 5 Using a Scale Drawing

Got It? **Use the scale drawing of the bridge. What is the actual height of the towers above the roadway?**

21. Use a centimeter ruler to measure the height of the towers above the roadway in the scale drawing. Label the drawing with the height.

22. Identify the variable.

Let h = the ? of the towers. actual height

23. Use the information on the scale drawing to write a proportion. Then solve to find the value of the variable.

$\left(\text{Hint: } \frac{1}{200} = \frac{\text{tower height in drawing (cm)}}{\text{actual height (m)}}\right)$

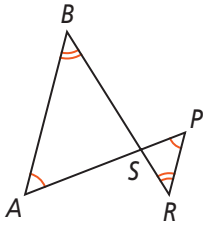
$\frac{1}{200} = \frac{0.8}{h}$

$h = 160$

24. The actual height of the towers above the roadway is 160 m.

Lesson Check • Do you UNDERSTAND?

The triangles at the right are similar. What are three similarity statements for the triangles?



25. The triangles are △ ABS and △ PRS.

26. $\angle A \cong \angle$ P $\angle B \cong \angle$ R $\angle S \cong \angle$ S

27. $\triangle ABS \sim$ △PRS $\triangle BSA \sim$ △RSP $\triangle SAB \sim$ △SPR

Math Success

Check off the vocabulary words that you understand.

☐ similar ☐ extended proportion ☐ scale factor ☐ scale drawing

Rate how well you can *identify and apply similar polygons*.

Need to review 0 2 4 6 8 10 Now I get it!