

7-2

Similar Polygons



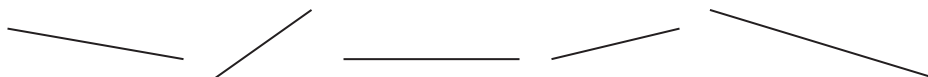
Vocabulary

Review

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

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

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



Vocabulary Builder

similar (adjective) sim uh lur

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

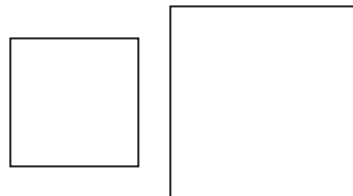
Definition: Things that are **similar** are alike, but not identical.

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

The symbol for **similar** is \sim .

Use Your Vocabulary

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



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

Key Concept Similar Polygons

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

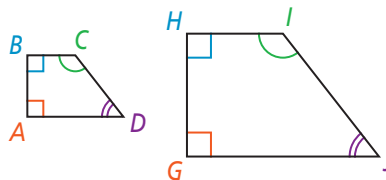
$ABCD \sim GHIJ$. Draw a line from each angle in Column A to its corresponding angle in Column B.

Column A

- 6. $\angle A$
- 7. $\angle B$
- 8. $\angle C$
- 9. $\angle D$

Column B

- $\angle H$
- $\angle J$
- $\angle G$
- $\angle I$



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

$$\frac{AB}{GH} = \frac{BC}{IJ} = \frac{\square}{\square} = \frac{AD}{\square}$$



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.

- $\angle D \cong \angle \square$
- $\angle E \cong \angle \square$
- $\angle K \cong \angle \square$
- $\angle L \cong \angle \square$

12. Complete the extended proportion.

$$\frac{DE}{HJ} = \frac{EF}{\square} = \frac{\square}{KL} = \frac{\square}{\square}$$

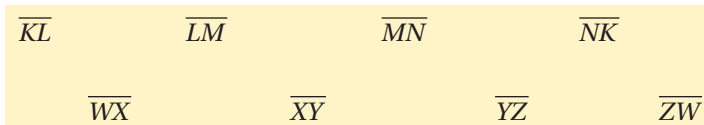
A *scale factor* is the ratio of the lengths of corresponding sides of similar triangles.



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.



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

$$\frac{KL}{WX} = \frac{10}{15} = \frac{\square}{\square} \quad \frac{LM}{YZ} = \frac{15}{\square} = \frac{\square}{\square} \quad \frac{MN}{ZW} = \frac{\square}{15} = \frac{\square}{\square} \quad \frac{NK}{WX} = \frac{\square}{\square} = \frac{\square}{\square}$$

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.

$\frac{y}{5} = \frac{6}{9}$

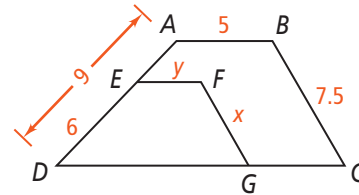
Substitute.

$9y = 30$

Cross Products Property

$y = \frac{10}{3}$

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 = in.

Width: 4 ft = in.

in. \div 6 in. = 6

in. \div 10 in. = 4.8

The design can be enlarged at most times.

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

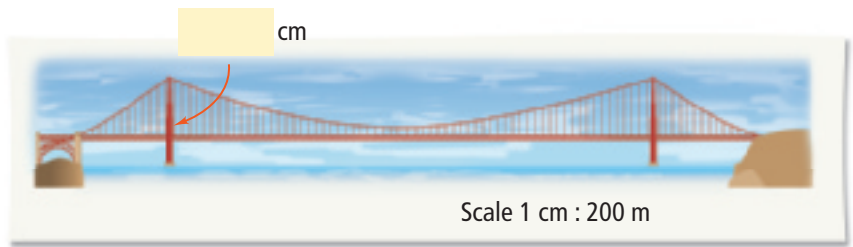
20. The largest complete poster that will fit is in. by in.



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.

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

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

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



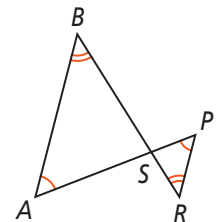
Lesson Check • Do you UNDERSTAND?

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

25. The triangles are \triangle and \triangle .

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

27. $\triangle ABS \sim$ $\triangle BSA \sim$ $\triangle SAB \sim$



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*.

