Student Objective
(Obj. 4d) TSW use proportions and corresponding parts to solve problems that involve similar figures.

Lesson
5-5 Using Similar Figures; Textbook Pages: 252-255

Bellwork
Study Guide problems 1,2,3,4,5 12,13,14,15.

Homework
Test next class on skills involving transformations, congruent figures, and similar figures. Complete Study Guide.

Last Night's Homework
Congruent Figures WS (9 problems)

Prior Knowledge
• Review bellwork.
• Earlier in the 9 weeks we learned how to cross multiply to solve proportions.
• Last week, we learned that congruent figures are figures that are the exact same shape and the exact same size. We also learned how to identify the corresponding parts of 2 shapes.
  Corresponding angles are the angles that match-up when you have 2 congruent figures.
  Corresponding sides are the sides that match-up when you have 2 congruent figures.

Anticipatory Set
• TODAY, you will use some of these skills to solve problems involving similar figures.
  Where do we see Similar Figures?
  What are “Similar Figures”? Why do we need to learn about Similar Figures?
• Show PowerPoint Transparencies - Similar Figures

Why learn?
As just shown in our PowerPoint similarity is seen in architecture, manufacturing, nature, and human reproduction.

Teacher Input
• Chapter 5-5 Using Similar Figures Textbook pages 252 – 255
• Review bellwork.
• Review homework.
• Use PowerPoint “Illustrations of Similar Figures” to lead into today’s lesson on similar figures.
• Pass out student notes.
• Define and show an example of similar figures. (circle map)
• List 2 important properties about similar figures.
• Explain and demonstrate how to determine if 2 figures are similar. (flow map)
• Explain and demonstrate how to find a missing side of similar figures (flow map).
• Allow students to work several “you try” problems. (individually)
• Classwork: Similar Figures Practice Sheet (Berg created) (think, pair, share)
  Extra Practice: Continue Study Guide

Assessment
Question students for understanding. Observation students as they work on their classwork. Major test next class.

Closure
1. What are Similar Figures? Figures that have same shape but not the same size.
2. When you have similar figures all of the angles must be __________? Congruent
3. When you have similar figure the corresponding sides must form a __________? Proportion
4. When 2 figures are similar, how can you find a missing side length? Set up a proportion. Cross multiply. Solve equation.
## Define

**Definition:** Figures that have the same shape **BUT** are not the same size.

**Symbol:** ~

**Similar Figures**

- They have corresponding angles and sides.
- Use *proportions* to solve problems involving similar figures.

## Important Properties

1. The corresponding **angles** have equal measurements.
2. The corresponding **sides** form a *proportion*.

## Use proportions to determine if 2 figures are similar.

**Step 1**
Write a proportion using corresponding sides.

**Step 2**
Cross Multiply.

**Step 3**
Compare cross products.

- If equal then they **ARE** similar.
- If not equal then they are **NOT** similar.

**Are the below figures similar?**

- **32 in**
- **20 in**
- **24 in**

\[
\frac{32}{20} = \frac{24}{20} \\
32 \times 20 = 640 \\
640 \neq 480 \\
20 \times 24 = 480
\]

**NO**

**They are not Similar!**
YOU Try!

Are the two polygons similar figures?

Set up your ratio here:  

Answer: Yes or No

If you know that 2 figures are similar, then you can use proportions to determine a missing side length.

Step 1  Write a proportion using corresponding sides.

Step 2  Cross Multiply.

Step 3  Solve the one-step equation.

In the figure below, △ABC ~ △DEF. What is the length of “x”?

\[
\frac{x}{12} = \frac{16}{8} \quad 8x = 192 \quad x = 24
\]

YOU Try!

The pairs of figures below are similar.
Find the value of each variable by setting up a proportion and solving.

a)  

b)  

\[
y = \phantom{0} 
\]
1. **Define**

   Definition: Figures that have the same shape **BUT** are **not** the same size.

   Use **proportions** to solve problems involving similar figures.

   They have *corresponding* angles and sides.

2. **Important Properties**

   1) The corresponding **angles** have **equal** measurements.
   2) The corresponding **sides** form a **proportion**.

3. **Use proportions to determine if 2 figures are similar.**

   **Step 1**
   Write a proportion using corresponding sides.

   **Step 2**
   Cross Multiply.

   **Step 3**
   Compare cross products.

   - If equal then they **ARE** similar.
   - If not equal then they **are NOT** similar.

Are the below figures similar?

\[
\frac{32}{20} = \frac{24}{20} \\
32 \times 20 = 640 \\
640 \neq 480 \\
20 \times 24 = 480
\]

**NO**

They are **not** Similar!
YOU Try!

Are the two polygons similar figures?

Set up your ratio here: \[ \frac{14}{14} = \frac{2.8}{?} \]

Answer: Yes or No

If you know that 2 figures are similar, then you can use proportions to determine a missing side length.

In the figure below, \( \triangle ABC \sim \triangle DEF \). What is the length of “x”?

\[ \frac{x}{12} = \frac{16}{8} \quad 8x = 192 \quad x = 24 \]

YOU Try!

The pairs of figures below are similar. Find the value of each variable by setting up a proportion and solving.

a) \[
\begin{align*}
x &= \quad \text{Answer: } & \frac{x}{5} &= \frac{4}{5} \quad x = 4
\end{align*}
\]

b) \[
\begin{align*}
\text{Answer: } & \frac{y}{10} = \frac{4.5}{6} \quad y = 7.5
\end{align*}
\]
Similar Figures

Directions: Solve each similar figure problem by setting up a proportion and solving.

1) The front of Jane’s house is similar in shape to the front of Spot’s doghouse. The base of the doghouse is 5 feet and the height is 6 feet. If the height of Jane’s house is 30 ft, what is the length of its base?

![Diagram of similar figures]

2) An adult 6 ft tall has a shadow of 3.6 ft long. How long is the shadow of a child 5 ft tall?

![Diagram of shadow problem]

3) The two triangles below are similar. What is the measurement of “x”?

![Diagram of similar triangles]

See Back →
4) In the figure below, \( \triangle ABC \sim \triangle DEF \). What is the length of \( x \)?

![Diagram of triangles ABC and DEF]

5) Given that the figures below are similar, solve for each variable.

a)

![Diagram of two objects with ratios]

\[ \frac{8}{2.5} = \frac{h}{10} \]

b)

![Diagram of a car and a smaller object]

\[ \frac{12}{3} = \frac{x}{5} \]

6) A rocket casts a shadow that is 91.5 feet long. A 4 foot model rocket casts a shadow that is 3 feet long. How tall is the rocket?

![Diagram of a rocket with a shadow]

\[ \frac{91.5}{3} = \frac{h}{4} \]

7) \( \triangle RSTU \sim \triangle WXYZ \). Find the length of side ST.

![Diagram of parallelograms RSTU and WXYZ]

\[ \frac{24}{36} = \frac{6}{9} \]

\[ \frac{48}{12} = \frac{7}{12} \]
Similar Figures

Directions: Solve each similar figure problem by setting up a proportion and solving.

1) The front of Jane's house is similar in shape to the front of Spot's doghouse. The base of the doghouse is 5 feet and the height is 6 feet. If the height of Jane's house is 30 ft, what is the length of its base?

\[
\frac{x}{5} = \frac{30}{6} \quad \text{Answer: } x = 25 \text{ ft}
\]

2) An adult 6 ft tall has a shadow of 3.6 ft long. How long is the shadow of a child 5 ft tall? Answer: 3 ft long

\[
\frac{x}{3.6} = \frac{5}{6} \quad \text{Answer: } x = 3 \text{ ft long}
\]

3) The two triangles below are similar. What is the measurement of “x”?

a) \[
\frac{x}{18} = \frac{7}{14} \quad \text{Answer: } x = 9
\]

b) \[
\frac{x}{24} = \frac{12}{20} \quad \text{Answer: } x = 14.4
\]

See Back →
4) In the figure below, \( \triangle ABC \sim \triangle DEF \). What is the length of "\( x \)?"

\[
\frac{x}{12} = \frac{16}{8}
\]

\[x = 24\]

5) Given that the figures below are similar, solve for each variable.

a)

\[
\frac{h}{8} = \frac{10}{2.5}
\]

\[h = 32\]

b)

\[
\frac{x}{3} = \frac{12}{5}
\]

\[x = 7.2\]

6) A rocket cast a shadow that is 91.5 feet long. A 4 foot model rocket casts a shadow that is 3 feet long. How tall is the rocket?

Answer: \( \frac{h}{4} = \frac{91.5}{3} \) \( x = 122 \text{ ft} \)

7) RSTU \sim WXYZ
Find the length of side ST.

Answer: \( \frac{x}{7} = \frac{36}{9} \) \( ST = 28 \)