Course: 7th Grade Math

Student Objective
(Obj. 3c) TSW... identify and justify the congruency of two figures.

Lesson
7-5 Congruent Figures  Textbook Pages: 346-349

Homework
Congruent Figures WS (Berg created)

Last Night's Homework
Review for Transformation Quiz

Bellwork
Transformation quiz

Prior Knowledge
- Review answers to bellwork quiz on transformations.
- LAST WEEK, we started our unit on Geometry. We learned how to transform different types of geometric figures.

Anticipatory Set
- TODAY, we will continue talking about geometry. We will learn to identify geometric figures that are CONGRUENT!
- What are “Congruent Figures”
  Why do we need to learn about Congruent Figures?
  Where do we see Congruent Figures?

  Well.... Let’s see.....

- Show PowerPoint
  We see congruent figures in Architecture.
  The U.S. Dept. of Treasury uses congruency when it makes money!
  Manufacturers use congruency when they make their products.

Teacher Input
- Review the answers to the bellwork quiz.
- Pass out student notes.
- Use PowerPoint “Congruent Figures Seen In the Real World” to lead into today’s lesson on congruent figures.
- Define and give example of congruent figures. (circle map)
- Explain and demonstrate how to match-up corresponding angles and sides using arcs and tick marks.
- Explain and demonstrate how to name corresponding figures.
- Allow students to work the “you try” problems.
- Classwork: Worksheet – Congruent Figures Problem #’s 1-5 (Berg created) (Think, Pair, Share)
  Extra Practice: Above worksheet problem #’s 6-9?
  Homework: Congruent Figures WS (Berg created)

Assessment
Question students for understanding. Observation students as they work on their classwork.

Closure
- Can anyone give me an example of where you would see congruency in real life?
  Architecture (twin towers), U.S. Dept. of Treasury uses it to make money, Manufacturing
- What is the difference between Congruent Figures and Similar Figures?
  Congruent Figures – are the exact same shape and same size
  Similar Figures – are the exact same size, but different sizes
- Let’s take one last look... display transparency for ▲ ABC ≅ ▲ WYX.
Identifying Translations, Rotations, and Reflections

In a **translation** every point in a figure slides the same distance and the same direction. The figure has moved up and right without turning.

A **rotation** occurs when a figure turns around a point. The point of rotation is A. The figure was rotated 90° around point A.

In a **reflection**, each point is the same distance from the line as the corresponding point in the original shape.

Identify the type of transformation shown by figures I and II. Write translation, rotation, or reflection.

1. reflection
2. rotation
3. translation
4. translation
5. rotation
6. reflection
7. reflection
8. rotation
9. translation
10. reflection
Translations
11. Use the graph below to translate triangle ABC right 6 units, then up 2 units.
12. Label the image A'B'C'
13. What are the new coordinates of:
   \[
   A'(2, -5) \quad B'(5, -5) \quad C'(4, -7)
   \]

Reflections
14. Reflect Point A over the x-axis.
15. Label the image correctly using Prime Notation. A'(9, -6)
16. What are the coordinates of the new point? A'(\_, \_)
Figures that have:
the same shape **AND** the same size.

The **corresponding** angles and sides will have the **exact** same measurements!

**Example**

**Symbol:** $\cong$

### Identifying corresponding parts.

**Corresponding Sides** are the sides that “match-up” in two figures.
**Corresponding Angles** are the angles that “match-up” in two figures.

- Look at the figures and think to yourself, “How can I match-up these figures?”
- Use “arcs” to indicate which angles match-up.
- Use “tick” marks to indicate which sides match-up.

### Naming Congruent figures.

You MUST write the angles in corresponding order.

**Corresponding Angles**

$\angle A \cong \angle D$

$\angle B \cong ____$

$\angle C \cong ____$

**Corresponding Sides**

$\overline{BC} \cong \overline{EF}$

$\overline{CA} \cong ____$

$\overline{AB} \cong ____$

**Name the Congruent Figure:** $\triangle ABC \cong \triangle ____$
If you are given the congruency statement it is easy to match up the corresponding sides and angles. It's all about the ordering!

Complete the congruency statements given the following: ▲ ABC ≅ ▲ XYZ

∠ BAC ≈ ___  AB ≈ ___  ∠ CBA ≈ ___  ZX ≈ ___

Directions: Use the following figures to answer Numbers 1 through 8.

Given: ABCD ≅ WXYZ

1. BC ≈ ________  5. YZ ≈ ________
2. ∠W ≈ ________  6. ∠Z ≈ ________
3. AD ≈ ________  7. WX ≈ ________

Directions: For Numbers 9 through 11, determine whether each pair of figures is congruent or similar.

9. ________

10. ________

11. ________
**Worksheet**

**Congruent Figures**

1) ▲ SHN ≅ ▲ DAV are congruent. Which of the following statements is **false**? Explain why.
   A. ∠ HSN ≅ ∠ ADV
   B. ∠ VAD ≅ ∠ NHS
   C. SH ≅ AV
   D. HS ≅ AD

2) Answer the following questions regarding the congruent figures below.

Which angle is congruent to ∠C? _____ Which side is congruent to CA? _____
Which angle is congruent to ∠A? _____ Which side is congruent to AB? _____
Which angle is congruent to ∠B? _____ Which side is congruent to BC? _____

3) ▲ QVC ≅ ▲ HSN are congruent. Complete each congruence statement.
   ∠ SNH ≅ ∠ _____    NS ≅ _____
   ∠ CVQ ≅ ∠ _____    VQ ≅ _____
   ∠ QCV ≅ ∠ _____    HN ≅ _____

4) LMNO ≅ WZYX

Complete the following congruency statements:

∠L ≅ _____    ∠Z ≅ _____
YZ ≅ _____    YZ ≅ _____
NM ≅ _____    LO ≅ _____
∠O ≅ _____    MN ≅ _____
∠Y ≅ _____    ∠N ≅ _____
XW ≅ _____    ∠W ≅ _____
LM ≅ _____    ZW ≅ _____
5) These two right triangles are congruent. 
   Name 3 pairs of corresponding angles. 
   Name 3 pairs of corresponding sides.
   \[ \angle A \cong \angle \quad \text{Side } AB \cong \quad \]
   \[ \angle B \cong \angle \quad \text{Side } AC \cong \quad \]
   \[ \angle C \cong \angle \quad \text{Side } BC \cong \quad \]

6) A math student concluded that the following two triangles were NOT congruent. 
   Why is the student correct?

   ![Triangles](image)

7) The quadrilaterals below are congruent. Write congruency statements for each angle and each side.
   \[ \angle A \cong \angle \quad \text{Side } AB \cong \quad \]
   \[ \angle B \cong \angle \quad \text{Side } BD \cong \quad \]
   \[ \angle C \cong \angle \quad \text{Side } CD \cong \quad \]
   \[ \angle D \cong \angle \quad \text{Side } AC \cong \quad \]

8) Identifying congruent figures.
   a) Define congruent figures:
   b) Looking at the figures below which are congruent?

   ![Figures](image)

9) Which two figures below appear to be congruent? Explain why you think they are congruent.

   Answer: Figures _____ and _____
   Why?
1) ▲ SHN ≅ ▲ DAV are congruent. Which of the following statements is false? Explain why.
   A. ∠ HSN ≅ ∠ ADV
   B. ∠ VAD ≅ ∠ NHS
   C. SH ≅ AV
   D. HS ≅ AD

   Answer: C The vertices of congruent triangles are written in corresponding order. Looking at the ordering of the letters, side SH does not match up to side AV.

2) Answer the following questions regarding the congruent figures below.

   Which angle is congruent to ∠C? Answer: ∠H
   Which angle is congruent to ∠A? Answer: ∠I
   Which angle is congruent to ∠B? Answer: ∠J
   Which side is congruent to CA? Answer: HI
   Which side is congruent to AB? Answer: IJ
   Which side is congruent to BC? Answer: JH

3) ▲ QVC ≅ ▲ HSN are congruent. Complete each congruence statement.

   ∠ SNH ≅ ∠ _____ △ VCQ
   ∠ CVQ ≅ ∠ _____ △ NSH
   ∠ QCV ≅ ∠ _____ △ HNS
4) \( \text{LMNO} \cong \text{WXYZ} \)

Complete the following congruency statements:

\[
\begin{align*}
\angle L & \cong \angle W & \angle Z & \cong \angle M \\
\angle YX & \cong \angle NO & \angle YZ & \cong \angle NM \\
\angle NM & \cong \angle YZ & \angle LO & \cong \angle WX \\
\angle O & \cong \angle X & \angle MN & \cong \angle ZY \\
\angle Y & \cong \angle N & \angle N & \cong \angle \angle Y \\
\angle XW & \cong \angle OL & \angle W & \cong \angle \angle L \\
\angle LM & \cong \angle WZ & \angle ZW & \cong \angle ML
\end{align*}
\]

5) These two right triangles are congruent.
Name 3 pairs of corresponding angles.
Name 3 pairs of corresponding sides.

\[
\begin{align*}
\angle A & \cong \angle D & \text{Side } \angle AB & \cong \angle DE \\
\angle B & \cong \angle E & \text{Side } \angle AC & \cong \angle DF \\
\angle C & \cong \angle F & \text{Side } \angle BC & \cong \angle EF
\end{align*}
\]

6) A math student concluded that the following two triangles were NOT congruent.
Why is the student correct? \textbf{The corresponding sides of the triangles are different lengths.}
7) The quadrilaterals below are congruent. Write congruency statements for each angle and each side.

\[ \angle A \cong \angle E \quad \text{Side } AB \cong \text{Side } EF \]
\[ \angle B \cong \angle F \quad \text{Side } BD \cong \text{Side } FH \]
\[ \angle C \cong \angle G \quad \text{Side } CD \cong \text{Side } GH \]
\[ \angle D \cong \angle H \quad \text{Side } AC \cong \text{Side } EG \]

8) Identifying congruent figures.
   a) Define congruent figures: **Figures that have the same size and shape.**
   b) Looking at the figures below which are congruent? a, b, c, d are all congruent!

9) Which two figures below appear to be congruent? Explain why you think they are congruent.

**Answer:** Figures 1 and 4

**Why?** Looking at the grids, figures 1 and 4 appear to be the same size and shape.
Use the congruent triangles on the right to answer the questions below. Write your answer in the blank provided beside each number.

1) Which angle is congruent to $\angle M$?
   A. $\angle P$  B. $\angle R$  C. $\angle Q$  D. $\angle N$

2) Which angle is congruent to $\angle N$?
   A. $\angle P$  B. $\angle R$  C. $\angle Q$  D. $\angle N$

3) Which angle is congruent to $\angle O$?
   A. $\angle P$  B. $\angle R$  C. $\angle Q$  D. $\angle N$

4) Which would complete the congruence statement: $\overline{ON} \cong$ ______
   A. $\overline{PQ}$  B. $\overline{PR}$  C. $\overline{QR}$  D. $\overline{RQ}$

5) Which segment is congruent to $\overline{MO}$?
   A. $\overline{PR}$  B. $\overline{RP}$  C. $\overline{PQ}$  D. $\overline{QR}$

6) Which would complete the congruence statement: $\triangle MNO \cong$ ______
   A. $\triangle QPR$  B. $\triangle PQR$  C. $\triangle RPQ$  D. $\triangle RQP$

7) Answer the following questions regarding the two congruent quadrilaterals below.

\begin{align*}
a) \ & \angle A \cong \underline{\  \  } \\
b) \ & \angle B \cong \underline{\  \  } \\
c) \ & \angle C \cong \underline{\  \  } \\
d) \ & \angle D \cong \underline{\  \  } \\
e) \ & \text{Side } AD \cong \text{Side } \underline{\  \  } \\
f) \ & \text{Side } CB \cong \text{Side } \underline{\  \  } \\
g) \ & \text{What is the length of Side } AB? \ \underline{\  \  } \text{cm} \\
\end{align*}

Remember corresponding sides are equal! So, look at its corresponding side on the other figure to get your answer!
8) Translate the ▲ABC Up 3 units, Left 5 units. It is ok if the triangles end up overlapping!

Name the new coordinates of:

A' (______,______)
B' (______,______)
C' (______,______)

9) a. Reflect ▲ABC across the y-axis.
b. Now, reflect ▲ABC over the x-axis.

Name the coordinates of each new image:

over the y-axis
over the x-axis

A' (______,______)
B' (______,______)
C' (______,______)
A' (______,______)
B' (______,______)
C' (______,______)
Congruent Figures

Use the congruent triangles on the right to answer the questions below. Write your answer in the blank provided beside each number.

1) Which angle is congruent to $\angle M$?
   A. $\angle P$    B. $\angle R$    C. $\angle Q$    D. $\angle N$

2) Which angle is congruent to $\angle N$?
   A. $\angle P$    B. $\angle R$    C. $\angle Q$    D. $\angle N$

3) Which angle is congruent to $\angle O$?
   A. $\angle P$    B. $\angle R$    C. $\angle Q$    D. $\angle N$

4) Which would complete the congruence statement: $\overline{ON} \cong$ ______
   A. $\overline{PQ}$    B. $\overline{PR}$    C. $\overline{QR}$    D. $\overline{RQ}$

5) Which segment is congruent to $\overline{MO}$?
   A. $\overline{PR}$    B. $\overline{RP}$    C. $\overline{PQ}$    D. $\overline{QR}$

6) Which would complete the congruence statement: $\triangle MNO \cong$ ______
   A. $\triangle QPR$    B. $\triangle PQR$    C. $\triangle RPQ$    D. $\triangle RQP$

7) Answer the following questions regarding the two congruent quadrilaterals below.

   a) $\angle A \cong$ ______    $\angle W$
   b) $\angle B \cong$ ______    $\angle X$
   c) $\angle C \cong$ ______    $\angle Y$
   d) $\angle D \cong$ ______    $\angle Z$
   e) Side $AD \cong$ Side ______    $WZ$
   f) Side $CB \cong$ Side ______    $YX$

   g) What is the length of Side $AB$? ______ cm    9 cm

Remember corresponding sides are equal! So, look at its corresponding side on the other figure to get your answer!
8) Translate the ▲ABC Up 3 units, Left 5 units. It is ok if the triangles end up overlapping!

Name the new coordinates of:

A' (−2, 9)
B' (−2, 4)
C' (4, 4)

9) a. Reflect ▲ABC across the y-axis.
b. Now, reflect ▲ABC over the x-axis.

Name the coordinates of each new image:

**over the y-axis**

A' (−3, 6)
B' (−3, 1)
C' (−9, 1)

**over the x-axis**

A' (3, −6)
B' (3, −1)
C' (9, −1)