

# Rigid Motions

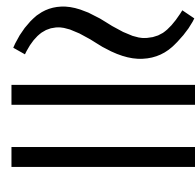
Non-Rigid Motions  
Distortion,  
Compression,  
Stretch

- What are **Rigid Motions**???
- “Motions that preserve the size and shape of figures”
- Who can name some Rigid Motions that we know???

Rotations, Reflections, Translations

# OBJECTIVE: WHAT DOES CONGRUENT MEAN???

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Symbol for  
congruence!

# Some other symbols to know

$\parallel$  parallel

$\perp$  perpendicular

# Congruent = same size, same shape

- All the angles are the same
- All the side lengths are the same

# Complete Reflection Questions 1 and 2 on pg. 910

$$\underline{\underline{\triangle ABC}} \cong \underline{\underline{\triangle DEF}}$$

## Reflect

1. If you know that  $\triangle ABC \cong \triangle DEF$ , what six congruence statements about segments and angles can you write? Why?

$$\angle A \cong \angle D$$

$$\angle B \cong \angle E$$

$$\angle C \cong \angle F$$

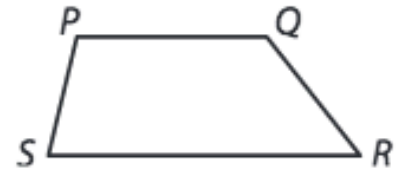
$$\overline{AB} \cong \overline{DE}$$

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

$$\overline{AC} \cong \overline{DF}$$

Does this

2. ~~Do the findings in the previous question~~ apply to figures other than triangles? For instance, if you know that quadrilaterals  $JKLM$  and  $PQRS$  are congruent, can you make any conclusions about corresponding parts? Why or why not?



matching

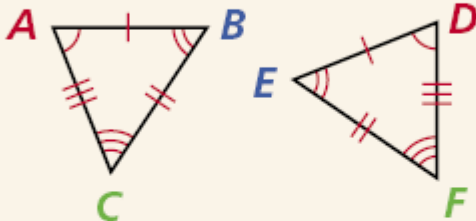
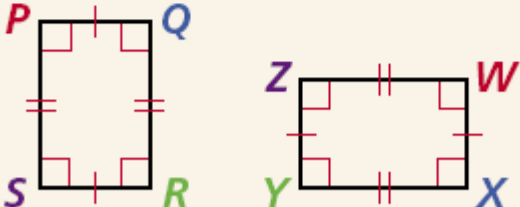
$$JKLM \cong PQRS$$

$$\overline{JK} \cong \overline{PQ}$$

$$\angle J \cong \angle P$$

Yes, Silly book.

## Properties of Congruent Polygons

| DIAGRAM   | CORRESPONDING ANGLES  | CORRESPONDING SIDES   |
|---|---|---|
|  <p><math>\triangle ABC \cong \triangle DEF</math></p>             | $\angle A \cong \angle D$ $\angle B \cong \angle E$ $\angle C \cong \angle F$                           | $\overline{AB} \cong \overline{DE}$ $\overline{BC} \cong \overline{EF}$ $\overline{AC} \cong \overline{DF}$                                     |
|  <p>polygon <math>PQRS \cong</math> polygon <math>WXYZ</math></p> | $\angle P \cong \angle W$ $\angle Q \cong \angle X$ $\angle R \cong \angle Y$ $\angle S \cong \angle Z$ | $\overline{PQ} \cong \overline{WX}$ $\overline{QR} \cong \overline{XY}$ $\overline{RS} \cong \overline{YZ}$ $\overline{PS} \cong \overline{WZ}$ |

# Highlight! pg. 910

## Corresponding Parts of Congruent Figures Are Congruent

If two figures are congruent, then corresponding sides are congruent and corresponding angles are congruent.

### Helpful Hint

When you write a statement such as  $\triangle ABC \cong \triangle DEF$ , you are also stating which parts are congruent!!!

If polygon  $LMNP \cong$  polygon  $EFGH$ , identify all pairs of corresponding congruent parts.

$$\angle L \cong \angle E$$

$$\angle M \cong \angle F$$

$$\angle N \cong \angle G$$

$$\angle P \cong \angle H$$

$$\overline{LM} \cong \overline{EF}$$

$$\overline{MN} \cong \overline{FG}$$

$$\overline{NP} \cong \overline{GH}$$

$$\overline{HE} \cong \overline{PL}$$



# Let's Look at Example A on pg. 910

**Example 1**  $\triangle ABC \cong \triangle DEF$ . Find the given side length or angle measure.

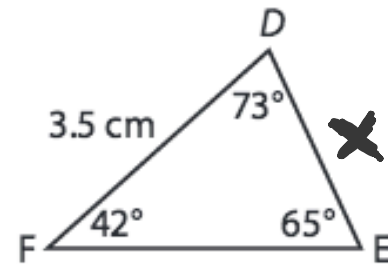
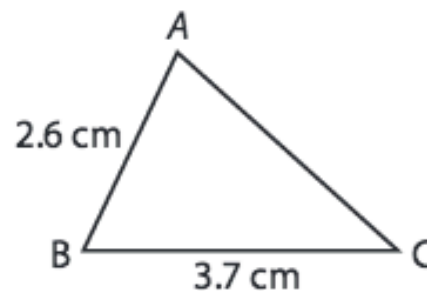
(A)  $DE$

~~Step 1 Find the side that corresponds to  $\overline{DE}$ .~~

~~Since  $\triangle ABC \cong \triangle DEF$ ,  $\overline{AB} \cong \overline{DE}$ .~~

~~Step 2 Find the unknown length.~~

~~$DE = AB$ , and  $AB = 2.6$  cm,  
so  $DE = 2.6$  cm.~~



2.6 cm  $\overline{DE} \cong \overline{AB}$

# Try Part B on pg. 910!

Ⓔ  $m\angle B$

**Step 1** Find the angle that corresponds to  $\angle B$ .

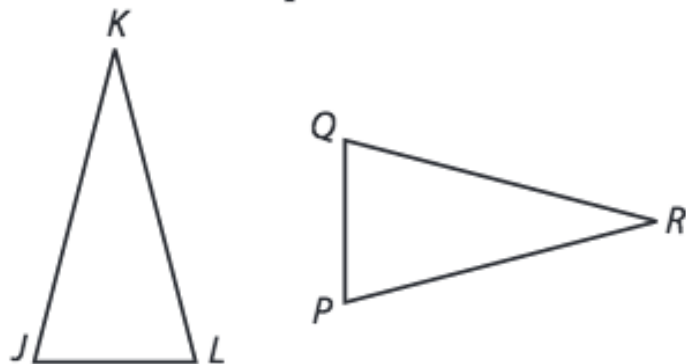
Since  $\triangle ABC \cong \triangle DEF$ ,  $\angle B \cong \angle$  **E** .

**Step 2** Find the unknown angle measure.

$m\angle B = m\angle$  **E** , and  $m\angle$  **E** = **65**  $^\circ$ , so  $m\angle B =$  **65**  $^\circ$ .

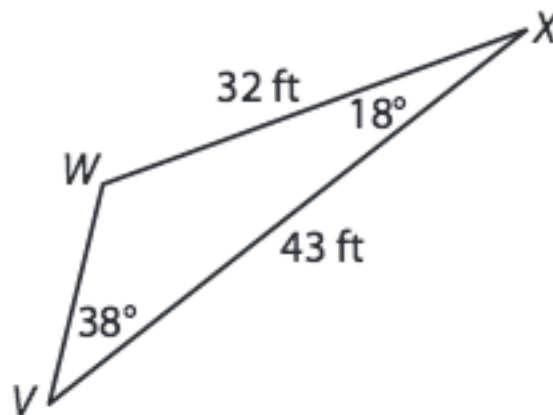
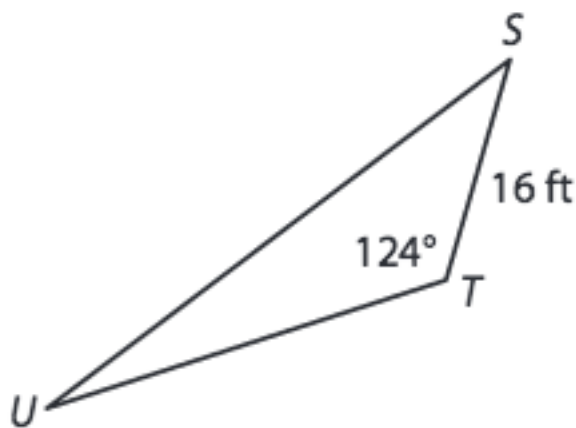
# Try Questions 3 – 5 on pg. 911

3. **Discussion** The triangles shown in the figure are congruent. Can you conclude that  $\overline{JK} \cong \overline{QR}$ ? Explain.



No  
We can't assume  
which parts are  $\cong$

$\triangle STU \cong \triangle VWX$ . Find the given side length or angle measure.



4.  $SU$

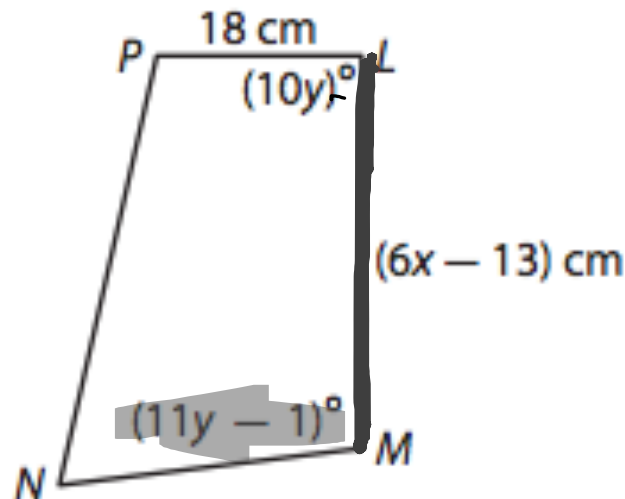
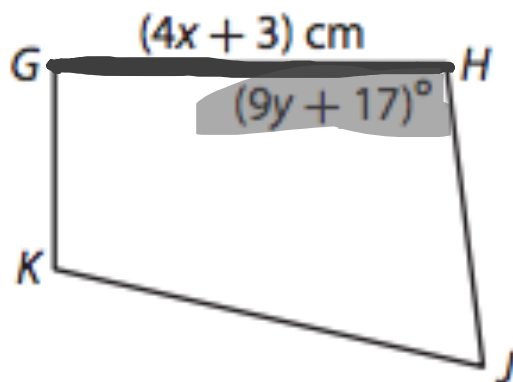
43 ft

5.  $m\angle S$

38°

# Try Questions 6-7 on pg. 912

Quadrilateral  $GHJK \cong$  quadrilateral  $LMNP$ . Find the given side length or angle measure.



6.  $LM \cong \overline{GH}$

$$4x + 3 = 6x - 13$$

$$x = 8$$

35

7.  $m\angle H$

98

$$11y - 1 = 9y + 17$$

$$y = 9$$

## Properties of Equality

Reflexive Property of Equality

$$a = a$$

Symmetric Property of Equality

If  $a = b$  then  $b = a$

Transitive Property of Equality

If  $a = b$  and  $b = c$  then  $a = c$

# Highlight pg. 911

## Properties of Congruence

Reflexive Property of Congruence

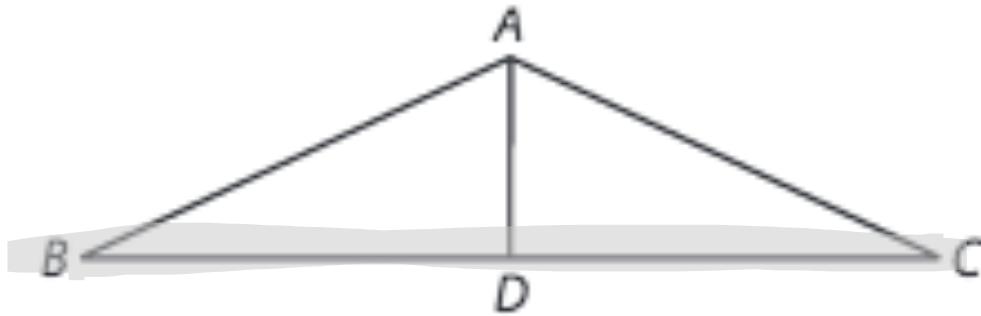
$$\overline{AB} \cong \overline{AB}$$

Symmetric Property of Congruence

$$\text{If } \overline{AB} \cong \overline{CD}, \text{ then } \overline{CD} \cong \overline{AB}.$$

Transitive Property of Congruence

$$\text{If } \overline{AB} \cong \overline{CD} \text{ and } \overline{CD} \cong \overline{EF}, \text{ then } \overline{AB} \cong \overline{EF}.$$



Given:  $\triangle ABD \cong \triangle ACD$

Prove:  $D$  is the midpoint of  $\overline{BC}$ .

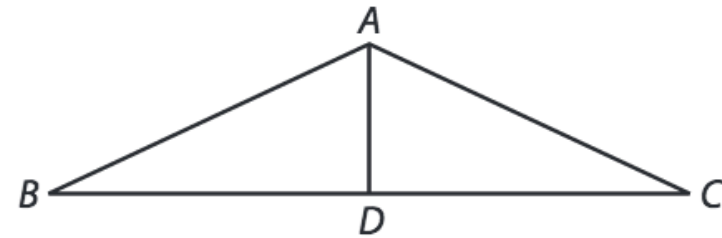
| Statements                             | Reasons  |
|--|--|
| $\triangle ABD \cong \triangle ACD$    | Given  |
| $\overline{BD} \cong \overline{CD}$    | corresponding parts of $\cong$ figures are $\cong$ |
| $D$ is the midpoint of $\overline{BC}$ | def. of midpoint                                   |

# pg. 912

## Example 3 Write each proof.

(A) Given:  $\triangle ABD \cong \triangle ACD$

Prove:  $D$  is the midpoint of  $\overline{BC}$ .

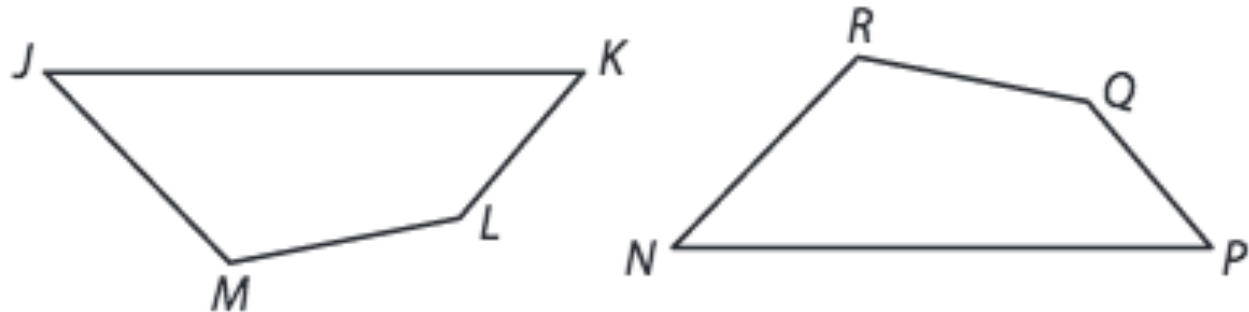


| Statements                                  | Reasons  |
|---|--|
| 1. $\triangle ABD \cong \triangle ACD$      | 1. Given   |
| 2. $\overline{BD} \cong \overline{CD}$      | 2. Corresponding parts of congruent figures are congruent. |
| 3. $D$ is the midpoint of $\overline{BC}$ . | 3. Definition of midpoint.                                 |



Given: Quadrilateral  $JKLM \cong$  quadrilateral  
 $NPQR$ ;  $\angle J \cong \angle K$

Prove:  $\angle J \cong \angle P$



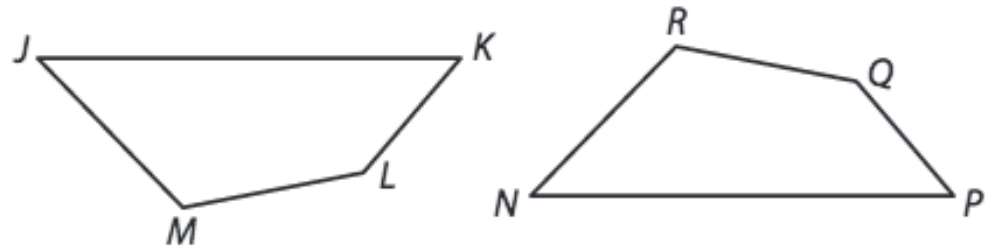
What do we KNOW?

What are we trying to prove?

# Try B on pg. 913

(B) Given: Quadrilateral  $JKLM \cong$  quadrilateral  $NPQR$ ;  $\angle J \cong \angle K$

Prove:  $\angle J \cong \angle P$



| Statements   | Reasons                                      |
|--|--|
| 1. Quadrilateral $JKLM \cong$ quadrilateral $NPQR$ | 1. GIVEN ☺                                   |
| 2. $\angle J \cong \angle K$<br>$a = b$            | 2. GIVEN ☺                                   |
| 3. $\angle K \cong \angle P$<br>$b = c$            | 3. Corr parts of $\cong$ figures are $\cong$ |
| 4. $\angle J \cong \angle P$<br>$a = c$            | 4. Transitive Property                       |

# Now try 8 – 12 on pgs. 913- 914

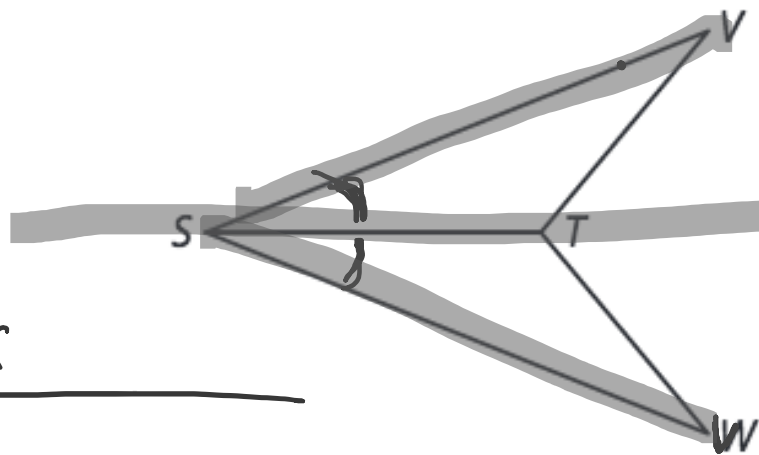
## Your Turn

Write each proof.

8. Given:  $\triangle SVT \cong \triangle SWT$

Prove:  $\overline{ST}$  bisects  $\angle VSW$

focus on angles



Statements

Reasons

$$\triangle SVT \cong \triangle SWT$$

Given  $\Downarrow$

$$\angle VST \cong \angle TSW$$

Corr parts of  $\cong$  figures  
are  $\cong$

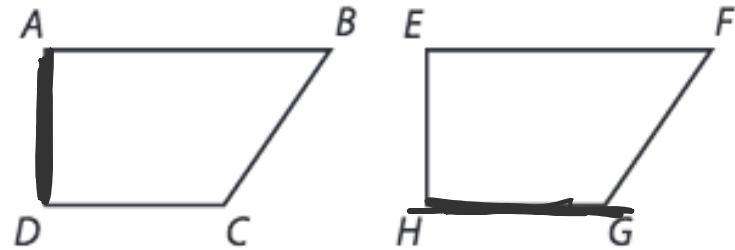
$\overline{ST}$  bisects  $\angle VSW$

definition of angle bisector

9. Given: Quadrilateral  $ABCD \cong$  quadrilateral  $EFGH$ ;

$$\overline{AD} \cong \overline{CD}$$

Prove:  $\overline{AD} \cong \overline{GH}$



| statements   | reasons                                  |
|--|--|
| $ABCD \cong EFGH$                                      | Given ☺                                  |
| $\rightarrow \overline{AD} \cong \overline{CD}$<br>a b | Given ☺                                  |
| $\overline{CD} \cong \overline{GH}$<br>b c             | Cor parts of $\cong$ figures are $\cong$ |
| $\rightarrow \overline{AD} \cong \overline{GH}$<br>a c | Transitive Property                      |