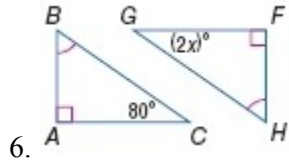


4-3 Congruent Triangles

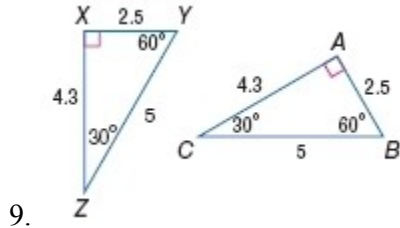
CCSS REGULARITY Find x . Explain your reasoning.



ANSWER:

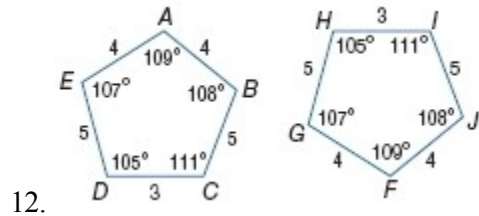
40; $\angle G$ corresponds to $\angle C$, so $2x = 80$.

Show that polygons are congruent by identifying all congruent corresponding parts. Then write a congruence statement.



ANSWER:

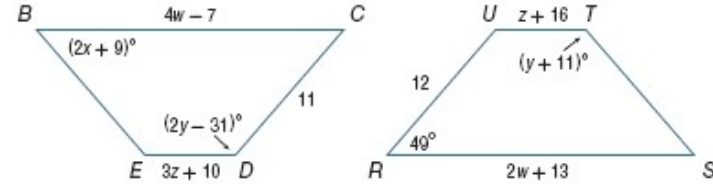
$\angle X \cong \angle A$, $\angle Y \cong \angle B$, $\angle Z \cong \angle C$,
 $\overline{XY} \cong \overline{AB}$, $\overline{XZ} \cong \overline{AC}$, $\overline{YZ} \cong \overline{BC}$; $\triangle XYZ \cong \triangle ABC$



ANSWER:

$\angle A \cong \angle F$, $\angle B \cong \angle J$, $\angle C \cong \angle I$, $\angle D \cong \angle H$, $\angle E \cong \angle G$,
 $\overline{AB} \cong \overline{FJ}$, $\overline{BC} \cong \overline{JI}$, $\overline{CD} \cong \overline{IH}$, $\overline{DE} \cong \overline{HG}$, $\overline{AE} \cong \overline{FG}$; polygon $ABCDE$
 \cong polygon $FJIHG$

Polygon $BCDE \cong$ polygon $RSTU$. Find each value.

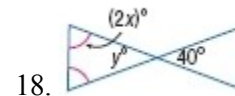


15. z

ANSWER:

3

Find x and y .



ANSWER:

$y = 40$; $x = 35$

4-3 Congruent Triangles

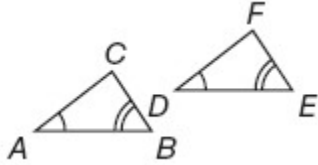
21. **PROOF** Write a two-column proof of Theorem 4.3.

ANSWER:

Given: $\angle A \cong \angle D$

$\angle B \cong \angle E$

Prove: $\angle C \cong \angle F$



Proof:

Statements (Reasons)

1. $\angle A \cong \angle D, \angle B \cong \angle E$ (Given)
2. $m\angle A = m\angle D, m\angle B = m\angle E$ (Def. of $\cong \angle$ s)
3. $m\angle A + m\angle B + m\angle C = 180, m\angle D + m\angle E + m\angle F = 180$ (\angle Sum Theorem)
4. $m\angle A + m\angle B + m\angle C = m\angle D + m\angle E + m\angle F$ (Trans. Prop.)
5. $m\angle D + m\angle E + m\angle C = m\angle D + m\angle E + m\angle F$ (Subst.)
6. $m\angle C = m\angle F$ (Subt. Prop.)
7. $\angle C \cong \angle F$ (Def. of $\cong \angle$ s)

CCSS ARGUMENTS Write a two-column proof.

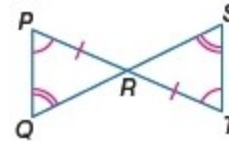
24. **Given:** $\angle P \cong \angle T, \angle S \cong \angle Q$

$\overline{TR} \cong \overline{PR}, \overline{RP} \cong \overline{RQ},$

$\overline{RT} \cong \overline{RS}$

$\overline{PQ} \cong \overline{TS}$

Prove: $\triangle PRQ \cong \triangle TRS$



ANSWER:

Proof:

Statements (Reasons)

1. $\angle P \cong \angle T, \angle S \cong \angle Q,$
 $\overline{TR} \cong \overline{PR}, \overline{RP} \cong \overline{RQ}, \overline{RT} \cong \overline{RS}, \overline{PQ} \cong \overline{TS}$ (Given)
2. $\overline{PR} \cong \overline{QR}, \overline{TR} \cong \overline{SR}$ (Symm. Prop.)
3. $\overline{TR} \cong \overline{QR}$ (Trans. Prop)
4. $\overline{QR} \cong \overline{TR}$ (Symm. Prop.)
5. $\overline{QR} \cong \overline{SR}$ (Trans. Prop.)
6. $\angle PRQ \cong \angle TRS$ (Vert. \angle s are \cong .)
7. $\triangle PRQ \cong \triangle TRS$ (Def. of $\cong \Delta$ s)

4-3 Congruent Triangles

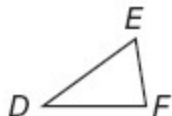
PROOF Write the specified type of proof of the indicated part of Theorem 4.4.

27. Congruence of triangles is reflexive. (flow proof)

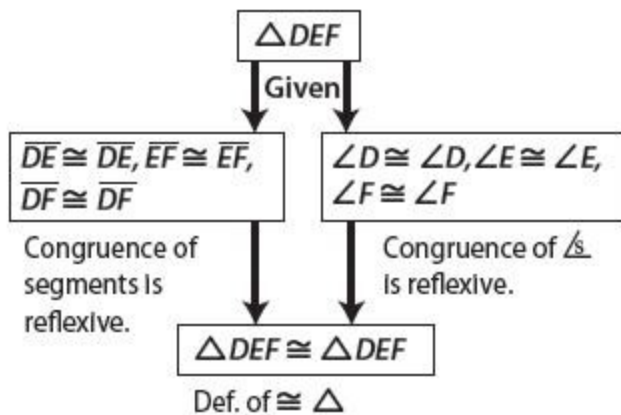
ANSWER:

Given: $\triangle DEF$

Prove: $\triangle DEF \cong \triangle DEF$



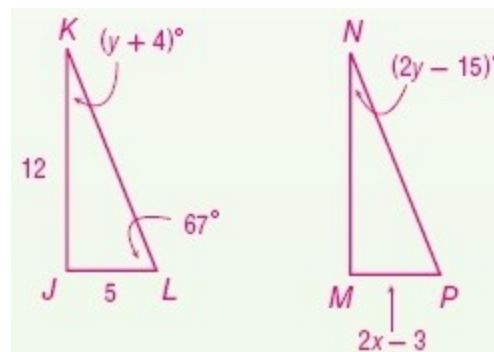
Proof:



ALGEBRA Draw and label a figure to represent the congruent triangles. Then find x and y .

30. $\triangle JKL \cong \triangle MNP$, $JK = 12$, $LJ = 5$, $PM = 2x - 3$, $m\angle L = 67$, $m\angle K = y + 4$ and $m\angle N = 2y - 15$

ANSWER:



$$x = 4; y = 19$$

33. **MULTIPLE REPRESENTATIONS** In this problem, you will explore the following statement.

The areas of congruent triangles are equal.

a. **VERBAL** Write a conditional statement to represent the relationship between the areas of a pair of congruent triangles.

b. **VERBAL** Write the converse of your conditional statement. Is the converse *true* or *false*? Explain your reasoning.

c. **GEOMETRIC** If possible, draw two equilateral triangles that have the same area but are not congruent. If not possible, explain why not.

d. **GEOMETRIC** If possible, draw two rectangles that have the same area but are not congruent. If not possible, explain why not.

e. **GEOMETRIC** If possible, draw two squares that have the same area but are not congruent. If not possible, explain why not.

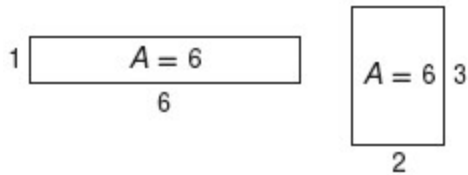
f. **VERBAL** For which polygons will the following conditional and its converse both be true? Explain your reasoning.

If a pair of _____ are congruent, then they have the same area.

ANSWER:

4-3 Congruent Triangles

- a. If two triangles are congruent, then their areas are equal.
- b. If the areas of a pair of triangles are equal, then the triangles are congruent; false; If one triangle has a base of 2 and a height of 6 and a second triangle has a base of 3 and a height of 4, then their areas are equal, but they are not congruent.
- c. No; sample answer: Any pair of equilateral triangles that have the same base also have the same height, so it is not possible to draw a pair of equilateral triangles with the same area that are not congruent.
- d. yes; sample answer:

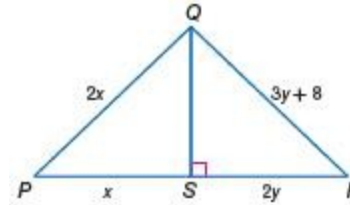


- e. No; any pair of squares that have the same area have the same side length, which is the square root of the area. If their areas are equal, they are congruent.
- f. Regular n -gons; If two regular n -gons are congruent, then they have the same area. All regular n -gons have the same shape, but may have different sizes. If two regular n -gons have the same area, then they not only have the same shape but also the same size. Therefore, they are congruent.
36. **WRITING IN MATH** Explain why the order of the vertices is important when naming congruent triangles. Give an example to support your answer.

ANSWER:

Sample answer: When naming congruent triangles, it is important that the corresponding vertices be in the same location for both triangles because the location indicates congruence. For example if $\triangle ABC$ is congruent to $\triangle DEF$, then $\angle A \cong \angle D$, $\angle B \cong \angle E$, and $\angle C \cong \angle F$.

39. **CHALLENGE** Find x and y if $\triangle PQS \cong \triangle RQS$.



ANSWER:

$$x = 16, y = 8$$