5.1 Angles of Triangles

Tuesday, December 6, 2016 9:06 AM

What You Will Learn

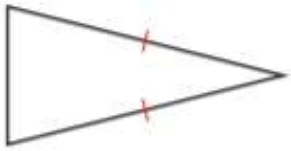
- Classify triangles by sides and angles.
- Find interior and exterior angle measures of triangles.

Classifying Triangles by Sides

Scalene Triangle

no congruent sides

Isosceles Triangle



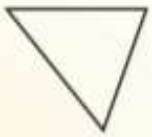
at least 2 congruent sides

Equilateral Triangle

3 congruent sides

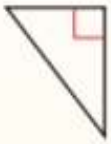
Classifying Triangles by Angles

Acute Triangle



3 acute angles

Right Triangle

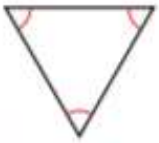


1 right angle

Obtuse Triangle

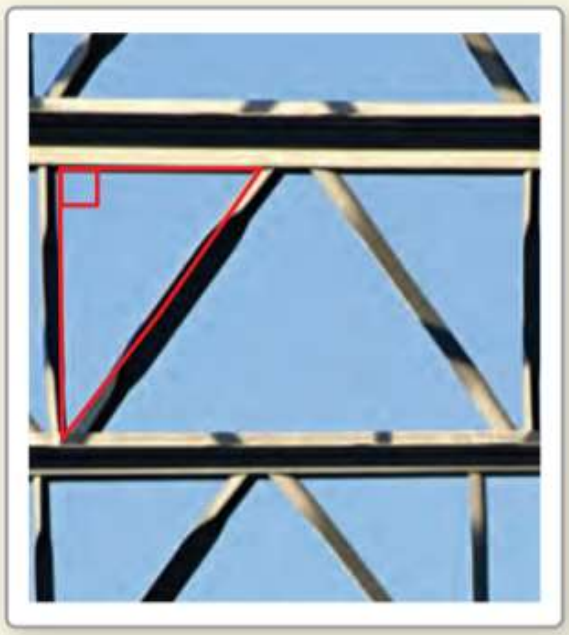
1 obtuse angle

Equiangular Triangle

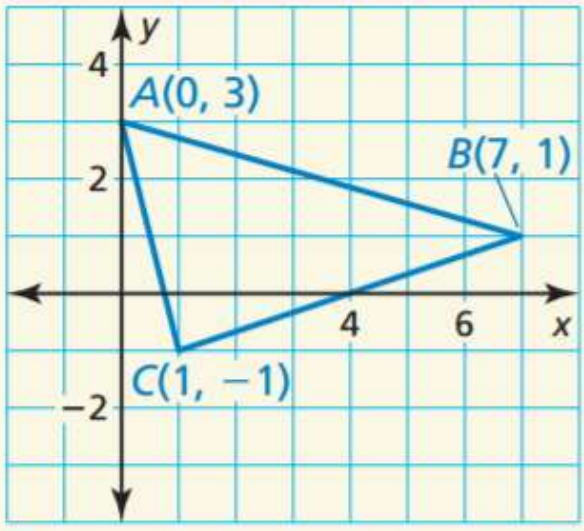


3 congruent angles

Classify the triangular shape of the support beams in the diagram by its sides and by measuring its angles.

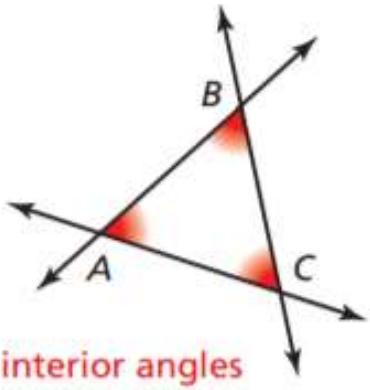


Classify $\triangle ABC$ by its sides. Then determine whether it is a right triangle.

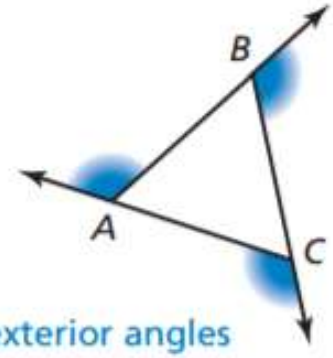


Finding Angle Measures of Triangles

When the sides of a polygon are extended, other angles are formed. The original angles are the **interior angles**. The angles that form linear pairs with the interior angles are the **exterior angles**.



interior angles

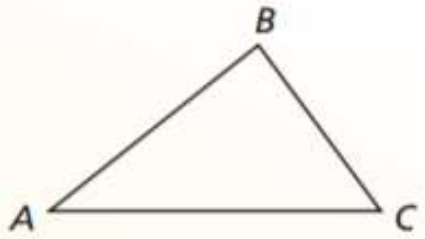


exterior angles

Theorem

Theorem 5.1 Triangle Sum Theorem

The sum of the measures of the interior angles of a triangle is 180°.



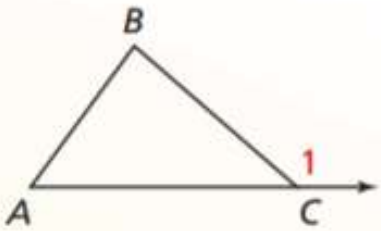
$m\angle A + m\angle B + m\angle C = 180°$

Proof p. 234; Ex. 53, p. 238

Theorem

Theorem 5.2 Exterior Angle Theorem

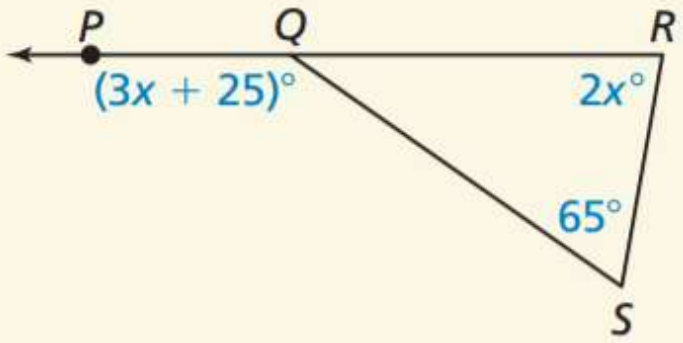
The measure of an exterior angle of a triangle is equal to the sum of the measures of the two nonadjacent interior angles.



Proof Ex. 42, p. 237

$m\angle 1 = m\angle A + m\angle B$

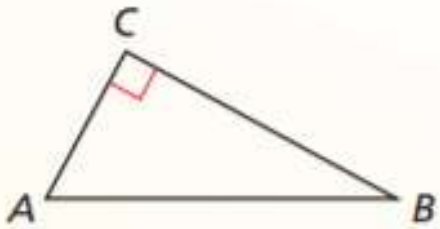
Find $m\angle PQS$.



Corollary

Corollary 5.1 Corollary to the Triangle Sum Theorem

The acute angles of a right triangle are complementary.



$m\angle A + m\angle B = 90°$

Proof Ex. 41, p. 237

The measure of one acute angle of a right triangle is 1.5 times the measure of the other acute angle. Find the measure of each acute angle.

Practice *sec 5.1* **pg. 236:**
1-3A, 5-25EO, 29-36A

5.2 Congruent Polygons

Wednesday, December 7, 2016 3:53 PM

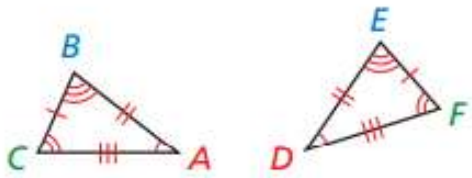
What You Will Learn

- Identify and use corresponding parts.
- Use the Third Angles Theorem.

Identifying and Using Corresponding Parts

Recall that two geometric figures are congruent if and only if a rigid motion or a composition of rigid motions maps one of the figures onto the other. A rigid motion maps each part of a figure to a **corresponding part** of its image. Because rigid motions preserve length and angle measure, corresponding parts of congruent figures are congruent. In congruent polygons, this means that the *corresponding sides* and the *corresponding angles* are congruent.

When $\triangle DEF$ is the image of $\triangle ABC$ after a rigid motion or a composition of rigid motions, you can write congruence statements for the corresponding angles and corresponding sides.



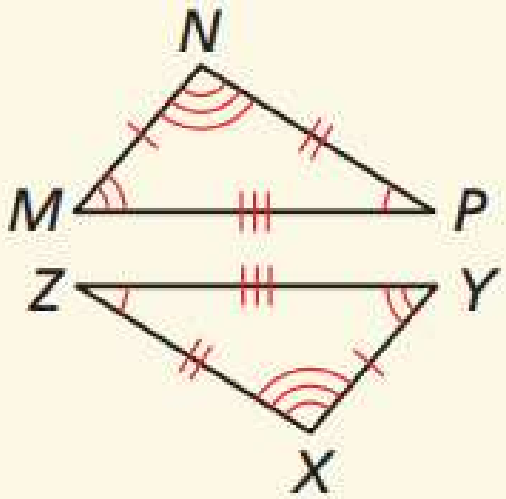
Corresponding angles

$\angle A \cong \angle D, \angle B \cong \angle E, \angle C \cong \angle F$

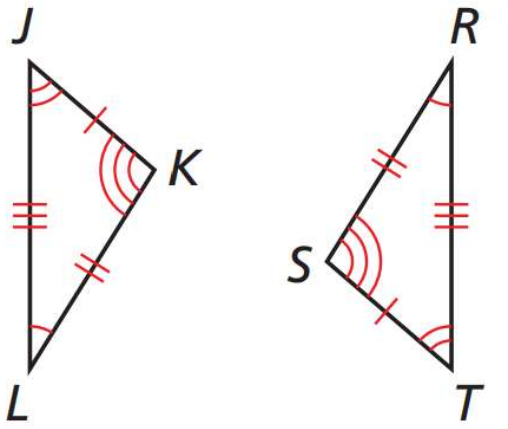
Corresponding sides

$\overline{AB} \cong \overline{DE}, \overline{BC} \cong \overline{EF}, \overline{AC} \cong \overline{DF}$

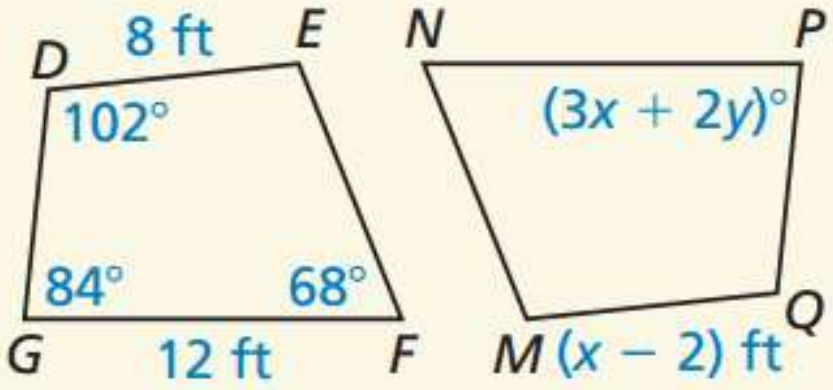
Write a congruence statement for the triangles. Identify all pairs of congruent corresponding parts.



Write a congruence statement for the triangles. Identify all pairs of congruent corresponding parts.



In the diagram, $DEFG \cong QMNP$.



a. Find the value of x.

b. Find the value of y.

Theorem

Theorem 5.3 Properties of Triangle Congruence

Triangle congruence is reflexive, symmetric, and transitive.

Reflexive For any triangle $\triangle ABC$, $\triangle ABC \cong \triangle ABC$.

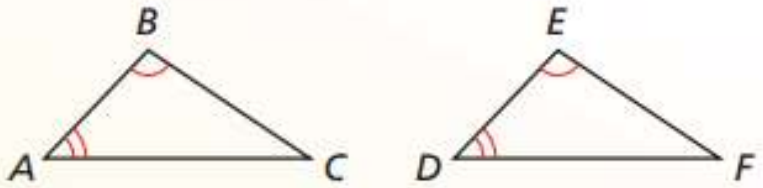
Symmetric If $\triangle ABC \cong \triangle DEF$, then $\triangle DEF \cong \triangle ABC$.

Transitive If $\triangle ABC \cong \triangle DEF$ and $\triangle DEF \cong \triangle JKL$, then $\triangle ABC \cong \triangle JKL$.

Theorem

Theorem 5.4 Third Angles Theorem

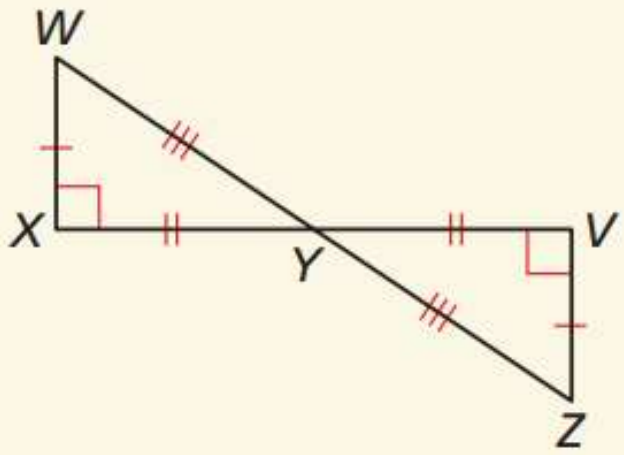
If two angles of one triangle are congruent to two angles of another triangle, then the third angles are also congruent.



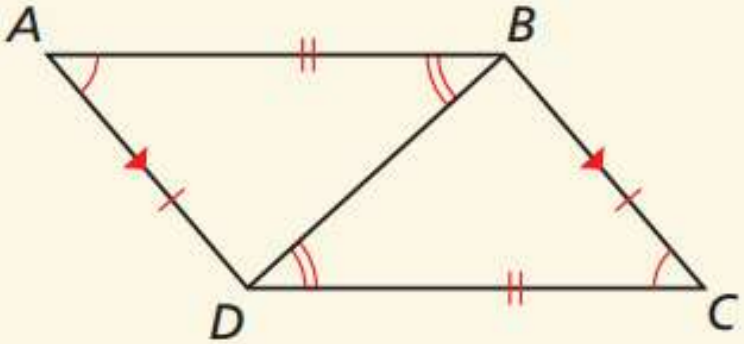
Proof Ex. 19, p. 244

If $\angle A \cong \angle D$ and $\angle B \cong \angle E$, then $\angle C \cong \angle F$.

Use the information in the figure to prove that $\triangle WXY \cong \triangle ZVY$.



Show that $\triangle ABD \cong \triangle CDB$. Explain your reasoning.



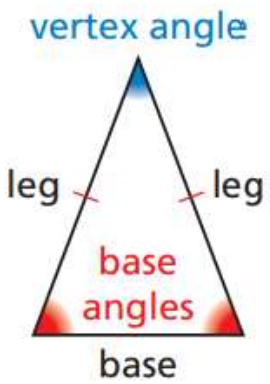
Practice *sec 5.2* **pg. 243: 3-13A**

What You Will Learn

- Use the Base Angles Theorem.
- Use isosceles and equilateral triangles.

Using the Base Angles Theorem

A triangle is isosceles when it has at least two congruent sides. When an isosceles triangle has exactly two congruent sides, these two sides are the **legs**. The angle formed by the legs is the **vertex angle**. The third side is the **base** of the isosceles triangle. The two angles adjacent to the base are called **base angles**.



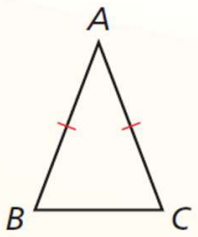
Theorems

Theorem 5.6 Base Angles Theorem

If two sides of a triangle are congruent, then the angles opposite them are congruent.

If $\overline{AB} \cong \overline{AC}$, then $\angle B \cong \angle C$.

Proof p. 252

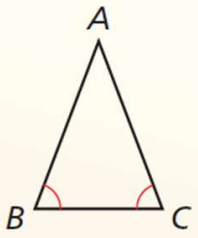


Theorem 5.7 Converse of the Base Angles Theorem

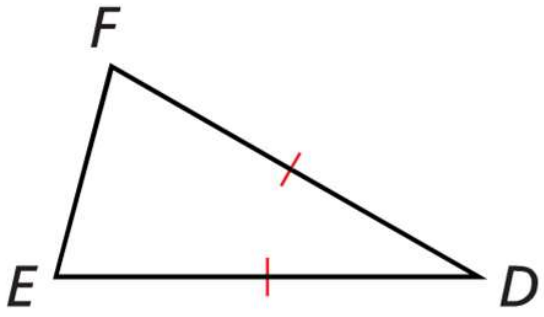
If two angles of a triangle are congruent, then the sides opposite them are congruent.

If $\angle B \cong \angle C$, then $\overline{AB} \cong \overline{AC}$.

Proof Ex. 27, p. 275

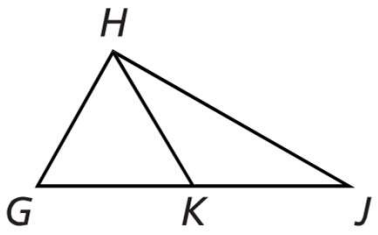


In $\triangle DEF$, $\overline{DE} \cong \overline{DF}$. Name two congruent angles.



Copy and complete the statement.

1. If $\overline{HG} \cong \overline{HK}$, then $\angle$_____ $\cong \angle$_____.
2. If $\angle KHJ \cong \angle KJH$, then _____ $\cong$ _____.



Corollaries

Corollary 5.2 Corollary to the Base Angles Theorem

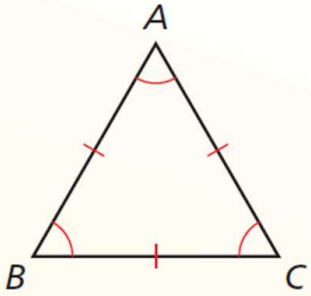
If a triangle is equilateral, then it is equiangular.

Proof Ex. 37, p. 258; Ex. 10, p. 353

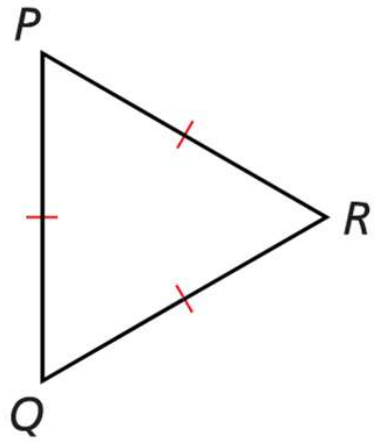
Corollary 5.3 Corollary to the Converse of the Base Angles Theorem

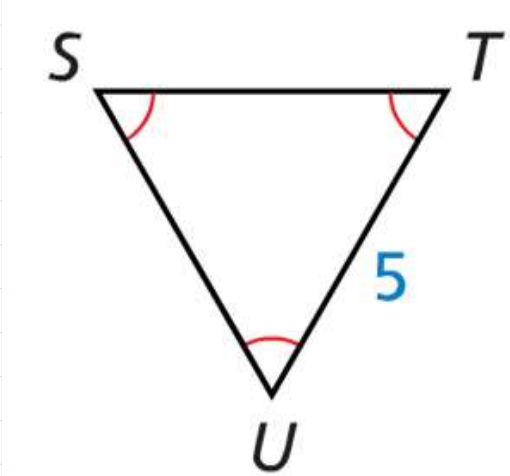
If a triangle is equiangular, then it is equilateral.

Proof Ex. 39, p. 258



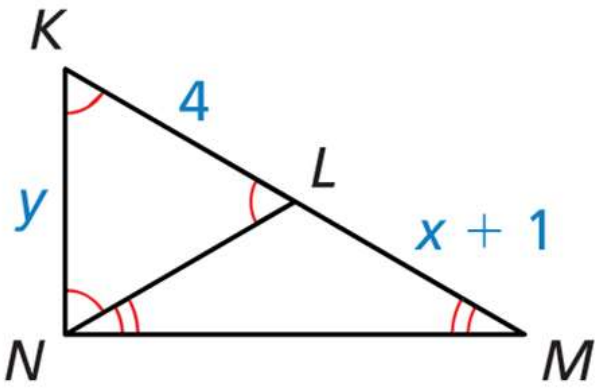
Find the measures of $\angle P$, $\angle Q$, and $\angle R$.



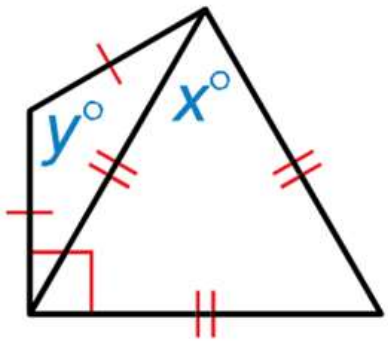


Find ST & SU

Find the values of x and y in the diagram.



Find the values of x and y in the diagram.



Sec. 5.4, Pg. 256

1, 2, 3-15EO, 42-44A

Friday review 5.1, 5.2, 5.4

Friday, December 1, 2017 7:16 AM

Review for Quiz on 5.1, 5.2, 5.4

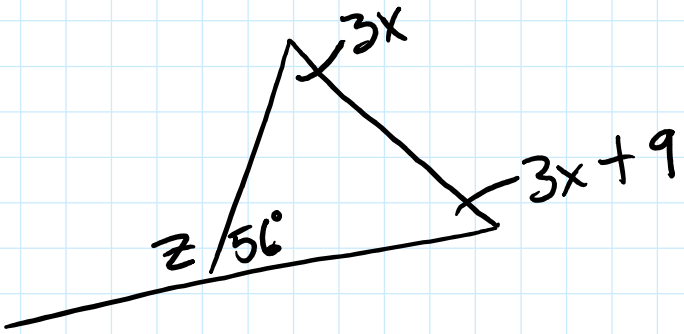
Quiz on Tuesday 12/5

Practice *5.1-5.4 Quiz* pg. 260:

1-5A, 9-15A

Quiz review!

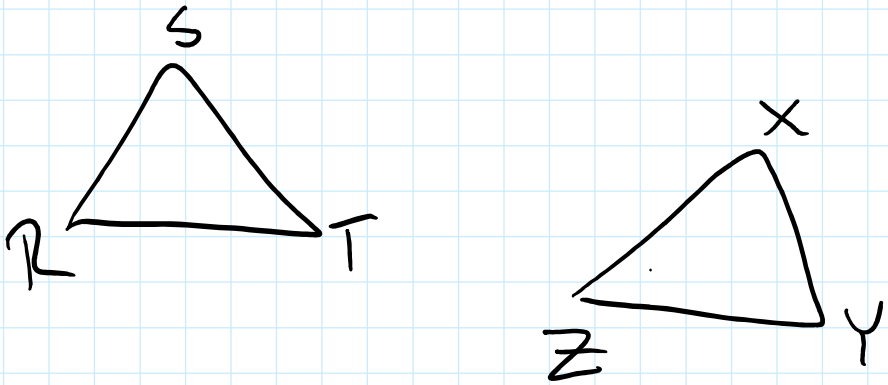
Find the value of x and the measure of the exterior angle.



(3?)

Identify all pairs of congruent sides.

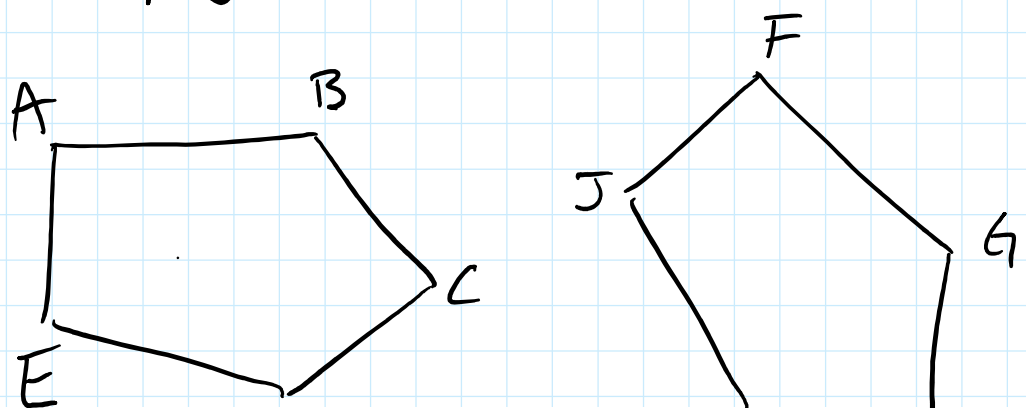
$\Delta RST \cong \Delta XYZ$

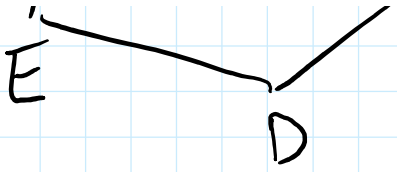


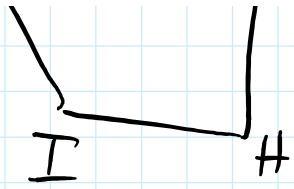
(2?)

Identify all pairs of congruent angles.

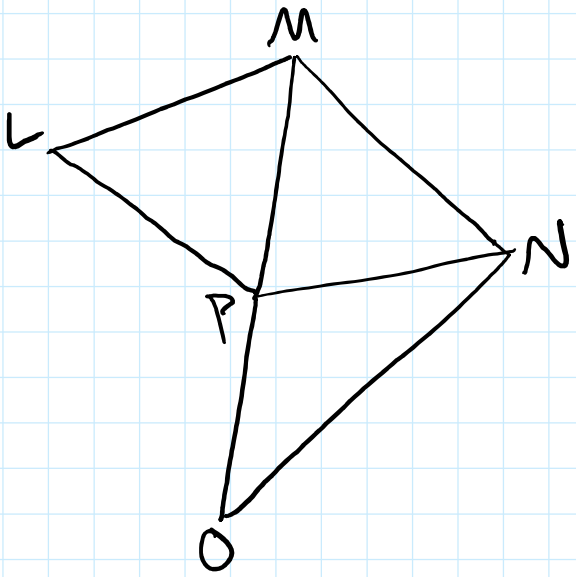
$ABCDE \cong FGHIJ$







(17)

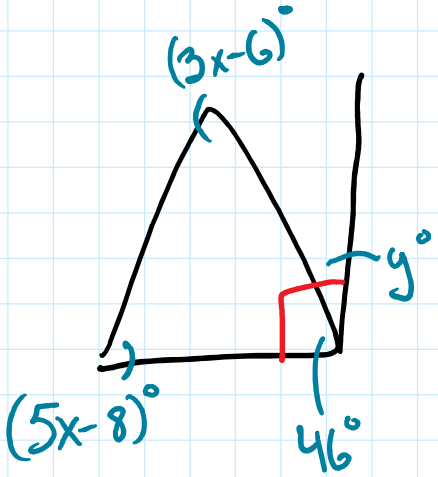


If $\overline{LM} \cong \overline{MP}$, which $\angle$'s are $\cong$?

If $\angle PMN \cong \angle MPN$, which segments are $\cong$?

If $\overline{PN} \cong \overline{OP}$, which $\angle$'s are $\cong$?

(37)

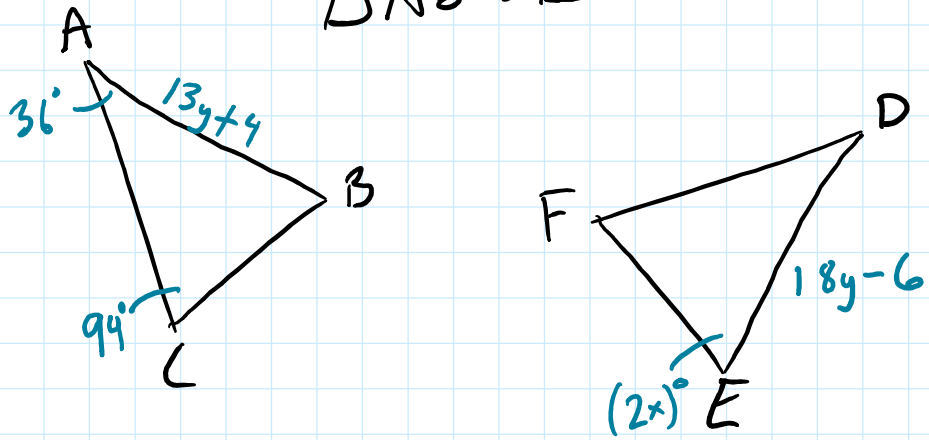


x= _____

y= _____

(27)

$\triangle ABC \cong \triangle DEF$



x= _____

y= _____

(27)

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13 Questions
Study and GOOD LUCK!