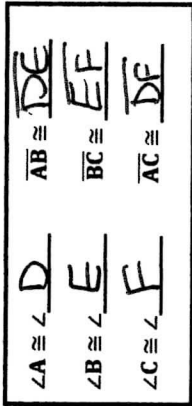


# NOTES 5.2 & 5.4 - CONGRUENT TRIANGLES

Objective: I can identify all pairs of congruent corresponding parts and can make conjectures about equilateral and isosceles triangles.  
**CONGRUENT TRIANGLES:** triangles that have equal corresponding sides and equal corresponding angles.

EXAMPLE 1: If  $\triangle ABC \cong \triangle DEF$ , then...

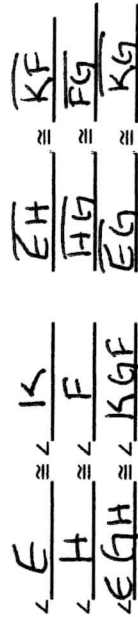


EXAMPLE 2: If  $\triangle XYZ \cong \triangle WMN$ , determine whether the following statements are TRUE or FALSE.

STATEMENT	TRUE	FALSE
$\triangle YZX \cong \triangle WMN$		X
$\triangle ZXY \cong \triangle NWM$	X	
$\triangle YZX \cong \triangle NMW$	X	

EXAMPLE 3: Use the given figure and information to name three pairs of congruent angles and three pairs of congruent sides.

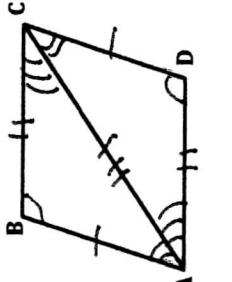
$\triangle EHG \cong \triangle KFG$



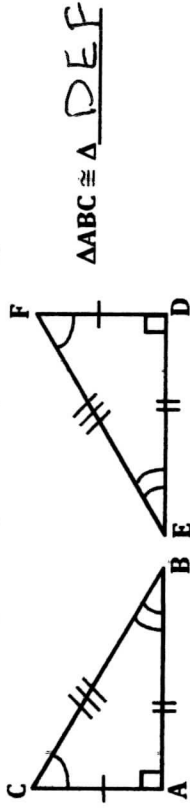
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EXAMPLE 4: Use the given figure and information to name three pairs of congruent angles and three pairs of congruent sides.

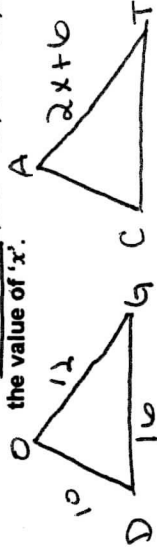
$\triangle ABC \cong \triangle CDA$



EXAMPLE 5: Using the diagram, complete the congruence statement.



EXAMPLE 6: If  $\triangle DOG \cong \triangle CAT$ ,  $DO = 10$ ,  $OG = 12$ ,  $DG = 16$ , and  $AT = 2x + 6$ , find the value of 'x'.



$$12 = 2x + 6$$

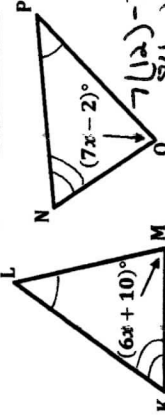
$$-6 \quad -6$$

$$\frac{6}{2} = \frac{2x}{2}$$

$$x = 3$$

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

EXAMPLE 7: Find  $m\angle M$  and  $m\angle Q$ .



$$6(12) + 10 = 82$$

$$72 + 10 = 82$$

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$12 = x$  plug back in!

$$m\angle M = m\angle Q = 82$$

# ISOSCELES & EQUILATERAL TRIANGLES

THEOREM	DIAGRAM
<p><b>ISOSCELES TRIANGLE THEOREM</b></p> <p>If <u>two sides</u> of a triangle are congruent, then the angles <u>opposite the sides</u> are congruent.</p>	<p>If <math>\overline{RT} \cong \overline{TS}</math>, then <math>\angle T \cong \angle S</math>.</p>
<p><b>CONVERSE OF ISOSCELES TRIANGLE THEOREM</b></p> <p>If <u>two angles</u> of a triangle are congruent, then the sides <u>opposite those angles</u> are congruent.</p>	<p>If <math>\angle N \cong \angle M</math>, then <math>\overline{LN} \cong \overline{LM}</math>.</p>

THEOREM	DIAGRAM
<p><b>EQUILATERAL TRIANGLE COROLLARY</b></p> <p>If a triangle is equilateral, then it is equiangular.</p>	<p>If <math>\overline{AB} \cong \overline{BC} \cong \overline{AC}</math>, then <math>\angle A \cong \angle B \cong \angle C</math>.</p>
<p><b>EQUIANGULAR TRIANGLE COROLLARY</b></p> <p>If a triangle is equiangular, then it is equilateral.</p>	<p>If <math>\angle A \cong \angle B \cong \angle C</math>, then <math>\overline{AB} \cong \overline{BC} \cong \overline{AC}</math>.</p>

EXAMPLES:	EXAMPLES:
<p>1. <math>m\angle C = 51^\circ</math></p> <p> <math display="block">\begin{array}{r} 180 \\ -78 \\ \hline 102 \\ \div 2 \\ \hline 51 \end{array}</math> </p>	<p>2. <math>m\angle Q = 47^\circ</math></p> <p> <math display="block">\begin{array}{r} 180 \\ -86 \\ \hline 94 \\ \div 2 \\ \hline 47 \end{array}</math> </p>
<p>3. <math>m\angle H = 72^\circ</math></p> <p> <math display="block">\begin{array}{r} 6x + 18 = 8x \\ -6x \quad -6x \\ \hline 18 = 2x \\ \div 2 \\ \hline 9 = x \end{array}</math>   <math>m\angle H = 8(9) = 72^\circ</math> </p>	<p>4. <math>m\angle M = 100^\circ</math></p> <p> <math display="block">\begin{array}{r} 2x = x + 30 \\ -x \quad -x \\ \hline x = 30 \end{array}</math>   <math>30 + 30 = 60^\circ</math> </p>

\* All angles = 60°

## COROLLARY

**EQUILATERAL TRIANGLE COROLLARY**  
If a triangle is equilateral, then it is equiangular.

**EQUIANGULAR TRIANGLE COROLLARY**  
If a triangle is equiangular, then it is equilateral.

## DIAGRAM



### EXAMPLES:

5.  $n = 12$

$$\begin{array}{r} 5n = 60 \\ \div 5 \\ \hline n = 12 \end{array}$$

6.  $x = 33$

$$\begin{array}{r} 2x - 6 = 60 \\ +6 \quad +6 \\ \hline 2x = 66 \\ \div 2 \quad \div 2 \\ \hline x = 33 \end{array}$$

7.  $vt = 18$

$$\begin{array}{r} 9r = 5r + 8 \\ -5r \quad -5r \\ \hline 4r = 8 \\ \div 4 \quad \div 4 \\ \hline r = 2 \end{array}$$
  
 $5(2) + 8 = 18$

8.  $MN = 13$

$$\begin{array}{r} 4y + 1 = y + 10 \\ -y \quad -y \\ \hline 3y + 1 = 10 \\ -1 \quad -1 \\ \hline 3y = 9 \\ \div 3 \quad \div 3 \\ \hline y = 3 \end{array}$$
  
 $4(3) + 1 = 13$

\* All sides are congruent if all angles are congruent