Geometry Notes – Chapter 4: Congruent Triangles

4.1 – Triangle Angle Sums

Classifying Triangles by Sides

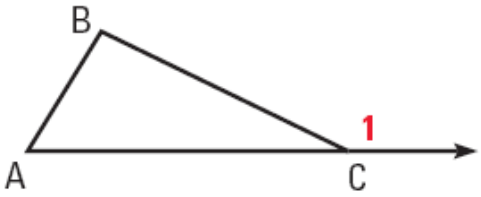
Scalene – No congruent sides
Isosceles – At least 2 congruent sides
Equilateral – 3 congruent sides

Classifying Triangles by Angles

Acute – 3 acute angles
Right – 1 right angle
Obtuse – 1 obtuse angle
Equiangular – 3 congruent angles

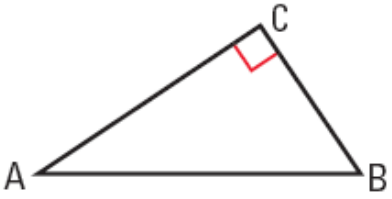
Theorem 4.1 – Triangle Sum Theorem
The sum of the measures of the interior angles of a triangle is 180°.

Theorem 4.2 – Exterior Angle Theorem
The measure of an exterior angle of a triangle is equal to the sum of the measures of the two nonadjacent angles.



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

Triangle Sum Corollary
The acute angles of a right triangle are complementary.



$m\angle A + m\angle B = 90°$

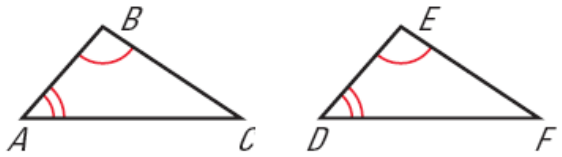
4.2 – Congruence and Triangles

Congruent Triangles
If two triangles are congruent, then all of the parts of one triangle are congruent to the corresponding parts of the other triangle. This means that the *corresponding sides* and the *corresponding angles* are congruent.

For example, if $\triangle ABC \cong \triangle DEF$, then

$\overline{AB} \cong \overline{DE}$	$\angle A \cong \angle D$
$\overline{BC} \cong \overline{EF}$	$\angle B \cong \angle E$
$\overline{AC} \cong \overline{DF}$	$\angle C \cong \angle F$

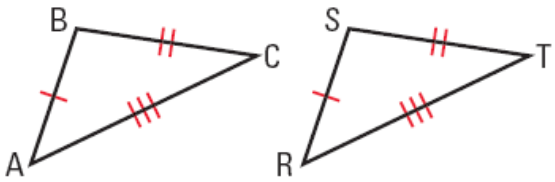
Theorem 4.3 – Third Angles Theorem
If two angles of one triangle are congruent to two angles of another triangle, then the third angles are also congruent.



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

4.3 – Triangle Congruency by SSS

Side-Side-Side (SSS) Congruence
If three sides of one triangle are congruent to three sides of a second triangle, then the two triangles are congruent.



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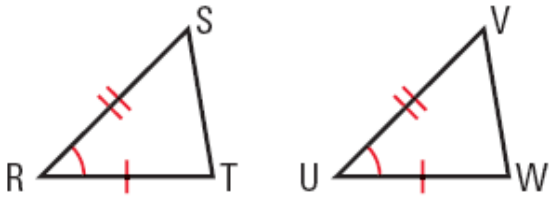
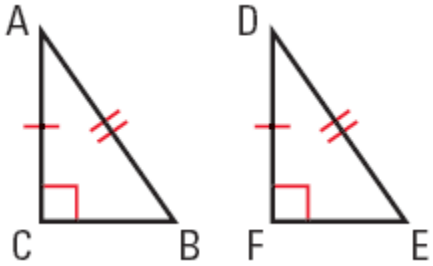
4.4 – Triangle Congruency by SAS & HL

Side-Angle-Side (SAS) Congruence
If two sides and the included angle of one triangle are congruent to two sides and the included angle of a second triangle, then the two triangles are congruent.

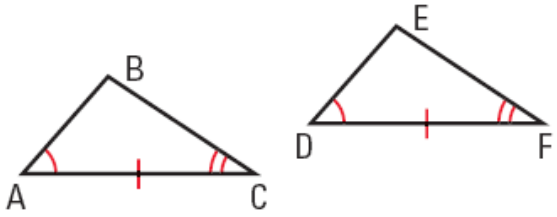


Hypotenuse-Leg (HL) Congruence
If the hypotenuse and a leg of a right triangle are congruent to the hypotenuse and a leg of a second right triangle, then the two triangles are congruent.

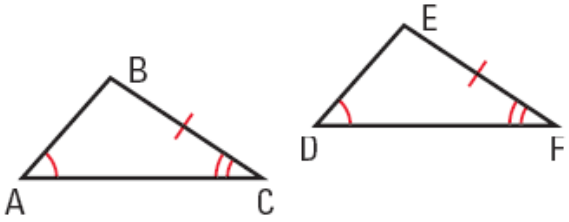


4.5 – Triangle Congruency - ASA & AAS

Angle-Side-Angle (ASA) Congruence
If two angles and the included side of one triangle are congruent to two angles and the included side of a second triangle, then the two triangles are congruent.



Angle-Angle-Side (AAS) Congruence
If two angles and a non-included side of one triangle are congruent to two angles and a non-included side of a second triangle, then the two triangles are congruent.



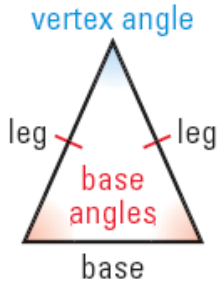
4.6 – Congruent Triangles and CPCTC

CPCTC
Corresponding Parts of Congruent Triangles are Congruent. If two triangles are congruent, any pair of corresponding sides or angles must be congruent.

4.7 – Isosceles & Equilateral Triangles

Theorem 4.7 – Base Angles Theorem
If two sides of a triangle are congruent, then the angles opposite them are congruent.

Theorem 4.8 – Base Angles Converse
If two angles of a triangle are congruent, then the sides opposite them are congruent.



Corollary to the Base Angles Theorem
If a triangle is equilateral, then it is also equiangular.

Corollary to the Base Angles Converse
If a triangle is equiangular, then it is also equilateral.