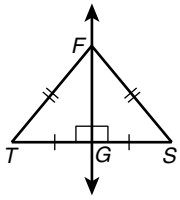
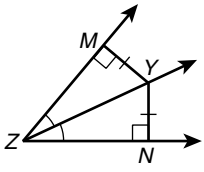
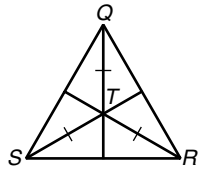
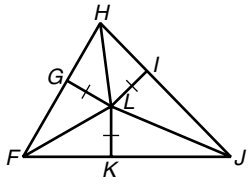
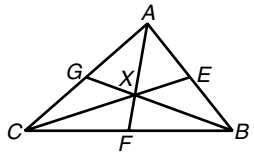
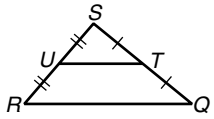
Date _____

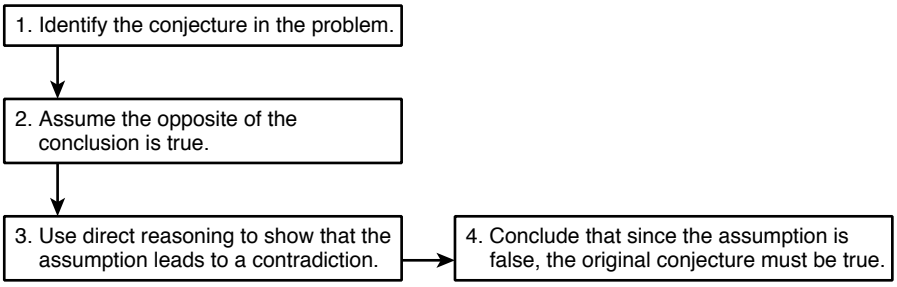
Dear Family,

In this chapter, your child will learn about the properties and attributes of triangles.

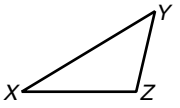
Your child will learn a number of theorems to explain the properties and attributes of triangles. A number of them are outlined in the table below.

Theorem	Definition	Example
Perpendicular Bisector Theorem	If a point is on the perpendicular bisector of a segment, then it is equidistant from the endpoints of the segment.	$\overleftrightarrow{FG}$ is the perpendicular bisector of $\overline{ST}$.  $\overleftrightarrow{FG} \perp \overline{TS}$; $\overline{TG} \cong \overline{GS}$; $FT = FS$
Angle Bisector Theorem	If a point is on the bisector of an angle, then it is equidistant from the sides of the angle.	$\overleftrightarrow{ZY}$ bisects $\angle MZN$.  $\angle MZY \cong \angle YZN$, $MY = YN$
Circumcenter Theorem	The circumcenter of a triangle is equidistant from the vertices of the triangle. (perpendicular bisectors)	T is the circumcenter of $\triangle QRS$.  $TS = TR = TQ$
Incenter Theorem	The incenter of a triangle is equidistant from the sides of the triangle. (angle bisectors)	L is the incenter of $\triangle FHJ$.  $LK = LG = LI$
Centroid Theorem	The centroid of a triangle is located $\frac{2}{3}$ of the distance from each vertex to the midpoint of the opposite side. (medians)	X is the centroid of $\triangle ABC$.  $AX = \frac{2}{3}AF$; $BX = \frac{2}{3}BG$; $CX = \frac{2}{3}CE$
Triangle Midsegment Theorem	A midsegment of a triangle is parallel to a side of the triangle, and its length is half the length of that side.	T and U are midpoints.  $\overline{TU} \parallel \overline{QR}$; $TU = \frac{1}{2}QR$

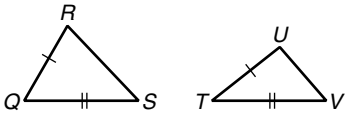
Your child will also learn to solve proofs in a new way in this chapter. He or she will learn to write **indirect proofs** that begin by assuming that the conclusion is false. The following flowchart shows the steps used to give an indirect proof.



There are certain relationships between the sides and the angles of a triangle that your child will learn to identify. For example, in a triangle, the larger angle is opposite the longer side. Here $XY > YZ$, so $m\angle Z > m\angle X$. The opposite of this logic can also be used by saying that in a triangle, the longer side is opposite the larger angle.

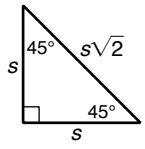


Your child will also learn to recognize inequalities in two triangles. Consider the two triangles at the right. In these two triangles, $m\angle Q > m\angle T$. This means that $RS > UV$.

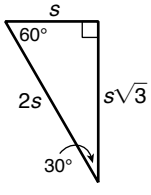


Your child will also learn to identify and discuss relationships for two types of special right triangles.

In a 45°-45°-90° triangle, both legs are congruent, and the length of the hypotenuse is the length of a leg times $\sqrt{2}$.



In a 30°-60°-90° triangle, the length of the hypotenuse is two times the length of the shorter leg, and the length of the longer leg is the length of the shorter leg multiplied by $\sqrt{3}$.



For additional resources, visit *go.hrw.com,* and enter the keyword MG7 Parent.