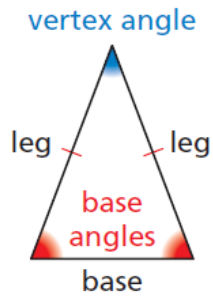
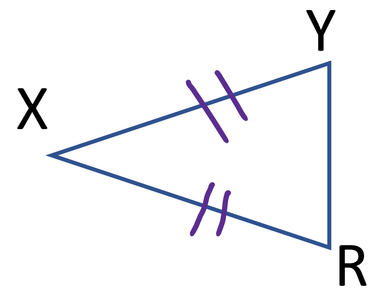
5.4 Equilateral and Isosceles Triangles Notes

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**.



Example: In the isosceles Triangle shown, identify the:

legs:____________________
vertex angle:_____________
base:___________________
base angles:______________



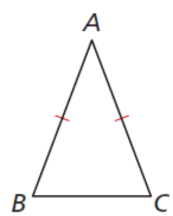
THEOREMS

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 $\angle B \cong \angle C$.

Prove this Theorem Explore It! part (b), page 249

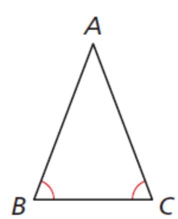


5.7 Converse of the Base Angles Theorem

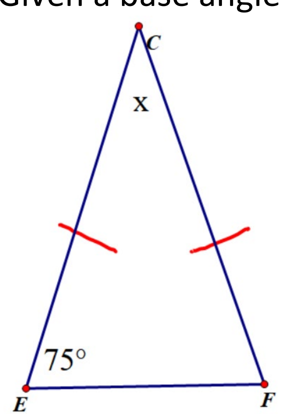
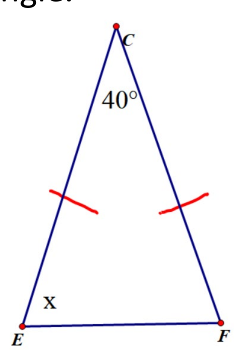
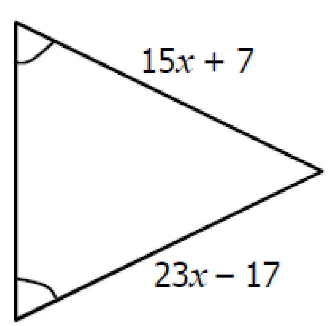
If two angles of a triangle are congruent, then the sides opposite them are congruent.

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

Prove this Theorem Exercise 20, page 271



Examples: Find x in each example below.

1) Given a base angle.	2) Given the vertex angle.	3)
		

COROLLARIES

5.2 Corollary to the Base Angles Theorem

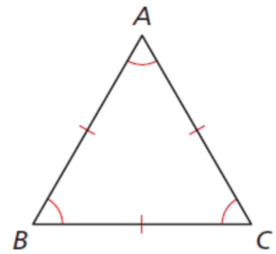
If a triangle is equilateral, then it is equiangular.

Prove this Corollary Exercise 29, page 255; Exercise 10, page 346

5.3 Corollary to the Converse of the Base Angles Theorem

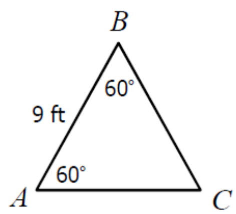
If a triangle is equiangular, then it is equilateral.

Prove this Corollary Exercise 31, page 256



Examples:

4)



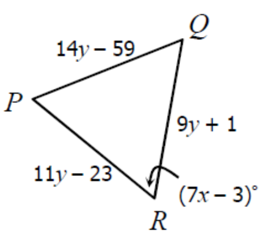
$m\angle C =$ ______

$BC =$ ______

$AC =$ ______

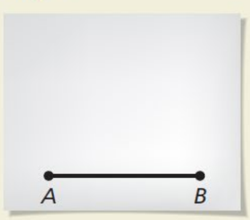
5)

If ΔPQR is an equilateral triangle, solve for x and y.



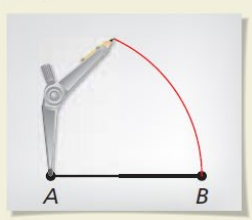
Constructing an equilateral triangle:

Step 1



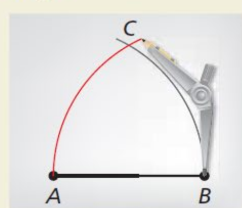
Copy a segment Copy $\overline{AB}$.

Step 2



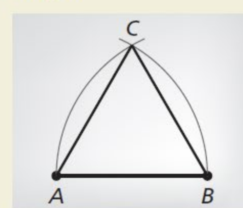
Draw an arc Draw an arc with center A and radius AB.

Step 3



Draw an arc Draw an arc with center B and radius AB. Label the intersection of the arcs from Steps 2 and 3 as C.

Step 4



Draw a triangle Draw $\triangle ABC$. Because $\overline{AB}$ and $\overline{AC}$ are radii of the same circle, $\overline{AB} \cong \overline{AC}$. Because $\overline{AB}$ and $\overline{BC}$ are radii of the same circle, $\overline{AB} \cong \overline{BC}$. By the Transitive Property of Segment Congruence, $\overline{AC} \cong \overline{BC}$. So, $\triangle ABC$ is equilateral.