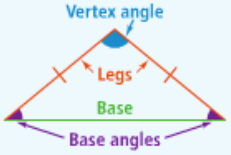
4-5 Isosceles and Equilateral Triangles

Content Standards
G.CO.10 Prove theorems about triangles . . . base angles of isosceles triangles are congruent . . .
Also G.CO.13, G.SRT.5

Objective To use and apply properties of isosceles and equilateral triangles

Essential Understanding The angles and sides of isosceles and equilateral triangles have special relationships.



take note

Theorem 4-3 Isosceles Triangle Theorem

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

If . . . $\overline{AC} \cong \overline{BC}$

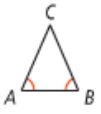
Then . . . $\angle A \cong \angle B$

take note

Theorem 4-4 Converse of the Isosceles Triangle Theorem

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

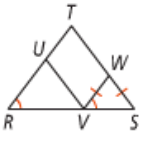
If . . . $\angle A \cong \angle B$



Then . . . $\overline{AC} \cong \overline{BC}$

You will prove Theorem 4-4 in Exercise 23.

Got It? **1. a.** Is $\angle WVS$ congruent to $\angle S$? Is $\overline{TR}$ congruent to $\overline{TS}$? Explain.

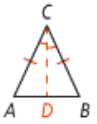


take note

Theorem 4-5

Theorem
If a line bisects the vertex angle of an isosceles triangle, then the line is also the perpendicular bisector of the base.

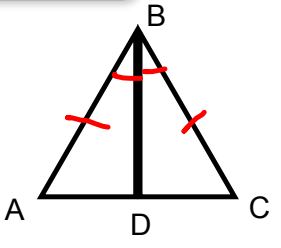
If . . .
$\overline{AC} \cong \overline{BC}$ and
$\angle ACD \cong \angle BCD$



Then . . .
$\overline{CD} \perp \overline{AB}$ and
$\overline{AD} \cong \overline{BD}$

You will prove Theorem 4-5 in Exercise 26.

Got It? **2.** Suppose $m\angle A = 27$. What is the value of x?



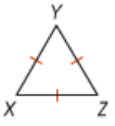
A **corollary** is a theorem that can be proved easily using another theorem. Since a corollary is a theorem, you can use it as a reason in a proof.

Take note

Corollary to Theorem 4-3

Corollary
If a triangle is equilateral, then the triangle is equiangular.

If . . .
$\overline{XY} \cong \overline{YZ} \cong \overline{ZX}$



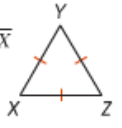
Then . . .
$\angle X \cong \angle Y \cong \angle Z$

Corollary to Theorem 4-4

Corollary
If a triangle is equiangular, then the triangle is equilateral.

If . . .
$\angle X \cong \angle Y \cong \angle Z$

Then . . .
$\overline{XY} \cong \overline{YZ} \cong \overline{ZX}$



The measure of one base angle of an isosceles triangle is 23. What are the measures of the other two angles?