Geometry

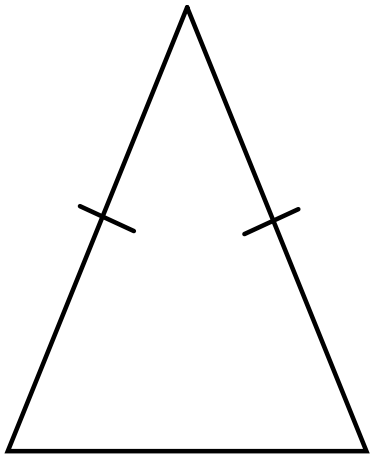
Chapter 4

Section 4-5

May 13-10:02 PM

Isosceles Triangles

A triangle with at least two congruent sides is called isosceles.



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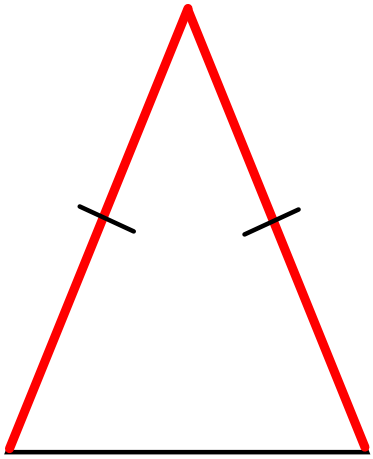
Isosceles Triangles

The two congruent sides of the isosceles triangle are called the *legs*.



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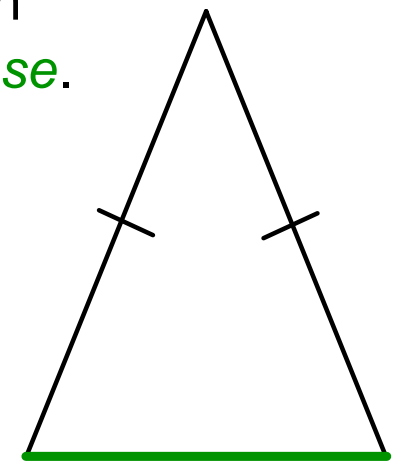
Isosceles Triangles

The third side (other than the *legs*) is called the *base*.



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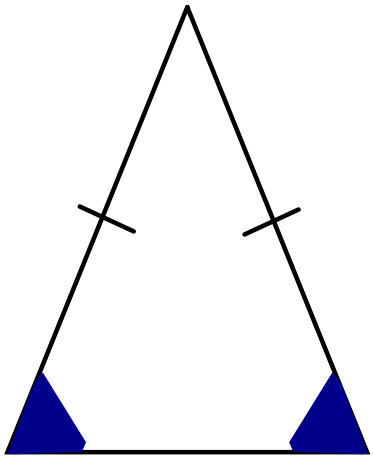
Isosceles Triangles

The angles that are opposite each leg are called the *base angles*.



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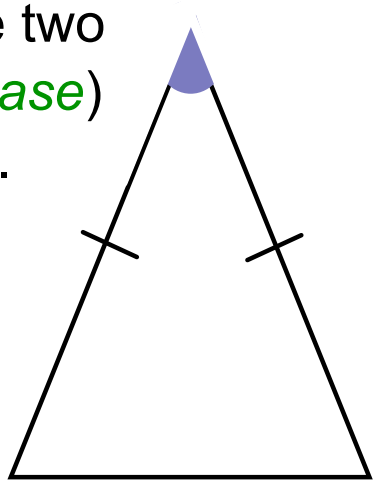
Isosceles Triangles

The angle made from the two *legs* (opposite from the *base*) is called the *vertex angle*.



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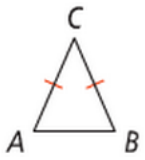
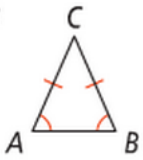
Theorem 4-3 Isosceles Triangle Theorem

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

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



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



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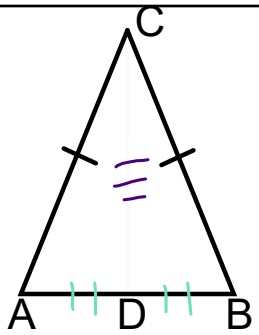
Given: $\overline{AC} \cong \overline{BC}$
Prove: $\angle A \cong \angle B$



$\overline{AC} \cong \overline{BC}$, D midpoint of $\overline{AB}$	Given
$\overline{AD} \cong \overline{DB}$	Definition of midpoint
$\overline{CD} \cong \overline{CD}$	Reflexive
$\triangle CAD \cong \triangle CBD$	SSS
$\angle A \cong \angle B$	Definition of $\cong \triangle$s

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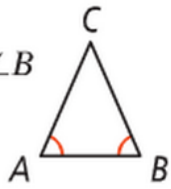
Theorem 4-4 Converse of the Isosceles Triangle Theorem

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

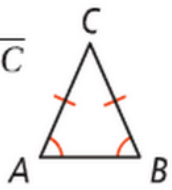
If . . .

$\angle A \cong \angle B$



Then . . .

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



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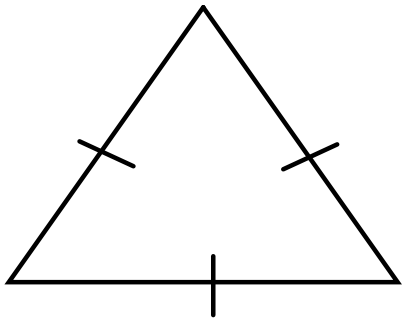
Equilateral Triangles

A triangle with three congruent sides is called equilateral.



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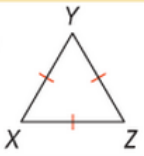
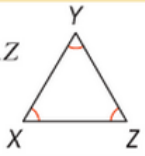
Corollary to Theorem 4-3 Equilateral Corollary

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

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



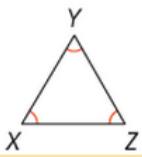
Then . . . $\angle X \cong \angle Y \cong \angle Z$



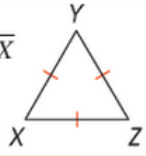
Corollary to Theorem 4-4 Equiangular Corollary

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

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



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



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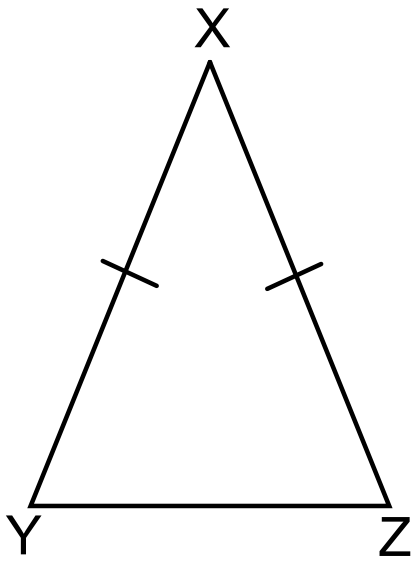
Find the side lengths.



→ XZ = 12 - b = 12 - 1 = 11

→ XY = 7 + 4b = 7 + 4(1) = 11

YZ = 3b = 3(1) = 3

$12 - b = 7 + 4b$

$-7 \quad +b \qquad -7 \quad +b$

$5 = 5b$

$b = 1$

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Find all angle measures.

$m\angle Y = 4a - 38$ $= 4(21) - 38 = 46$

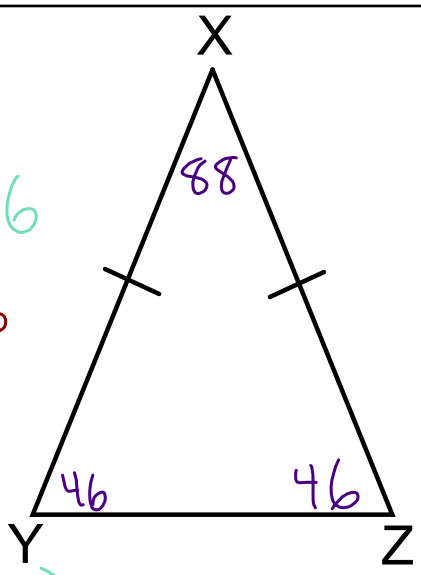
$m\angle Z = a + 25$ $= 21 + 25 = 46$

$4a - 38 = a + 25$

$-a \quad +38 \quad -a \quad +38$

$3a = 63$

$a = 21$



$180 - (46 + 46)$

92

$m\angle X = 88$

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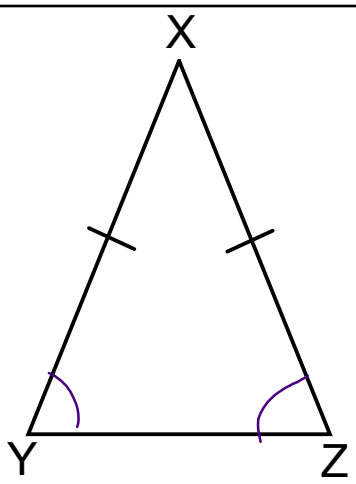
Find all angle measures.

$m\angle X = 22$

$m\angle Z = n - 32$



$m\angle X + m\angle Y + m\angle Z = 180$

$22 + m\angle Y + m\angle Z = 180$

$-22 \qquad -22$

$m\angle Y + m\angle Z = 158$

$\div 2$

$m\angle Z = n - 32 = 79$

$+32 \quad +32$

$n = 111$

$m\angle Y = 79$

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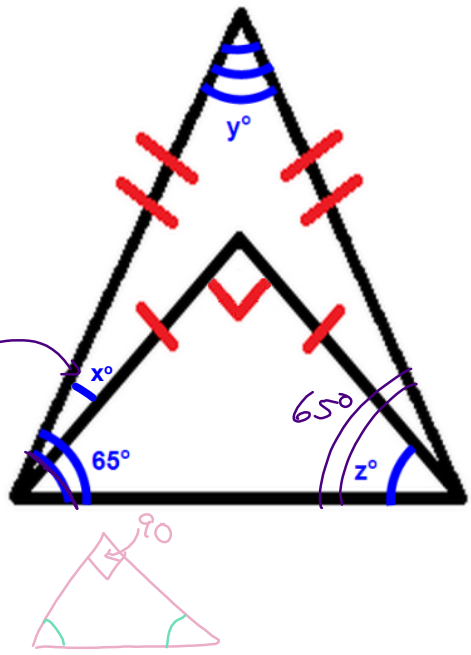
Solve for all variables.



$180-65=115$

-65

$y=50$

$180-90=90$

$\div 2$

$z=45$

$x+45=65$

$x=20$

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Homework

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6 - 13 all, 23, 25, 30 - 34 all

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