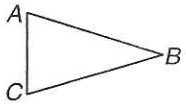
NAME _____ DATE _____ PERIOD ____

4-6 Study Guide and Intervention

Isosceles Triangles

Properties of Isosceles Triangles An **isosceles triangle** has two congruent sides. The angle formed by these sides is called the **vertex angle**. The other two angles are called **base angles**. You can prove a theorem and its converse about isosceles triangles.

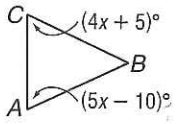
- If two sides of a triangle are congruent, then the angles opposite those sides are congruent. **(Isosceles Triangle Theorem)**
- If two angles of a triangle are congruent, then the sides opposite those angles are congruent.



If $\overline{AB} \cong \overline{CB}$, then $\angle A \cong \angle C$.

If $\angle A \cong \angle C$, then $\overline{AB} \cong \overline{CB}$.

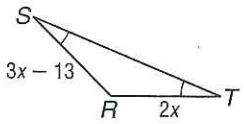
Example 1 **Find x, given $\overline{BC} \cong \overline{BA}$.**



$BC = BA$, so

$m\angle A = m\angle C$.		Isos. Triangle Theorem
$5x - 10 = 4x + 5$		Substitution
$x - 10 = 5$		Subtract $4x$ from each side.
$x = 15$		Add 10 to each side.

Example 2 **Find x.**



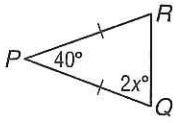
$m\angle S = m\angle T$, so

$SR = TR$.		Converse of Isos. △ Thm.
$3x - 13 = 2x$		Substitution
$3x = 2x + 13$		Add 13 to each side.
$x = 13$		Subtract $2x$ from each side.

Exercises

Find x.

1.



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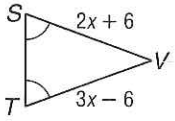

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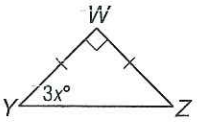

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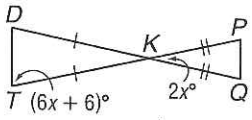

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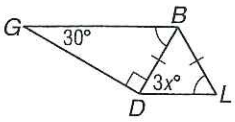

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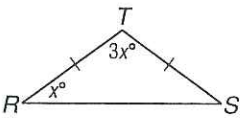
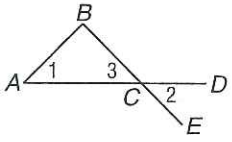


7. Write a two-column proof.

Given: $\angle 1 \cong \angle 2$

Prove: $\overline{AB} \cong \overline{CB}$



Statements	Reasons

NAME _____ DATE _____ PERIOD ____

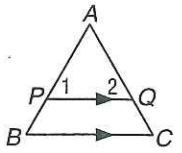
4-6 Study Guide and Intervention *(continued)*

Isosceles Triangles

Properties of Equilateral Triangles An **equilateral triangle** has three congruent sides. The Isosceles Triangle Theorem can be used to prove two properties of equilateral triangles.

1. A triangle is equilateral if and only if it is equiangular.
2. Each angle of an equilateral triangle measures 60°.

Example **Prove that if a line is parallel to one side of an equilateral triangle, then it forms another equilateral triangle.**

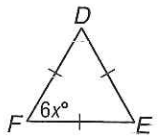


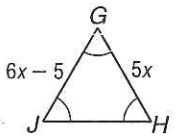
Proof:

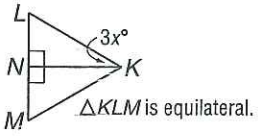
Statements	Reasons
1. $\triangle ABC$ is equilateral; $\overline{PQ} \parallel \overline{BC}$.	1. Given
2. $m\angle A = m\angle B = m\angle C = 60$	2. Each $\angle$ of an equilateral $\triangle$ measures 60°.
3. $\angle 1 \cong \angle B$, $\angle 2 \cong \angle C$	3. If $\parallel$ lines, then corres. $\angle$s are $\cong$.
4. $m\angle 1 = 60$, $m\angle 2 = 60$	4. Substitution
5. $\triangle APQ$ is equilateral.	5. If a $\triangle$ is equiangular, then it is equilateral.

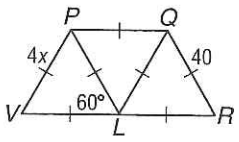
Exercises

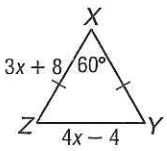
Find x.

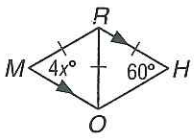
1. 

2. 

3. 

4. 

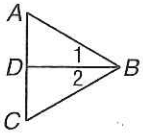
5. 

6. 

7. Write a two-column proof.

Given: $\triangle ABC$ is equilateral; $\angle 1 \cong \angle 2$.

Prove: $\angle ADB \cong \angle CDB$



Proof:

Statements	Reasons

NAME _____ DATE _____ PERIOD ____

4-6 Study Guide and Intervention

Isosceles Triangles

Properties of Isosceles Triangles An **isosceles triangle** has two congruent sides. The angle formed by these sides is called the **vertex angle**. The other two angles are called **base angles**. You can prove a theorem and its converse about isosceles triangles.

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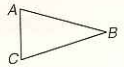

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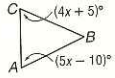

$BC = BA$, so

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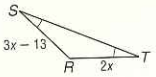

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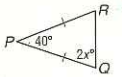
Exercises

Find x.

1. 

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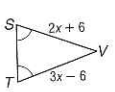
2. 

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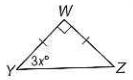
3. 

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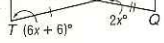
4. 

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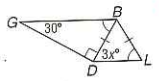
5. 

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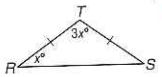
6. 

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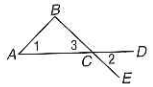
7. Write a two-column proof.

Given: $\angle 1 \cong \angle 2$

Prove: $\overline{AB} \cong \overline{CB}$



Statements	Reasons
1. $\angle 1 \cong \angle 2$	1. Given
2. $\angle 2 \cong \angle 3$	2. Vertical angles are congruent.
3. $\angle 1 \cong \angle 3$	3. Transitive Property of $\cong$
4. $\overline{AB} \cong \overline{CB}$	4. If two angles of a triangle are $\cong$, then the sides opposite the angles are $\cong$.

Lesson 4-6

NAME _____ DATE _____ PERIOD ____

4-6 Study Guide and Intervention *(continued)*

Isosceles Triangles

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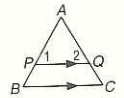

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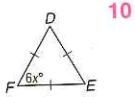
Exercises

Find x.

1. 

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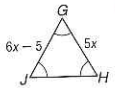
2. 

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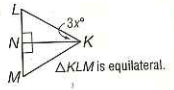
3. 

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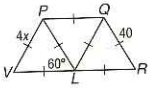
4. 

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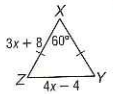
5. 

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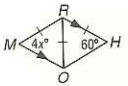
6. 

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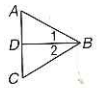
7. Write a two-column proof.

Given: $\triangle ABC$ is equilateral; $\angle 1 \cong \angle 2$.

Prove: $\angle ADB \cong \angle CDB$



Proof:

Statements	Reasons
1. $\triangle ABC$ is equilateral.	1. Given
2. $\overline{AB} \cong \overline{CB}$; $\angle A \cong \angle C$	2. An equilateral $\triangle$ has $\cong$ sides and $\cong$ angles.
3. $\angle 1 \cong \angle 2$	3. Given
4. $\triangle ABD \cong \triangle CBD$	4. ASA Postulate
5. $\angle ADB \cong \angle CDB$	5. CPCTC