NAME _____ DATE _____ PERIOD ____

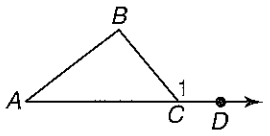
5-2 Study Guide and Intervention

Inequalities and Triangles

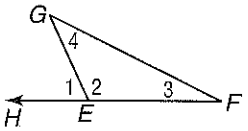
Angle Inequalities Properties of inequalities, including the Transitive, Addition, Subtraction, Multiplication, and Division Properties of Inequality, can be used with measures of angles and segments. There is also a Comparison Property of Inequality.

For any real numbers a and b, either $a < b$, $a = b$, or $a > b$.

The Exterior Angle Theorem can be used to prove this inequality involving an exterior angle.

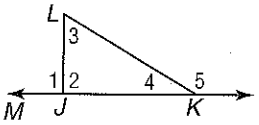
Exterior Angle Inequality Theorem	If an angle is an exterior angle of a triangle, then its measure is greater than the measure of either of its corresponding remote interior angles.	 $m\angle 1 > m\angle A$, $m\angle 1 > m\angle B$

Example **List all angles of $\triangle EFG$ whose measures are less than $m\angle 1$.**



The measure of an exterior angle is greater than the measure of either remote interior angle. So $m\angle 3 < m\angle 1$ and $m\angle 4 < m\angle 1$.

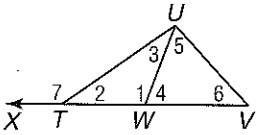
List all angles that satisfy the stated condition.



Exercises 1–2

1. all angles whose measures are less than $m\angle 1$

2. all angles whose measures are greater than $m\angle 3$



Exercises 3–8

3. all angles whose measures are less than $m\angle 1$

4. all angles whose measures are greater than $m\angle 1$

5. all angles whose measures are less than $m\angle 7$

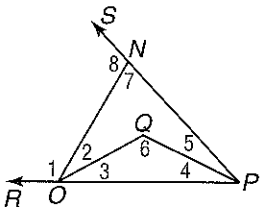
6. all angles whose measures are greater than $m\angle 2$

7. all angles whose measures are greater than $m\angle 5$

8. all angles whose measures are less than $m\angle 4$

9. all angles whose measures are less than $m\angle 1$

10. all angles whose measures are greater than $m\angle 4$



Exercises 9–10

Lesson 5-2

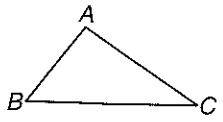
NAME _____ DATE _____ PERIOD ____

5-2 Study Guide and Intervention *(continued)*

Inequalities and Triangles

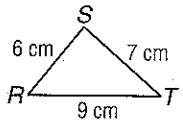
Angle-Side Relationships When the sides of triangles are not congruent, there is a relationship between the sides and angles of the triangles.

- If one side of a triangle is longer than another side, then the angle opposite the longer side has a greater measure than the angle opposite the shorter side.
- If one angle of a triangle has a greater measure than another angle, then the side opposite the greater angle is longer than the side opposite the lesser angle.



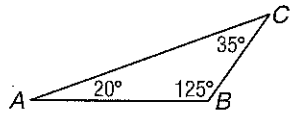
If $AC > AB$, then $m\angle B > m\angle C$.
If $m\angle A > m\angle C$, then $BC > AB$.

Example 1 **List the angles in order from least to greatest measure.**



$\angle T, \angle R, \angle S$

Example 2 **List the sides in order from shortest to longest.**

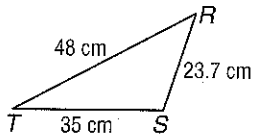


$\overline{CB}, \overline{AB}, \overline{AC}$

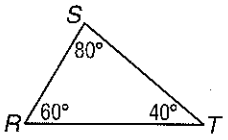
Exercises

List the angles or sides in order from least to greatest measure.

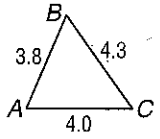
1.



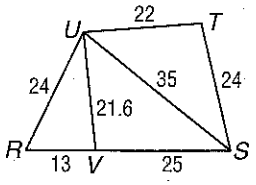
2.



3.



Determine the relationship between the measures of the given angles.

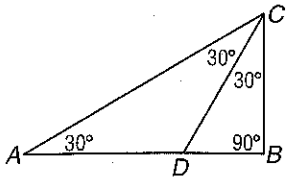


4. $\angle R, \angle RUS$

5. $\angle T, \angle UST$

6. $\angle UVS, \angle R$

Determine the relationship between the lengths of the given sides.



7. $\overline{AC}, \overline{BC}$

8. $\overline{BC}, \overline{DB}$

9. $\overline{AC}, \overline{DB}$

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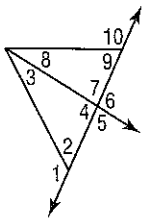
5-2 Practice

Inequalities and Triangles

Determine which angle has the greatest measure.



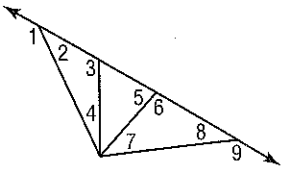
1. $\angle 1, \angle 3, \angle 4$

2. $\angle 4, \angle 8, \angle 9$

3. $\angle 2, \angle 3, \angle 7$

4. $\angle 7, \angle 8, \angle 10$

Use the Exterior Angle Inequality Theorem to list all angles that satisfy the stated condition.



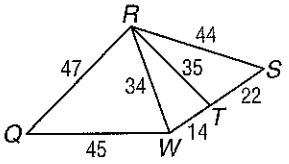
5. all angles whose measures are less than $m\angle 1$

6. all angles whose measures are less than $m\angle 3$

7. all angles whose measures are greater than $m\angle 7$

8. all angles whose measures are greater than $m\angle 2$

Determine the relationship between the measures of the given angles.



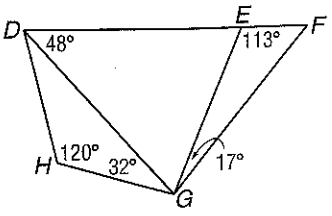
9. $m\angle QRW, m\angle RWQ$

10. $m\angle RTW, m\angle TWR$

11. $m\angle RST, m\angle TRS$

12. $m\angle WQR, m\angle QRW$

Determine the relationship between the lengths of the given sides.



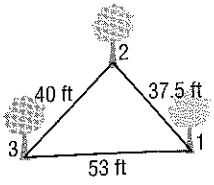
13. $\overline{DH}, \overline{GH}$

14. $\overline{DE}, \overline{DG}$

15. $\overline{EG}, \overline{FG}$

16. $\overline{DE}, \overline{EG}$

17. SPORTS The figure shows the position of three trees on one part of a Frisbee™ course. At which tree position is the angle between the trees the greatest?



NAME _____ DATE _____ PERIOD ____

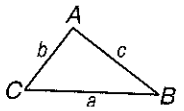
5-4

Study Guide and Intervention

The Triangle Inequality

The Triangle Inequality If you take three straws of lengths 8 inches, 5 inches, and 1 inch and try to make a triangle with them, you will find that it is not possible. This illustrates the Triangle Inequality Theorem.

Triangle Inequality Theorem	The sum of the lengths of any two sides of a triangle is greater than the length of the third side.



Example **The measures of two sides of a triangle are 5 and 8. Find a range for the length of the third side.**

By the Triangle Inequality, all three of the following inequalities must be true.

$5 + x > 8$ $\quad 8 + x > 5$ $\quad 5 + 8 > x$

$x > 3$ $\quad x > -3$ $\quad 13 > x$

Therefore x must be between 3 and 13.

Exercises

Determine whether the given measures can be the lengths of the sides of a triangle. Write *yes* or *no*.

1. 3, 4, 6

2. 6, 9, 15

3. 8, 8, 8

4. 2, 4, 5

5. 4, 8, 16

6. 1.5, 2.5, 3

Find the range for the measure of the third side given the measures of two sides.

7. 1 and 6

8. 12 and 18

9. 1.5 and 5.5

10. 82 and 8

11. Suppose you have three different positive numbers arranged in order from least to greatest. What single comparison will let you see if the numbers can be the lengths of the sides of a triangle?

Lesson 5-4