Objectives:
• Students will use inequalities for segments and angles.

Comparison Property Postulate: Given any two real numbers, \(a\) and \(b\), one of three statements is true about the two numbers.

\[ a < b, \quad a = b, \quad a > b \]

Segments can be compared by the same reasoning.

\[ AB < CD, \quad = CD, \quad \text{or} \quad > CD \]

\[ m\angle X < m\angle Z, \quad = m\angle Z, \quad \text{or} \quad > m\angle Z \]
Objectives:
• Students will use inequalities for segments and angles.

Theorem 7-1: If points A, B, and C are collinear, and point C is between points A and B, then $AB > AC$ and $AB > CB$

Theorem 7-2: If EP is between ED and EF, then $m\angle DEF > m\angle DEP$ and $m\angle DEF > m\angle PEF$
### Geometry

**Chapter 7.1 Segments, Angles, and Inequalities**

**Objectives:**
- Students will use inequalities for segments and angles.

<table>
<thead>
<tr>
<th>Property</th>
<th>For any numbers a, b, and c</th>
<th>Example</th>
</tr>
</thead>
</table>
| Transitive Property               | 1. if $a < b$ and $b < c$, then $a < c$
                              | 2. if $a > b$ and $b > c$, then $a > c$ | 6, 7, and 10    |
|                                  |                             | 9, 5, and 3      |
| Addition and Subtraction Property | 1. if $a < b$, then $a + c < b + c$ and $a - c < b - c$
                              | 2. if $a > b$, then $a + c > b + c$ and $a - c > b - c$ | 1. $1 < 3$
                                              | 1 + $8 < 3 + 8$
                              | 1 - $8 < 3 - 8$

|                                  |                             | 2. Write an example |
| Multiplication and Division Property | 1. if $c > 0$ and $a < b$, then $ac < bc$ and $\frac{a}{c} < \frac{b}{c}$
                                           | 2. if $c > 0$ and $a > b$, then $ac > bc$ and $\frac{a}{c} > \frac{b}{c}$ | 1. $8 < 10$
                                              | $8 \cdot 2 < 10 \cdot 2$
                              | $\frac{8}{2} < \frac{10}{2}$

|                                  |                             | 2. Write an example |

**Bookwork:** page 280; problems 12-33
Chapter 7.2 Exterior Angle Theorem

Objectives:
• Students will identify exterior angles and remote interior angles.

In \( \triangle PQR \), \( \angle' \)'s 1, 2, and 3 are the interior angles.

What is \( \angle 4 \) called? **Exterior angle**

An exterior angle forms a linear pair with one of the interior angles of the triangle.

\( \angle' \)'s 1 and 2 are the **remote interior angles** of the triangle with respect to \( \angle 4 \).

Remote means to be away from, correct?
So remote interior angles must be inside the triangle and away from the angle we are referring to.

How many exterior angles does a triangle have? **six**
Objectives:
- Students will identify exterior angles and remote interior angles.

In $\triangle PQR$, $\angle 1, 2, 3$, and $\angle 4$ are the interior angles and $\angle 4$ is an exterior angle.

$m\angle 1 + m\angle 2 + m\angle 3 = 180^\circ$

$m\angle 3 + m\angle 4 = 180^\circ$

What is true about $m\angle 1$ and $m\angle 2$ and $m\angle 4$?

$m\angle 1 + m\angle 2 = m\angle 4$

The Exterior Angle Theorem: the measure of an exterior angle of a triangle is equal to the sum of the measures of its two remote interior angles.
Objectives:
- Students will identify exterior angles and remote interior angles.

Exterior Angle Inequality Theorem: the measure of an exterior angle of a triangle is greater than the measure of either of its two remote interior angles.

If $m\angle 4 = m\angle 1 + m\angle 2$, then ...

$m\angle 4 > m\angle 1$, and..

$m\angle 4 > m\angle 2$

Theorem 7-5: If a triangle has one right angle, then the other two angles must be acute.

Bookwork: page 286; problems 9-25
Objectives:
• Students will identify relationships between the angles and sides of triangles.

If we take two congruent segments and form two non-congruent angles...

then connect the endpoints of these angles, which angle would have the longest opposite side?

Does it stand to reason then, that a small angle has a short opposite side; and a long side would have a large opposite angle?
Objectives:

• Students will identify relationships between the angles and sides of triangles.

**Theorem 7-6:** if the lengths of three sides of a triangle are unequal, then the measures of the opposite angles are unequal in the same order of size.

\[
\text{if } MN < LM < LN \\
\text{then } m\angle L < m\angle N < m\angle M
\]

The converse is also true...

**Theorem 7-7:** if the measures of the angles of a triangle are unequal, then the measures of the opposite sides are unequal in the same order of size.

**Theorem 7-8:** in a right angle, the hypotenuse is the side with the greatest measure.

Bookwork: page 293; problems 9-25
Geometry

Chapter 7.4 Triangle Inequality Theorem

Objectives:
• Students will determine if all side lengths make a triangle.

Given side lengths of 2, 5, and 8, can a triangle be constructed?

No, because the two shorter sides are not longer than the longest side.
Objectives:
• Students will determine if all side lengths make a triangle.

Triangle Inequality Theorem: the sum of the measures of any two sides of a triangle must be greater than the third side.

Is there a greatest or least measure a third side can be to construct the triangle?

We know $b < a + c$

however, $b > c - a$, and $b > a - c$

Whichever difference is the least

Bookwork: page 299; problems 9-23