FOM 11

2.3 Angle Properties In Triangles

The sum of the angles in a triangle is 180°.

We can use our knowledge of parallel lines to prove (deductively) this theorem.

**Example 1:** Given \( \triangle ABC \), prove \( \angle 1 + \angle 2 + \angle 3 = 180° \).

\[
\angle 1 = \angle 4 \quad \text{alt. int. } \angle' s \\
\angle 2 = \angle 5 \quad \text{alt. int. } \angle' s \\
\angle 3 + \angle 4 + \angle 5 = 180° \quad \angle' s \text{ on line} \\
\angle 3 + \angle 1 + \angle 2 = 180° \quad \text{substitution}
\]

**Example 2:** Determine the measures of \( \angle 1 \) and \( \angle 2 \).

\[
\angle 1 = 70° \quad \text{sum } \triangle \\
\angle 2 = 70° \quad \text{vert opp } \angle' s
\]
The measure of an exterior angle of a triangle is equal to the sum of the measures of the two non-adjacent interior angles.

Example 3: Prove $\angle e = \angle a + \angle b$.

\[ \angle e + \angle c = 180^\circ \quad \angle s \text{ on line} \]
\[ \angle a + \angle b + \angle c = 180^\circ \quad \angle \text{sum } \triangle \]
\[ \angle e = 180^\circ - \angle c \quad \angle a + \angle b = 180^\circ - \angle c \]
\[ \angle e = \angle a + \angle b \]

Example 4: Determine $\angle 1$, $\angle 2$, $\angle 3$, and $\angle 4$.

Example 5: Given $AB \parallel CD$ and $\angle 1 = \angle 4$
Prove $\angle 1 = \angle 2$

Assignment: pg. 90 #2, 3, 5-9, 12, 15, 16, 18

<table>
<thead>
<tr>
<th>Statement</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>$AB \parallel CD$</td>
<td>Given</td>
</tr>
<tr>
<td>$\angle 2 = \angle 4$</td>
<td>corresponding $\angle$'s</td>
</tr>
<tr>
<td>$\angle 1 = \angle 4$</td>
<td>Given</td>
</tr>
<tr>
<td>$\angle 2 = \angle 1$</td>
<td>both $= \angle 4$</td>
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