

Lesson 4-5

Problem

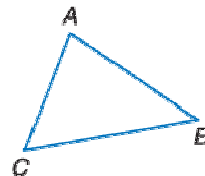
Prove the following statement.

If a figure is a triangle, then it cannot have two obtuse angles.

Solution

Begin by drawing a representative triangle, such as $\triangle ABC$ at the right.

Step 1: Assume that the conclusion is false. That is, assume that a triangle can have two obtuse angles. In particular, in $\triangle ABC$, assume $\angle A$ and $\angle B$ are obtuse angles.



Step 2: Reason logically from the assumption, as follows. By the definition of an obtuse angle, $90^\circ < m\angle A < 180^\circ$ and $90^\circ < m\angle B < 180^\circ$. Choose an angle measure x° such that $90^\circ < x < 180^\circ$. If $x^\circ = 91^\circ$, then $m\angle A + m\angle B = 91^\circ + 91^\circ = 182^\circ$. By the triangle-sum theorem, $m\angle A + m\angle B + m\angle C = 180^\circ$.

Step 3: Note that the statement $m\angle A + m\angle B = 91^\circ + 91^\circ = 182^\circ$ has the sum of the two angles already greater than the sum of all three angles in a triangle. Therefore, the assumption that a triangle can have two obtuse triangles is false. The given statement must be true.