Name: ___________________________

Date: ___________________________

Period: _________________________

Geometry Lesson 48

Objective: TSW use indirect proofs.

Direct reasoning - The process of reasoning that begins with a true hypothesis and builds a logical argument to show that a conclusion is true.

___________________________ Proof - A proof in which the statement to be proved is assumed to be false and a contradiction is shown.

Proof by ____ – Another name for an indirect proof.

Follow these three steps to write an indirect proof.

1. Assume the conclusion is _______________.
2. Show that the assumption you made is contradicted by a theorem, a postulate, a definition, or the given information.
3. State that the assumption must be __________________, so the conclusion must be ___________________.

Example 1 Writing an Indirect Proof

Prove Theorem 4-1: If two lines intersect, then they intersect at exactly one point.

SOLUTION

In an indirect proof, it is often helpful to draw a diagram, just as you would for a 2-column, paragraph, or flowchart proof. A diagram is helpful in determining what assumptions should be made to prove the statement, and in finding the postulate, theorem, or definition that contradicts the assumption.

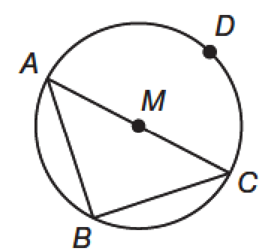
Example 2 Writing an Indirect Proof

Use the diagram to prove Theorem 47-2: If an inscribed angle intercepts a semicircle, then it is a right angle.

Given: $\overline{AC}$ is a diameter of $\odot M$.

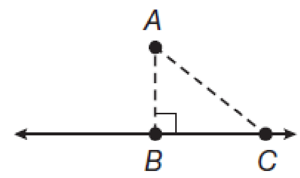
Prove: $m\angle ABC \neq 90^\circ$

SOLUTION



Example 3 Writing an Indirect Proof

Use the diagram to prove Theorem 42-1: The perpendicular segment from a point to a line is the shortest segment from the point to the line.



Given: $\overline{AB} \perp \overleftrightarrow{BC}$

Prove: $\overline{AB}$ is the shortest segment from *A* to $\overleftrightarrow{BC}$.

SOLUTION

You Try!!!!!!

a. State the assumption you would make to start an indirect proof to show that m∠*X* = m∠*Y*.

b. State the assumption you would make to start an indirect proof to show that $\overleftrightarrow{AB} \perp \overleftrightarrow{CB}$.

c. An isosceles triangle has at least two congruent sides. To prove this statement indirectly, assume an isosceles triangle does not have at least two congruent sides. What case needs to be explored to find a contradiction?

d. Use an indirect proof to prove that a triangle can have at most one right angle.

e. Use an indirect proof to show that $\angle 4 \cong \angle 6$, if $m \parallel n$.