Geometry

5.6 Inequalities in Two Triangles and Indirect Proof

## Hinge Theorem

larger

included

2 sides

2 sides

If \_\_\_\_\_\_\_\_\_ of one Δ are congruent to \_\_\_\_\_\_\_\_\_\_\_\_ of another Δ, and the \_\_\_\_\_\_\_\_\_\_\_\_\_ angle of the 1st Δ is \_\_\_\_\_\_\_\_\_\_\_\_\_ than the \_\_\_\_\_\_\_\_\_\_\_\_ angle of the 2nd Δ, then the \_\_\_\_\_\_\_\_\_\_\_\_ of the 1st Δ is \_\_\_\_\_\_\_\_\_\_\_\_ than the \_\_\_\_\_\_\_\_\_\_ of the 2nd Δ.

3rd side

longer

3rd side

included

60°

15

40°

10

## Converse of the Hinge Theorem

longer

3rd side

2 sides

2 sides

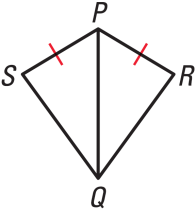
If \_\_\_\_\_\_\_\_\_\_ of one Δ are congruent to \_\_\_\_\_\_\_\_\_\_\_\_\_ of another Δ, and the \_\_\_\_\_\_\_\_\_\_\_ of the first is \_\_\_\_\_\_\_\_\_\_\_\_ than the \_\_\_\_\_\_\_\_\_\_\_ of the 2nd Δ, then the \_\_\_\_\_\_\_\_\_\_\_\_ angle of the 1st Δ is \_\_\_\_\_\_\_\_\_ than the \_\_\_\_\_\_\_\_\_\_\_\_\_ angle of the 2nd Δ.

included

larger

included

3rd side

If PR = PS and mQPR > mQPS, which is longer, or ?

If PR = PS and RQ < SQ, which is larger, mRPQ or mSPQ?

# Indirect Reasoning

* Let’s assume Mack is guilty of stealing my calculator yesterday.
* Another student points out that Mack was sick and at home yesterday.
* Since Mack had to be here to steal the calculator, my assumption is wrong and Mack did not steal the calculator.

You can use the same type of logic to prove geometric things.

## Indirect Proof

contradiction

assumption

assumption

* Proving things by making an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and showing that the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ leads to a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

possibilities

eliminating

* Essentially it is proof by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ all the other \_\_\_\_\_\_\_\_\_\_\_\_\_\_.

## Steps for writing indirect proofs

false

conclusion

prove

Identify

1. \_\_\_\_\_\_\_\_\_\_ what you are trying to \_\_\_\_\_\_\_\_\_\_. Temporarily, assume the \_\_\_\_\_\_\_\_\_\_\_\_\_ is \_\_\_\_\_\_\_\_ and that the \_\_\_\_\_\_\_\_\_\_\_\_\_ is \_\_\_\_\_\_\_.

fact

hypothesis

contradiction

true

opposite

1. Show that this leads to a \_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ or some other \_\_\_\_\_\_\_\_\_.

true

conclusion

false

assumption

1. Point out that the \_\_\_\_\_\_\_\_\_\_\_\_\_ must be \_\_\_\_\_\_\_\_\_, so the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ must be \_\_\_\_\_\_\_.

Prove that through a point not on a line, there is only one line perpendicular to the line.

P

M

N

1. We want to show that only one line is to . So, assume that lines PM and PN to .
2. PMN and PNM are rt s by definition of lines
3. The angles of a triangle should add to be 180 degrees, but this triangle adds to more. This is a contradiction, so our assumption is false. And there is only one line perpendicular to the line through point P.

Suppose you wanted to prove the statement “If x + y ≠ 14 and y = 5, then x ≠ 9.” What temporary assumption could you make to prove the conclusion indirectly?

Assume x = 9

How does that assumption lead to a contradiction?

If x = 9, then x + y ≠ 14. 9 + 5 ≠ 14 🡪 14 ≠ 14. This is the contradiction

Assignment: 338 #4-18 even, 22-34 even = 15 total

Extra Credit: 341 #2, 4 = +2