# Inequalities Within Triangles

### Section 6-4 & 6-5

### Introduction

 What is meant by inequalities is that we are going to study what will make parts of a triangle different from each other.

 That means we are going to be using inequalities like < and >.

## **Topics of Discussion** Inequalities within one triangle – Angles and sides - The Triangle Inequality Inequalities within two triangles SAS inequality SSS inequality

### Theorem 6-2

If one side of a triangle is longer than a second side, then the angle opposite the first side is larger than the angle opposite the second side.

# The bigger the side, the bigger the opposite angle.

Since this side is bigger 12 cm 10 cm 5 maller 5 maller Then its opp. angle is bigger

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# <sup>Pg 221 (1-3)</sup> Example 1

# From the illustration below, which angle is bigger, <1 or <2?

45 in

Answer: <1 is bigger Because it is across from a bigger side.

2

48 in

### Theorem 6-3

### Converse of Theorem 6-2 The bigger the angle, the bigger the opposite side.

smaller

48°

bigger

Since this angle is bigger

Then its opp. side is bigger

70°

# Pg 221 (4-6) Example 2

# From the illustration below, which side is bigger, AB or CB?

A 42°

41°/

#### Answer: BC is bigger Because it is across from a bigger angle.

## Corollary 1 & 2

C1 – The shortest segment from a point to a line will be a perpendicular segment.
Shortbist Offstance from this point or this one Not this segment

To this line

C2 – The same thing will be true of the distance between a point and a plane.

# Pg 221 (7-12) Theorem 6-4

The sum of the length of any two sides of a triangle is greater than the length of the third side.

Any two sides will have more length than the leftover side.

AC + AB > BC B If the third side was bigger...

The triangle would not be complete.

## Example

32<sup>°</sup>

42°,

# Find the longest and shortest segment in this figure.

40

60°

Section 6-5 Inequalities For Two Triangles Theorem 6-5 – SAS Inequality Thm If two sides of one triangle are congruent to two sides of another triangle, but the included angle of the first triangle is larger than the included angle of the second, then the third side of the first triangle is longer than the third side of the second triangle

## Example

Since the second triangle has a bigger included angle, it will have a larger third side.

86°

smaller

⁄32°

larger

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### **SSS Inequality**

If two sides of one triangle are congruent to two sides of another triangle, but the third side of the first triangle is longer than the third side of the second, then the included angle of the first triangle is larger.

# Example



# Complete...

#### Homework: Pg 222 (1-13, & 15) Pg 230 (1-7)



#### What can you conclude?

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DC < OC