# Lesson 6.4 and 6.6 Triangle Inequalities

Monday, February 13, 2023    9:00 PM

Click Link Below for Interactive Pear Deck Powerpoint

pdf
Lesson 6.4
and 6.6

# Lesson 6.4 Inequalities in One Triangle
# and
# Lesson 6.6 The Triangle Inequality

Mc Graw Hill

## Florida's B.E.S.T. Standards for Mathematics

**MA.912.GR.1.3** Prove relationships and theorems about triangles. Solve mathematical and real-world problems involving postulates, relationships and theorems of triangles.

**Content Objective**
Students solve problems using inequalities in the angles and sides of a triangle.

**Content Objective**

Students prove and apply the Triangle Inequality Theorem.

**Click the link below to complete the Geogebra Investigation.**

**Let's prove theorems about sides of triangles.**

**Then add the activity to your Geogebra Page.**

Students browse: https://www.geogebra.org/m/JT5UmZ8w

Pear Deck Interactive Slide
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**Click the link below to complete the Geogebra Investigation.**

**Let's prove theorems about angles compared to sides of triangles.**

**Then add the activity to your Geogebra Page.**

Students browse: https://www.geogebra.org/classic?lang=en

Pear Deck Interactive Slide
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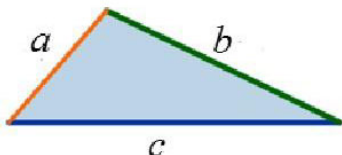
## Learn
The Triangle Inequality

## Triangle Inequality Theorem

The sum of the lengths of any two sides of a triangle must be greater than the length of the third side.

### Triangle Inequality Theorem

*The sum of the lengths of any two sides of a triangle is greater than the length of the third side.*
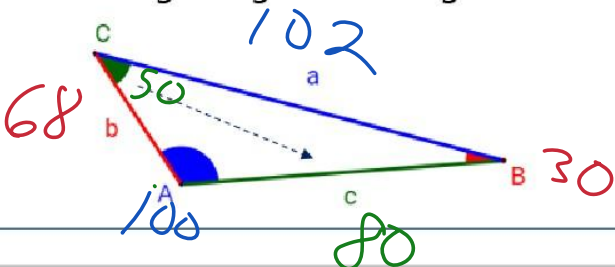
$$a + b > c$$
$$a + c > b$$
$$b + c > a$$

## Learn
## Angle-Side Inequalities in One Triangle

If one side of a triangle is longer than another side, then the angle opposite the longer side has a greater measure than the angle opposite the shorter side.

### Angle-Side Relationship Theorem

*In a triangle, the side opposite the larger angle is the longer side.*

102

68  50

100  80  B 30

If one angle of a triangle has a greater measure than another angle, then the side opposite the angle with the greater measure is longer than the side opposite the angle with the lesser measure.

$\overline{AB} = 12.13$ is opposite $\angle C$

A

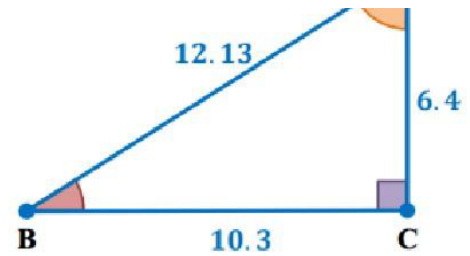$BC = 10.3$ is opposite $\angle A$

$\overline{AC} = 6.4$ is opposite $\angle B$

$\overline{AB} < \overline{BC} < \overline{AC}$
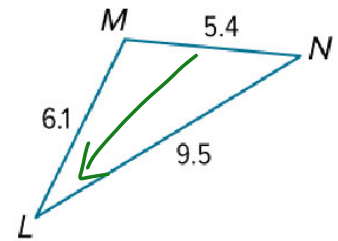
$m\angle B < m\angle A < m\angle B$



12.13

6.4

B   10.3   C

## Example 2
Order Triangle Angle Measures

**List the angles of △LMN in order from smallest to largest.**
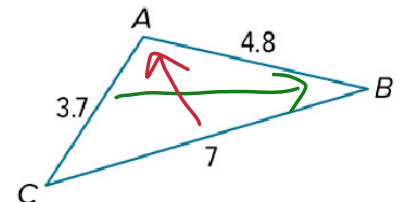
$\angle L, \angle N, \angle M$



M   5.4   N

6.1

9.5

L

## Example 2
Order Triangle Angle Measures

**Check**

List the angles of △ABC in order from smallest to largest.
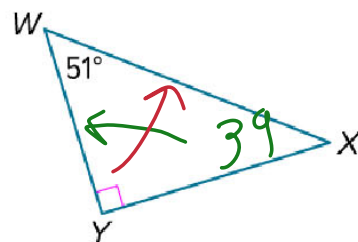
$\angle B, \angle C, \angle A$



A   4.8   B

3.7

7

C

## Example 3
Order Triangle Side Lengths

**List the sides of △WXY in order from shortest to longest.**
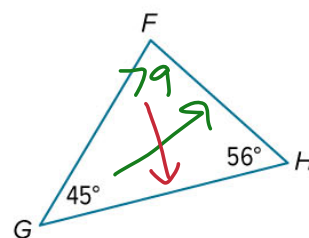
$$\overline{WY}, \overline{XY}, \overline{WX}$$

51°

39

W

X

Y

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## Example 3
Order Triangle Side Lengths

**Check**

List the sides of △FGH in order from shortest to longest.

$$\overline{FH}, \overline{FG}, \overline{GH}$$
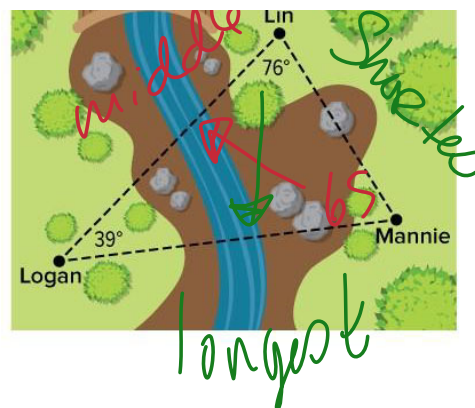
F

79

45°

56°  H

G

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## Example 4
Use Angle-Side Relationships

**PAINTBALL** During a game of

paintball, opposing teams try to eliminate players on the opposite team. Mannie and Lin are on the same team and want to eliminate Logan from the game. If Mannie, Lin, and Logan are located at the positions shown on the diagram, who is closer to Logan? Explain your reasoning.
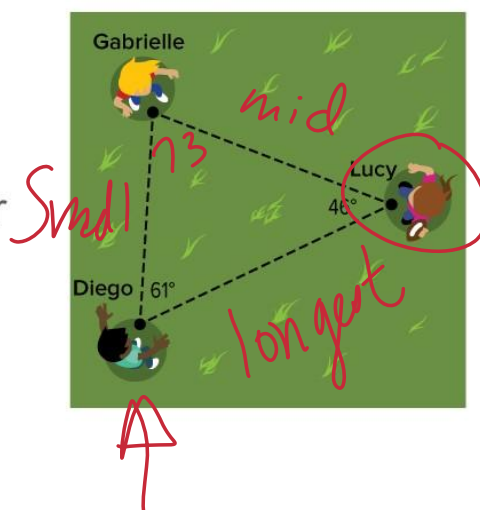
*Handwritten annotations on diagram: "middle", "Shorter", "65", "longest", angles 76°, 39°, labels Lin, Mannie, Logan*

# Example 4
## Use Angle-Side Relationships

**Check**

**SPORTS** Gabrielle, Diego, and Lucy are passing a football. Lucy wants to practice throwing the ball long distances. Which player should she throw the ball to next if she wants to pass the football the farthest distance?

*Handwritten: "Diego"*

*Handwritten annotations on diagram: "mid", "Smol", "longest", "A", angles 73, 46°, 61°, labels Gabrielle, Lucy, Diego*

# Example 1
## Identify Possible Triangles Given Side Lengths

**Is it possible to form a triangle with the given side lengths? If not, explain why not.**

a. 9 cm, 12 cm, 18 cm

b. 3 in., 5 in., 8 in.

*Handwritten: "Yes" (for a), "NO" (for b), triangle diagrams with 9, 18, 12 and 3, 8, 5; "3+8", "8."*

# Example 1
## Identify Possible Triangles Given Side Lengths

## Check

Is it possible to form a triangle with the given side lengths? If not, explain why not.

*yes*

**a.** 2 mm, 5 mm, 6 mm

*NO*

**b.** 3 yd, 4 yd, 8 yd

$3 + 4 = 7 \not> 8$