

Lesson 3.04 Triangle Inequality & Angle Sum Theorem

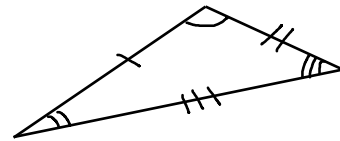
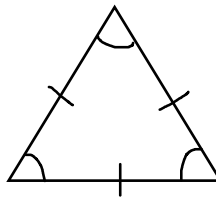
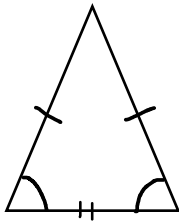
Students will be able to:

- Content Objective: Prove & apply the triangle inequality and angle sum theorem.
- Language Objective: Talk through the process of solving for an angle using the exterior angle theorem.



Warm Up

Identify each type of triangle shown below.





Investigate

You will need the following materials:

- Uncooked spaghetti or pieces of paper
- Ruler

Directions: Break a piece of spaghetti into 3 pieces and try to form a triangle. Measure each piece in centimeters and record the results in the first row of the table below. We will fill in the rest of the table with the results of ten other students in the class.

Piece 1 (cm)	Piece 2 (cm)	Piece 3 (cm)	Triangle? Yes or No

- a. Did all combinations of lengths form a triangle? If not, what observations can we make about the lengths that did form a triangle versus the lengths that did not form a triangle?
- b. What conditions are necessary for the three lengths to form a triangle?
- c. What condition resulted in three lengths not able to form a triangle?

Triangle Inequality Theorem

The sum of the lengths of any two sides of a triangle is _____ than the remaining side.


Skill 1: Sides of a Triangle

Use the triangle inequality to determine if it is possible to form a triangle using segments with the following measurements.

$8\text{ cm}, 9.2\text{ cm}, \text{ cm}$


Exercise 1: Sides of a Triangle

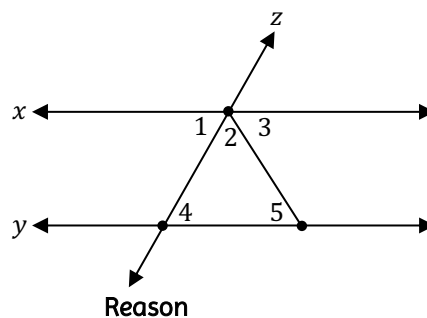
Use the triangle inequality to determine if it is possible to form a triangle using segments with the following measurements.

$8\text{ in}, 4.3\text{ in}, 12.4\text{ in}$


Investigate

Given: The diagram with parallel lines x and y with transversal z .

Prove: $m\angle 2 + m\angle 4 + m\angle 5 = 180^\circ$



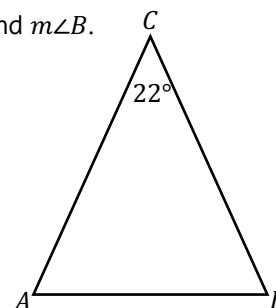
Statement

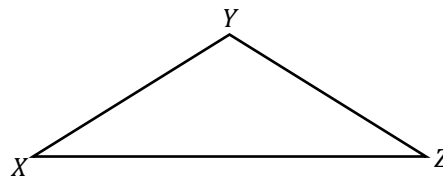
Reason

Angle Sum Theorem

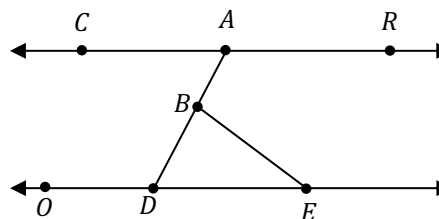
The interior angles of a triangle sum to _____ degrees.


Skill 2: Angles in a Triangle

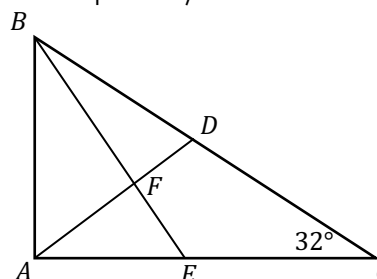
 Shown below is isosceles triangle ABC with base angles $\angle A$ and $\angle B$. Find $m\angle A$ and $m\angle B$.

Exercise 2: Angles in a Triangle

 Given isosceles triangle XYZ with legs \overline{XY} and \overline{ZY} , find $m\angle Y$ when $m\angle Z = 25^\circ$. Show all work that leads to your answer.

Talk it Out

 In the diagram below, $\overline{CAR} \parallel \overline{ODE}$, and \overline{ABD} and \overline{BE} are drawn.

 If $m\angle CAB = 38^\circ$ and $m\angle OEB = 18^\circ$, what is $m\angle ABE$? Show all work that leads to your answer. Diagram is not drawn to scale.

Check Point

 In the diagram below of triangle ABC , $\angle A$ and $\angle B$ are bisected by \overline{AD} and \overline{BE} respectively. \overline{AD} and \overline{BE} intersect at point F , and $m\angle C = 32^\circ$.

 If $m\angle FAE = 40^\circ$, find $m\angle BFD$. Show all work that leads to your answer.




3.04- Problem Set

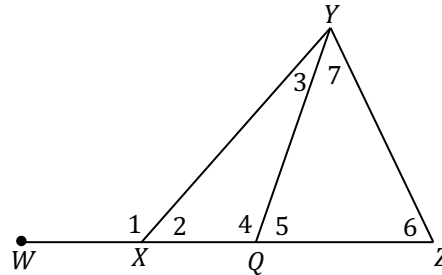
Name: _____

- Determine whether the sides lengths could represent a triangle.
 - 5 in, 6 in and 0.5 in
 - 3.2cm, 2.1cm, and 1.2cm
 - 12 cm, 6cm, and 6cm

- Determine whether the angle measures could represent a triangle.
 - 30°, 71°, and 178°
 - 112°, 54°, and 14°
 - 13°, 166°, and 1°

- The triangle below shows $\triangle XYZ$, where \overline{ZX} is extended through point X to point W , and \overline{YQ} is drawn to \overline{XZ} . Which equation is not always true?

- $m\angle 2 + m\angle 3 + m\angle 4 = 180^\circ$
- $m\angle 1 + m\angle 2 = m\angle 4 + m\angle 5$
- $m\angle 2 + m\angle 3 + m\angle 7 + m\angle 6 = 180^\circ$
- $m\angle 4 + m\angle 5 = m\angle 3 + m\angle 7$



- The measures of the angles of a triangle are in the ratio 3: 4: 5. Determine the measure, in degrees, of the *largest* angle of the triangle.