NAME____________________________________

Module 9 **Characteristics of Geometric Shapes**
Lesson 5 **Inductive and Deductive Reasoning**

Lesson Notes 9.5

Lesson Objectives

- Define and apply deductive reasoning to solve problems involving geometric relationships.
- Define and apply inductive reasoning to solve problems involving number patterns and geometric relationships.

Subtopic 1 Inductive Reasoning

Inductive Reasoning

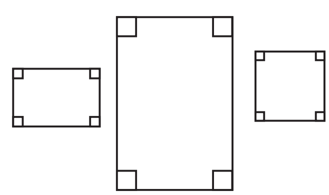
- Look at **examples**.
- Discover a **pattern**.
- Form a conjecture.

A conjecture is an **unproven** statement based on observations.

A diagonal is a **line segment** that joins two non-adjacent vertices of a polygon.

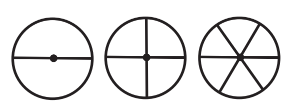
A counterexample is an example that shows that a conjecture is **false**.

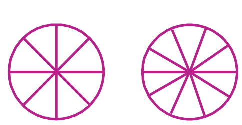
1 A student looks at the three quadrilaterals shown and conjectures that all quadrilaterals have four right angles. Determine if this statement is true or false. If false, give a counterexample.



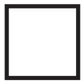
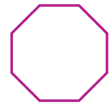
False

2 Draw the next two terms of the sequence.





3 Find the next two terms in the pattern.

Triangle,  , Pentagon,  , Heptagon, 

Subtopic 2 Deductive Reasoning

Deductive Reasoning

A logical process of drawing **conclusions** from given facts.

4 Use deductive reasoning to prove that all equilateral triangles are acute triangles.

- **Equilateral triangles are equiangular triangles.**
- **The three angles of an equiangular triangle measure 60°.**
- **All three angles are acute.**
- **A triangle with three acute angles is an acute triangle.**

Therefore, all equilateral triangles are acute.

5 Determine if the argument is an example of inductive or deductive reasoning and determine its validity.

Shawn is shown ten circles with chords.
None of the chords passes through the center of a circle.
He determines that a chord cannot pass through the center of a circle.

Inductive reasoning: Not valid
Counterexample: A diameter is a chord that passes through the center of a circle.

6 Determine if this reasoning is valid.

Every obtuse triangle has two acute angles.
Since $\triangle ABC$ has two acute angles, it must be an obtuse triangle.

Not valid: Counterexample: