Name KEY Date _____ Period _____

Deductive Reasoning

Lesson Objective

USE DEDUCTIVE REASONING AND LAWS OF LOGIC TO MAKE CONCLUSIONS FROM GIVEN INFORMATION.

Deductive Reasoning: uses facts, definitions, accepted properties, and the laws of logic to form a logical argument. This is different from *inductive reasoning*, which uses specific examples and patterns to form a conjecture.

Law of Detachment: If the HYPOTHESIS of a conditional statement is true, then the CONCLUSION is also true.

Example:

1. If two segments have the same length, then they are congruent. You know that BC = XY. Using the Law of Detachment, what statement can you make?

   $\overline{BC} \cong \overline{XY}$

2. If a figure is a square, then it is a rectangle. You know that quadrilateral ABCD is a square. Using the Law of Detachment, what statement can you make?

   ABCD IS A RECTANGLE.

Law of Syllogism: If hypothesis p, then conclusion q. ← IF THESE ARE TRUE

If hypothesis q, then conclusion r ←

If hypothesis p, then conclusion r. ← THEN THIS IS TRUE

Example: If possible, use the Law of Syllogism to write a new conditional statement that follows from the pair of statements.

3. If $x^2 > 25$ then $x^2 > 20$

   If $x > 5$, then $x^2 > 25$

   IF $x > 5$, THEN $x^2 > 20$.

4. If a polygon is regular, then all angles in the interior of the polygon are congruent.
   If a polygon is regular, then all its sides are congruent.

   THE FIRST STATEMENT'S CONCLUSION IS NOT THE SAME AS THE SECOND STATEMENT'S HYPOTHESIS, SO WE CANNOT USE THE LAW OF SYLLOGISM.

Using Inductive and Deductive Reasoning

Example:

5. What conclusion can you make about the product of an even integer and any other integer?

Inductive:

Deductive:

SKIP

Comparing Inductive and Deductive Reasoning

Example: Decide whether inductive reasoning or deductive reasoning is used to reach the conclusion. Explain your reasoning.

6. Each time Monica kicks a ball up in the air, it returns to the ground. So, the next time Monica kicks a ball up in the air, it will return to the ground.

INDUCTIVE! USES PATTERNS/SPECIFIC CASES OF MONICA KICKING THE BALL TO MAKE A CONJECTURE.

7. All reptiles are cold-blooded. Parrots are not cold-blooded. Sue's pet parrot is not a reptile.

DEDUCTIVE! USES FACTS TO MAKE A CONJECTURE.

8. All multiples of 8 are divisible by 4. 64 is a multiple of 8. So, 64 is divisible by 4.

DEDUCTIVE! USES LAW OF DETACHMENT.