

Deductive Reasoning

Lesson Objective

INBAT 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.

↑ "matches"

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?

Quad. ABCD is a rectangle.

Law of Syllogism: If hypothesis p , then conclusion q .

If hypothesis q , then conclusion r .

If hypothesis p , then conclusion r .

↗ If these are true...

⚡ 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 $x^2 > 25$

~~hypothesis~~ conclusion of 2nd is hypothesis of 1st. order does not matter!

So, 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.

no conclusion is same as other's hypothesis.

So. cannot use Law of Syllogism. to say anything

Comparing Inductive and Deductive Reasoning

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

5. 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! you observe pattern of
ball $\uparrow$ then $\downarrow$ to make
your conclusion

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

$\nwarrow$ facts $\nearrow$

Deductive! use facts to make
conclusion

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

Deductive! Law of Detachment