

Section 3.6 Inductive and Deductive Reasoning

INDUCTIVE REASONING uses patterns, examples, or observations to make a conjecture. Conclusion and can be true or false.

DEDUCTIVE REASONING uses facts, rules, definitions, or properties to reach logical conclusions. Conclusion must be true if hypotheses are true.

Examples

Determine if the following statements uses inductive or deductive reasoning.

1. If you don't pay your credit card bill, you get a late fee of \$50. **DEDUCTIVE REASONING**
2. A chemistry experiment produces the same result 20 times. You conclude that it will always produce the same result. **INDUCTIVE REASONING**
3. Students at Troy High School must have a B average in order to participate in sports. Olivia has a B average, so she concludes that she can participate in sports at school. **DEDUCTIVE REASONING**
4. Every Valentine's Day, Mrs. Lee gets mad because she tells Mr. Lee that he doesn't have to get her a gift, but really she wants a gift and is just playing stupid girl mind games. Today is Valentine's Day and Mrs. Lee is now fuming mad. **INDUCTIVE REASONING**
5. Mrs. Lee is cousins with Shrek's wife, Fiona (ogre version). **DEDUCTIVE REASONING**

Laws of Logic

LAW OF DETACHMENT

If the hypothesis of a true if – then statement is true, then the conclusion is true (writing just the conclusion).

Law of Detachment
Statement 1: $p \rightarrow q$
Statement 2: p
Statement 3: q

Examples

Using the Law of Detachment, write what you can conclude from the following true statements.

6. If you are late for class, then you are tardy.
You are late for class.

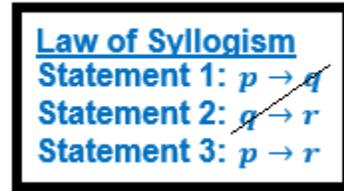
Conclusion: **You are tardy.**
7. If $x = 7$, then $2x - 3$ has a value of 11.
 $x = 7$.

Conclusion: **$2x - 3$ has a value of 11.**
8. If you speed while driving, then you will get a ticket.
You speed while driving.

Conclusion: **You will get a ticket.**

LAW OF SYLLOGISM (Transitive Property)

If statement P , then statement Q .
If statement Q , then statement R .
Therefore, if statement P , then statement R .



Examples

Using the Law of Syllogism, write the statement that follows from the pair of true statement.

9. If a ball is thrown at the window (P), then it will hit the window (Q).
If the ball hits the window (Q), then the window will break (R).

Solution: **If a ball is thrown at the window, then the window will break.**

10. If Mr. Lee has a wife, then Mr. Lee is married.
If Mr. Lee is married, then he is miserable.

Solution: **If Mr. Lee has a wife, then he is miserable.**

11. Create your own example.

Determine if the statements follows from statements of Law of Detachment or Law of Syllogism. If it does, state which law was used. If it does not , write invalid.

12. If you are a student, then you have lots of homework.
If you have lots of homework, then you have no social life.
If you are a student, then you have no social life. **Law of Syllogism**
13. If the lines are perpendicular, then they intersect to form a right angle.
Line l is perpendicular to line m .
Lines l and m intersect to form a right angle. **Law of Detachment**
14. Vertical angles are congruent.
 $\angle A \cong \angle B$.
 $\angle A$ and $\angle B$ are vertical angles. **Invalid**
15. If the quadrilateral is a square, then it has four right angles.
Quadrilateral $ABCD$ has four right angles.
Quadrilateral $ABCD$ is a square. **Invalid**
16. If you practice the clarinet, then you will improve.
Kevin practices his clarinet.
Kevin's clarinet playing improves. **Law of Detachment**
17. If $m\angle 2 \neq 40^\circ$, then $m\angle 3 \neq 140^\circ$.
If $m\angle 3 \neq 140^\circ$, then $m\angle 4 \neq 40^\circ$.
If $m\angle 2 \neq 40^\circ$, then $m\angle 4 \neq 40^\circ$. **Law of Syllogism**