Inductive Reasoning

- Inductive reasoning begins with a series of specific facts or data (evidence) and moves to a general statement or conclusion based on the evidence.

- In inductive reasoning, the specific facts or evidence can never absolutely prove that the conclusion is true. However, the facts/evidence can support the conclusion.
  - Strong evidence = a conclusion that is sound.
  - Weak evidence = a conclusion that is questionable or perhaps inaccurate.

- To evaluate the soundness of an inductive argument, identify both the evidence and the conclusion.
  - Signal words for evidence: since, because, as shown by
  - Signal words for conclusion: therefore, consequently, in conclusion, as a result

Inductive Reasoning Example #1

Suppose you took a photograph indoors without a flash on three different occasions. When you looked at the pictures, you discovered that no pictures resulted from these shots.

Evidence:
- Photo A taken indoors without a flash did not come out.
- Photo B taken indoors without a flash did not come out.
- Photo C taken indoors without a flash did not come out.

You could continue to take photos indoors without a flash indefinitely, or you could form a conclusion based on the evidence you have collected.

**Conclusion:** Photos taken indoors without a flash will not come out. (The evidence does not prove that the conclusion is sound. However, it supports that the conclusion is sound.)
Use inductive reasoning to write a conclusion for each of the sets of evidence below:

Young children read comic strips.
Teenagers read comic strips.
Adults read comic strips.
Conclusion: ____________________________________________

Jim enjoys snow skiing.
Jim enjoys ice-skating.
Jim enjoys bobsledding.
Jim enjoys tobogganing.
Jim enjoys ice hockey.
Conclusion: ____________________________________________

Frank is fluent in Spanish.
Frank speaks German like a native.
Frank reads French newspapers and magazines.
Frank learned Russian in three weeks.
Conclusion: ____________________________________________

The beach roads are jammed with traffic every Memorial Day.
The beach roads are jammed with traffic every July 4th.
The beach roads are jammed with traffic every Labor Day.
Conclusion: ____________________________________________
Deductive Reasoning

- Deductive reasoning begins with a general or universal statement and moves to a specific, more limited statement.
- Syllogism—a form of deductive reasoning made up of three parts: a major premise, a minor premise, and a conclusion.
- Premise—a general or universal statement which is said to be true.
- Major Premise-- must make a universal statement. This means that it must be true of all, every, no, or none of the people, objects, or events that are the subject of the statement. A major premise can never contain a limiter, such as some, most, or many.
- Minor Premise—fact or truth stated must be related to the major premise.
- For the conclusion of a deductive argument to be true, three conditions must be met:
  - The major premise must make a universal statement
  - Both of the premises must be true.
  - The argument must be valid (follow the rules of reasoning)
- The key to the credibility of a deductive conclusion lies in the premises.

Deductive Reasoning Examples

Major Premise: All 8th graders must take science.
Minor Premise: John is an 8th grader.
Conclusion: John must take science.

Major Premise: Frogs are amphibians. (the word all is implied)
Minor Premise: The coqui is a frog native to Puerto Rico.
Conclusion: The coqui is an amphibian.

Minor Premise: Murphy is a dog.
Major Premise: All dogs can bark.
Conclusion: Murphy can bark.

Useful Questions to Evaluate Deductive Arguments

1. What is the conclusion?
2. What are all of the reasons offered to support the conclusion?
3. Are all of the reasons offered to support the conclusion true? (How can they be checked?)
4. If the reasons are true, must the conclusion necessarily be true? (Does the argument follow the laws of reasoning? Is there a break in the logic of the relationship between the major premise and minor premise?)
5. Does the argument contain any fallacies?
Deductive Reasoning

For each of the following pairs of statements, write the conclusion that follows logically from the premises. If no valid conclusion is possible, write “No conclusion possible.”

1. All lawyers must pass a bar exam.
   Barbara Smith is a lawyer.

2. Alan is allergic to all foods containing wheat.
   Spaghetti contains wheat.

3. Carey’s dog barks only when it is hungry.
   Carey’s dog is barking.

4. Five to ten per cent of all men are color-blind.
   Jerry is a man.

5. The ancient Chinese believed that objects carved from jade had supernatural qualities.
   This ancient Chinese deer is carved from jade.

Identify the faulty reasoning in each of the examples below and write an explanation for each error.

1. All snakes are cold-blooded.
   All snails are cold-blooded.
   All snails are snakes.

2. Some 2002 Fords are blue.
   I have a 2002 Ford.
   My 2002 Ford is blue.

3. All Germans have blond hair.
   Hans has blond hair.
   Hans is a German.
For each of the following situations, decide whether inductive or deductive reasoning is being used. Be ready to explain your answers. Write a syllogism to represent the reasoning for those that you have identified as being deductive.

1. Mrs. Jones is the principal of a middle school which is struggling with high absenteeism. Before deciding on a plan of action to improve attendance, she begins by studying the monthly attendance reports. She also examines excuse notes students have brought. Then she gathers data from teachers and parents about why students are absent. Finally, she writes a report explaining her findings and offering suggestions for improving the problem.

2. Jim is an 8th grader at Pleasant Valley Middle School. His class is taking a field trip tomorrow. Since they will be going to the park after touring the Parthenon, Jim would like to wear athletic shorts. When he asks his teacher if that would be alright, she consults the dress code section of the student handbook. She discovers that it says students are allowed to wear athletic shorts only during P.E. She then tells Jim that he will not be allowed to wear the athletic shorts on the field trip.

3. Before the jury goes out to deliberate, the prosecuting attorney summarizes the evidence he has presented in court against a person accused of robbing the local McDonald’s. He concludes his argument by saying that the evidence makes it clear that the person is guilty of the crime.

4. One of Sarah’s friends told her that a policeman has been using his radar gun to catch speeders in an area along Highway 96 where the speed limit has just been lowered from 55 to 40. That afternoon as she approaches that particular location, she slows down in order to avoid getting a speeding ticket.

5. A science teacher assigns the following homework: at 9 p.m. every night for two months, see which constellations are visible in the eastern sky. Report your findings to the class.