APPENDIX D

ADDITIONAL INFORMATION ABOUT DEDUCTIVE CONCLUSIONS
Additional Information About Deductive Conclusions

Deductive reasoning involves drawing conclusions from premises. Sets of conclusions and premises are called syllogisms, and they are often expressed using letters to represent the premises and conclusions. For example, one common syllogism is:

- All A are B.
- All B are C.
- Therefore, all A are C.

The validity of this syllogism is easily seen by replacing the letters with phrases.

- All men (A) are human (B).
- All humans (B) are mammals (C).
- Therefore, all men (A) are mammals (C).

This syllogism can also be diagrammed, as is shown in figure D.1.

![Figure D.1: Syllogism diagram.](image)

There are number of different types of syllogisms, some valid and some invalid. For example, consider the following syllogism:

- All A are B.
- All C are B.
- Therefore, ________________________________.

A student might be inclined to infer some sort of relationship between A and C based on this textual version of the syllogism. However, by diagramming it, the student can see that the
relationship between A and C is not fully expressed by this particular syllogism. There are several possibilities, as shown in figure D.2.

![Figure D.2: Possible syllogistic relationships.](image)

As a result, it is impossible to draw a valid conclusion from figure D.2. Students can be provided with exercises like the ones in figure D.3 to allow them to practice determining whether or not syllogisms have a valid conclusion.

**Directions:** Identify which of the following are valid conclusions.

1. All A are B.
   - All C are B.
   - Therefore, all C are A.
2. All C are B.
   - No B are A.
   - Therefore, no C are A.

**Answers:** 1—Not valid; 2—Valid

**Figure D.3: Identifying valid syllogisms exercise.**

Once students have an understanding of how to identify valid syllogisms that are stated using letters, they can be presented with syllogisms in sentence form. For example, syllogisms like the following can provide students with practice validating conclusions presented in sentence form.

- All people from Colorado vote Republican in elections.
- Bill is from Colorado.
- Therefore, Bill will vote Republican in the next election.

Stating syllogisms in their sentence form gives teachers the opportunity to address the most important aspect of this type of reasoning, which is evaluating the truth of conclusions. Syllogisms are valid if the conclusion follows the premises logically. However, in order for a syllogism to be true, not only must the conclusion be valid, but the premises must also be true.
In the preceding example, the premise that “all people from Colorado vote Republican” is not true. This means that the conclusion “therefore, Bill will vote Republican in the next election” is valid, but not true.

The distinction between truth and validity lies at the heart of many examples of faulty reasoning. For example, prejudice is an example of drawing valid conclusions based on untrue premises. A person who believes that people of a certain race are inferior to people of another race may be reasoning from a valid but untrue set of premises like the following.

- **Foundational premise:** All people of Asian descent are inferior to people of European descent.
- **Minor premise:** Sam is of Asian descent, and Millie is of European descent.
- **Conclusion:** Therefore, Millie is superior to Sam.

In order to become facile with evaluating conclusions for truth and validity, students must become adept at translating statements they hear into syllogistic form, with two premises and a conclusion. For example, a student presented with the phrase “He is going to vote Republican because he is from Colorado,” should be able to break it down into the following premises and conclusion:

A—All people from Colorado vote Republican.
B—He is from Colorado.
C—Therefore, he will vote Republican in the next election.

Once seen in this form, it is much easier to identify that this conclusion is valid but untrue. Once students are skillful with breaking down statements into syllogisms and evaluating them for truth and validity, teachers should ask them to find statements in the mass media that can be broken down into their premises and conclusion. The following vignette depicts how a teacher would invite students to bring these into class to be the subject of a discussion on their validity and truth.

Ms. Rockham’s students have been practicing breaking down statements into syllogisms. She has asked students to bring in statements that they have found in the mass media. Geoff has brought in a quote from a politician: “Legal immigration leads to more illegal immigration.” The class breaks this statement down into its premises and conclusions. They decide that the foundational premise is, “Immigrants want to bring their family members and friends to the United States,” and the minor premise is, “A legal immigrant will help their family members and friends to immigrate illegally.” From these premises, they formulated the following syllogism:

A—Immigrants want to bring their family members and friends to the United States.
B—A legal immigrant will help their family members and friends to immigrate illegally.
C—Legal immigration leads to illegal immigration.

They decide that although A may be true, B is not true, and therefore while C may be valid, it is not true.