

3.3 Deductive & Inductive Reasoning

- ▶ Use deductive reasoning with syllogisms.
- ▶ Know how a deductive reasoning system is created.
- ▶ Use inductive reasoning.

Deductive Reasoning and Syllogisms

In this section, you will study two types of reasoning: **deductive reasoning** and **inductive reasoning**. In deductive reasoning, you start with two or more statements that you know or assume to be true. From these, you *deduce* or *infer* the truth of another statement. Here is an example.

- **Premise:** If this traffic doesn't clear up, I will be late for work.
- **Premise:** The traffic hasn't cleared up.
- **Conclusion:** I will be late for work.

This pattern for deductive reasoning is called a **syllogism**. The classical Greek philosopher Aristotle required that each premise be of the form "All A are B," "Some A are B," "No A are B," or "Some A are not B." Such syllogisms are called **categorical syllogisms**.

EXAMPLE 1 Writing a Syllogism

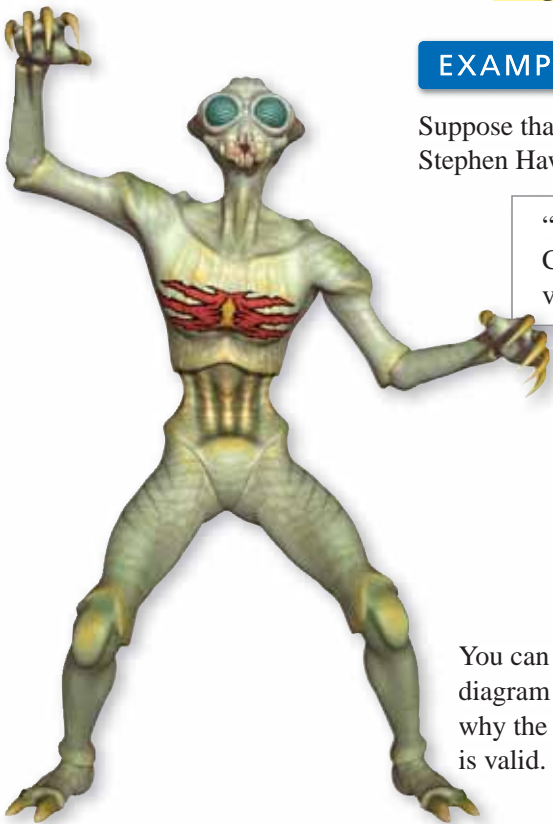
Suppose that aliens from Mars visit Earth. Also suppose that the physicist Stephen Hawking is correct on the outcome. What conclusion can you draw?

"If aliens ever visit us, I think the outcome would be much as when Christopher Columbus first landed in America, which didn't turn out very well for the Native Americans." Stephen Hawking

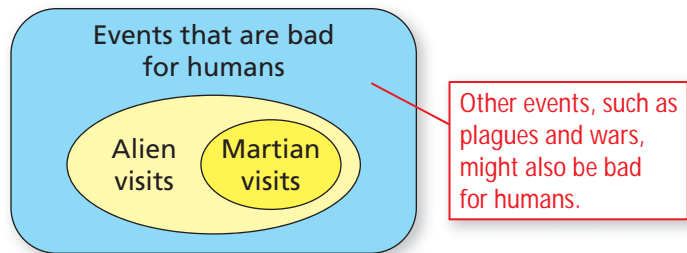
SOLUTION

Here is one way to write this argument as a syllogism.

- **Premise:** All alien visits are bad for humans.
- **Premise:** All Martian visits are alien visits.
- **Conclusion:** All Martian visits are bad for humans.



You can use a set diagram to help see why the syllogism is valid.



✓ Checkpoint

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Any theory of gravity is a physical theory. Write a syllogism in which the first premise is the Stephen Hawking quote, "Any physical theory is always provisional, in the sense that it is only a hypothesis: you can never prove it."