3.4 Fallacies in Logic

- Recognize deductive fallacies.
- Use set diagrams to detect fallacies.
- Recognize fallacies in advertisements.

Study Tip

In the first example at the right, whether it rained or did not rain is irrelevant. The point is that the reasoning is invalid. This type of fallacy is called *affirming the consequent.*

- Premise: If P, then Q.
- Premise: Q
- Conclusion: Therefore, P. ☹

Deductive Fallacies

A **fallacy** is an error in reasoning. This differs from a factual error, which is simply being wrong about a fact. A **deductive fallacy** is a deductive argument that is invalid. Here is an example.

- Premise: When it rains, the ground gets wet.
- Premise: The ground is wet.
- Conclusion: Therefore, it must have rained. ☹

Here is an example of valid reasoning.

- Premise: When it rains, the ground gets wet.
- Premise: It rained.
- Conclusion: Therefore, the ground got wet. ☺

An **inductive fallacy** occurs when the premises do not provide enough support for the conclusion.

EXAMPLE 1 Detecting a Fallacy

Is the logic in this description of lie detectors valid?

> To detect lies, a polygraph test evaluates a person's heart rate, breathing rate, blood pressure, and perspiration on fingertips. Sometimes a polygraph test also evaluates involuntary arm and leg movements and nervous tics, which often occur while being asked difficult questions. When people lie, their heart rates increase and they start sweating. So, when a polygraph test shows an increased heart rate and sweating, you can conclude that the person is lying.

SOLUTION

This argument is not valid. It is the same type of fallacy as shown above: *affirming the consequent.*

- Premise: When people lie, their heart rates increase and they start sweating.
- Premise: This man has an increased heart rate and is sweating.
- Conclusion: Therefore, he is lying. ☹

Checkpoint

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Is the logic in this description of craters valid? Explain.

> When meteors hit Earth, they form craters, some of which are over a mile in diameter. The diameter of Crater Lake in Oregon is about 5 miles. So, it must have been formed by a huge meteor.