

## 3-6 Inductive Reasoning

Throughout these first three chapters, we have been using deductive reasoning. Now we'll consider **inductive reasoning**, a kind of reasoning that is widely used in science and in everyday life.

**Example 1** After picking marigolds for the first time, Connie began to sneeze. She also began sneezing the next four times she was near marigolds. Based on this past experience, Connie reasons inductively that she is allergic to marigolds.

**Example 2** Every time Pitch has thrown a high curve ball to Slugger, Slugger has gotten a hit. Pitch concludes from this experience that it is not a good idea to pitch high curve balls to Slugger.

In coming to this conclusion, Pitch has used inductive reasoning. It may be that Slugger just happened to be lucky those times, but Pitch is too bright to feed another high curve to Slugger.

From these examples you can see how inductive reasoning differs from deductive reasoning.

### Deductive Reasoning

Conclusion based on accepted statements (definitions, postulates, previous theorems, corollaries, and given information)

Conclusion *must* be true if hypotheses are true.

### Inductive Reasoning

Conclusion based on several past observations

Conclusion is *probably* true, but not necessarily true.

Often in mathematics you can reason inductively by observing a pattern.

**Example 3** Look for a pattern and predict the next number in each sequence.

a. 3, 6, 12, 24, ?      b. 11, 15, 19, 23, ?      c. 5, 6, 8, 11, 15, ?

**Solution** a. Each number is twice the preceding number. The next number will be  $2 \times 24$ , or 48.

b. Each number is 4 more than the preceding number. The next number will be  $23 + 4$ , or 27.

c. Look at the differences between the numbers.

Numbers	5	6	8	11	15	?
Differences		1	2	3	4	?

The next difference will be 5, and thus the next number will be  $15 + 5$ , or 20.