

Lesson 12-5

Example 1

Find a pattern for the sum of the first n even numbers greater than 1.

$$2 = 2 = 1^2 + 1$$

$$2 + 4 = 6 = 2^2 + 2$$

$$2 + 4 + 6 = 12 = 3^2 + 3$$

$$2 + 4 + 6 + 8 = 20 = 4^2 + 4$$

$$2 + 4 + 6 + 8 + 10 = 30 = 5^2 + 5$$

$$2 + 4 + 6 + 8 + 10 + 12 = 42 = 6^2 + 6$$

Solution

Let n = the number of even numbers added together. The series of statements suggests the following conjecture.

Conjecture The sum of the first n even numbers greater than 1 equals $n^2 + n$.

Test the conjecture. Shown are the next two sums in the series.

$$2 + 4 + 6 + 8 + 10 + 12 + 14 = 56 = 7^2 + 7$$

$$2 + 4 + 6 + 8 + 10 + 12 + 14 + 16 = 72 = 8^2 + 8$$

The conjecture seems to be true, so the sum of the first n even numbers greater than 1 probably equals $n^2 + n$.

Example 2

SCHOOL Complete the deductive argument by writing the conclusion that follows from the premises.

Premise 1 If a student is on the honor role, then the student has a grade point average of at least 2.5.

Premise 2 Malcolm is on the honor role.

Solution

Malcolm is on the honor role, so he fits the condition stated in Premise 1. Given these premises, only one conclusion follows.

Conclusion Malcolm has a grade point average of at least 2.5.

Example 3

Tell whether the reasoning is *inductive* or *deductive*.

- a.** Colleen observes a work crew building a house next door and notices that they take their lunch break every weekday at 11:45 A.M. She concludes that next Tuesday, the work crew will take a lunch break at 11:45 A.M.
- b.** Gina knows that in order to be in the school choir, you must be able to sing or play an instrument. Eddie is in the school choir. Gina concludes that he must be able to sing or play an instrument.

Solution

- a.** Colleen draws a conclusion about what time the work crew takes their lunch break after watching them for several days. She reasons from evidence of a few instances to a conclusion about every instance. The reasoning is inductive.
- b.** Gina reasons from the requirements to be in the school choir to draw a conclusion about one of the choir's members. The conclusion follows logically from the premises. The reasoning is deductive.