2.1 Use Inductive Reasoning

Goal • Describe patterns and use inductive reasoning.

Geometry, like much of science and mathematics, was developed partly as a result of people recognizing and describing patterns.

*We will discover patterns and use them to make predictions.

EXAMPLE 1 Describe a visual pattern

Describe how to sketch the fourth figure in the pattern. Then sketch the fourth figure.

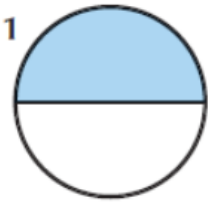
Figure 1 

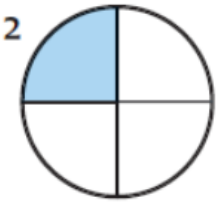
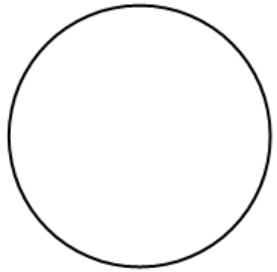
Figure 2 

Figure 3 



EXAMPLE 2 Describe a number pattern

READ SYMBOLS
The three dots (. . .) tell you that the pattern continues.

Describe the pattern in the numbers −7, −21, −63, −189, . . . and write the next three numbers in the pattern.

Conjecture-an unproven statement based upon observations.

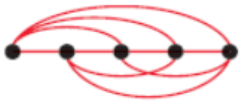
Inductive Reasoning-Reasoning where you use strong evidence to support the truth "Not Proven"

EXAMPLE 3 Make a conjecture

Given five collinear points, make a conjecture about the number of ways to connect different pairs of the points.

Solution

Make a table and look for a pattern. Notice the pattern in how the number of connections increases. You can use the pattern to make a conjecture.

Number of points	1	2	3	4	5
Picture					
Number of connections	0	1	3	6	?

EXAMPLE 4 Make and test a conjecture

Numbers such as 3, 4, and 5 are called *consecutive numbers*. Make and test a conjecture about the sum of any three consecutive numbers.

Solution

STEP 1 **Find** a pattern using a few groups of small numbers.

$3 + 4 + 5 = 12 = 4 \cdot 3$ $\quad$ $7 + 8 + 9 = 24 = 8 \cdot 3$

$10 + 11 + 12 = 33 = 11 \cdot 3$ $\quad$ $16 + 17 + 18 = 51 = 17 \cdot 3$

*To show that a conjecture is true, you must show that it is true for all cases

*To show that a conjecture is false, you must find one counterexample

Counterexample - a specific case where the conjecture is false.

EXAMPLE 5 Find a counterexample

A student makes the following conjecture about the sum of two numbers. Find a counterexample to disprove the student's conjecture.

Conjecture The sum of two numbers is always greater than the larger number.

Solution

To find a counterexample, you need to find a sum that is less than the larger number.

EXAMPLE 6 Standardized Test Practice

Which conjecture could a high school athletic director make based on the graph at the right?

ELIMINATE CHOICES
Because the graph does not show data about boys or the World Cup games, you can eliminate choices A and C.

(A) More boys play soccer than girls.

(B) More girls are playing soccer today than in 1995.

(C) More people are playing soccer today than in the past because the 1994 World Cup games were held in the United States.

(D) The number of girls playing soccer was more in 1995 than in 2001.

Solution

Assignment: Pg. 75, 1-28, 32, 39-49