

1.1 Patterns and Inductive Reasoning

GOAL: Find and describe patterns and use inductive reasoning.

VOCABULARY

A **conjecture** is an unproven statement that is based on observations.

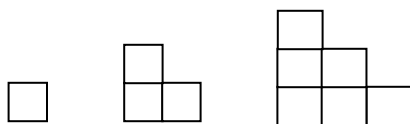
Inductive reasoning is a process that involves looking for patterns and making conjectures.

A **counter example** is an example that shows a conjecture is false.

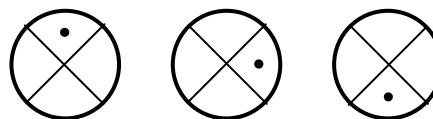
EXAMPLE 1: Describing a Visual Pattern

Sketch the next figure in the pattern.

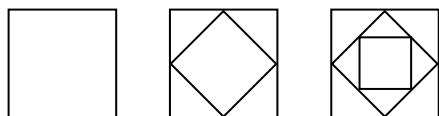
a.



b.



c.



d.



EXAMPLE 2: Describing a Number Pattern

Describe a pattern in the sequence of numbers. Then predict the next number.

a. 5, 3, 1, -1 , ...

b. 1, 4, 9, 16, ...

c. $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, ...

d. 1, -4 , 9, -16 , ...

e. 1, 2, 6, 24, ...

EXAMPLE 3: Making a conjecture

Complete each conjecture. Show some examples that support your answer.

- a. The product of two odd numbers is _____.
- b. The sum of two odd numbers is _____.
- c. The product of two consecutive even integers is divisible by _____.
- d. For any two integers a and b , $(a+b)(a-b) =$ _____.

EXAMPLE 4: Finding a Counterexample

Show the conjecture is false by finding a counterexample.

- a. All odd numbers are prime.
- b. The quotient of two whole numbers is a whole number.
- c. For all real numbers x , the expression x^2 is greater than or equal to x .
- d. The square of the sum of two numbers is equal to the sum of the squares of the two numbers.
That is, $(a+b)^2 = a^2 + b^2$.