

2.1 Notes

2.1 Inductive Reasoning and Conjecturing

Objectives

Use inductive reasoning to identify patterns and make conjectures.

Find counterexamples to disprove conjectures.

Inductive Reasoning is the process of

- * looking at specific situations or patterns
- * arriving at a conclusion or rule
- * then proving the rule or show it is false.

Scientists believed the earth was flat until Christopher Columbus proved them otherwise.

looking at specific situations or patterns

Example 1: Identifying a Pattern

Find the next item in the pattern.

January, March, May, ... **July**

7, 14, 21, 28, ... **35**



0.4, 0.04, 0.004, ...

0.0004

arriving at a conclusion or rule

Conjecture: an educated guess based on observations or patterns.

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Example 2: Making a Conjecture

Complete the conjecture. *Look at examples*

The sum of two positive numbers is ? Positive
 $1+3=4$ $3+2=5$ *How are they alike?*
 $2+4=6$ $8+1=9$

The number of lines formed by 4 points, no three of which are collinear, is ? 6



6

The product of two odd numbers is ? odd
 $3 * 5 = 15$ $7 * -3 = -21$
 $1 * 7 = 7$ $-3 * 1 = -3$
 all 4 numbers are ODD.

then proving the rule or show it is false.

Counterexample: a false example

****A conjecture based on observations may be true or false.****

Example 4: Finding a Counterexample

Show that the conjecture is false by finding a counterexample.

For every integer n , n^3 is positive. *Make a table*

n	n^3
1	$1^3 = 1$
-1	$-1^3 = -1$
0	$0^3 = 0$

Counter example
 $-1^3 \neq \text{Positive}$

Two complementary angles are not congruent.

$\angle 45^\circ$ $\angle 45^\circ$ *both angles are congruent and they are Complementary*

For any real number x , $x^2 \geq x$.

x	$x^2 \geq x$
-1	$-1^2 \geq -1$ T
1	$1^2 \geq 1$ T
$\frac{1}{2}$	$(\frac{1}{2})^2 \geq \frac{1}{2}$ F b/c $(\frac{1}{2})^2 = \frac{1}{4} < \frac{1}{2}$
0	$0^2 \geq 0$ T