

Inductive and Deductive Reasoning: Notes

A Conjecture is an unproven statement that is based on observations. (*Educated Guess*)

Ex. 1: Find the pattern, and make a conjecture:

If $3 + 4 + 5 = 12 = 4 * 3$, then $10 + 11 + 12 = \underline{33} = \underline{11} * \underline{3}$

Conjecture: The sum of any 3 consecutive integers is the middle number multiplied by 3.

To show that a conjecture is always true you must prove it. (*State the pattern, explain*)

A Counterexample is a specific case which makes a conjecture false.

Ex. 2: Find a counterexample to show the conjecture false:

If two angles are supplements of each other, then one of the angles must be acute.

What if the angles are right & 's ?, they wouldn't be acute!

Reasoning Types

Inductive Reasoning	Deductive Reasoning
<u>Patterns, Observations</u>	<u>Facts, Definitions, Rules, or Properties, Laws</u>
<ul style="list-style-type: none"> Based on observations Based on past experiences Uses specific observations to create a specific rule Is useful in providing a <i>conjecture</i> or <i>hypothesis</i> Does Not Always lead to valid conclusions. 	<ul style="list-style-type: none"> Based on facts, definitions, postulates, properties and theorems. Moves from general observations to specific results. Is useful in <i>proving conjectures</i>. Always leads to a valid conclusion as long as assumptions are true.

Describe the pattern, then write or draw the next two items in the sequence. (Inductive reasoning)

Ex. 3 Counting by 7's
7, 14, 21, 28, 35, 42

Ex. 4 Rotating 90° counterclockwise



Let's practice trying to identify inductive/deductive reasoning.

Ex. 5: You observe for the last 5 or 6 weeks, the school cafeteria has served chicken on Thursday. Since tomorrow is Thursday, your conjecture would be that they are serving chicken.

Inductive reasoning.
(they present a pattern)

Ex. 6: At Reagan High School, students must pass Geometry before they take Algebra 2. Emily is in Algebra 2, so she must have passed Geometry.

Deductive reasoning.
(it is a rule as presented)

Ex. 7: The United States Census Bureau collects data on the earnings of American citizens. Using data for the three years from 2001 to 2003, the bureau concluded that the national average median income for a four-person family was \$43,527.

Inductive reasoning
(they use observations from previous years)

Ex. 8: Your teacher tells the class that no credit will be given to assignments that show no work. For two months you do your homework. Last week, your assignment had a couple of problems where no work was shown. You received no credit for the assignment.

Deductive reasoning
(it is a classroom rule)