

2.2 Inductive and Deductive Reasoning



KEY IDEA

Inductive Reasoning

A **conjecture** is an unproven statement that is based on observations. You use **inductive reasoning** when you find a pattern in specific cases and then write a conjecture for the general case.

NOTE: IN INDUCTIVE REASONING, YOU START WITH EXAMPLES, FIND A PATTERN, THEN MAKE A RULE/CONJECTURE.

Ex.

1. 38, 31, 24, 17, _____, _____, _____, _____, _____

Conjecture: _____

2. 2, 5, 11, 23, _____, _____, _____, _____, _____

Conjecture: _____

3.

↑, →, ↓, _____, _____, _____, _____, _____

Conjecture: _____

4.



Conjecture: _____

(Sketch it too)



KEY IDEAS

Deductive Reasoning

Deductive reasoning uses facts, definitions, accepted properties, and the laws of logic to form a logical argument. This is different from *inductive reasoning*, which uses specific examples and patterns to form a conjecture.

NOTE: IN DEDUCTIVE REASONING, YOU START WITH A RULE THEN APPLY IT TO SPECIFIC EXAMPLES.

SPECIFICALLY, DEDUCTIVE REASONING USES TWO GENERAL FORMS OF REASONING (LAWS OF LOGIC)

Laws of Logic

Law of Detachment (also called Modus Ponens)

If the hypothesis of a true conditional statement is true, then the conclusion is also true.

Law of Detachment

$$\begin{array}{l} p \rightarrow q \\ p \\ \hline \therefore q \end{array}$$

Ex.

1. **Given:** If Mark saves \$30, then he can buy a new video game.
Mark saves \$30.

Conclusion: _____

2.

- Given:** If you are 18 years old, then you can register to vote.
Olivia is not 18 years old.

Conclusion: _____

3.

- Given:** If the sum of the measures of two angles is 90° , then they are complementary.
 $m\angle J = 58^\circ$ and $m\angle K = 32^\circ$

Conclusion: _____

Be careful with the next one....

4.

- Given:** If two angles form a linear pair, then they are supplementary.

Angles A and B are supplementary.

Conclusion: _____

Law of Syllogism

Law of Syllogism

If hypothesis p , then conclusion q .

If hypothesis q , then conclusion r .

If hypothesis p , then conclusion r . ← then this statement is true.

↘ If these statements are true,

$$\begin{array}{l} p \rightarrow q \\ q \rightarrow r \\ \hline \therefore p \rightarrow r \end{array}$$

Ex.

1.

Given: If it is Saturday, then Jake has a baseball tournament.

If Jake has a baseball tournament, then he will need to pack his lunch.

Conclusion: _____

2.

Given: If a number is divisible by 12, then it is divisible by 6.

If a number is divisible by 6, then it is divisible by 3.

Conclusion: _____

3.

Given: If a quadrilateral is a square, then it is a rectangle.

If a quadrilateral is a rectangle, then it has four right angles.

Conclusion: _____

Be careful with the next one.

4.

Given: If it is sunny this weekend, then you will go boating.

If it is sunny this weekend, then you will wear shorts.

Conclusion: _____