

Lesson 2.7.2: Inductive and Deductive Reasoning

Inductive Reasoning:

- ▶ a type of reasoning where the conclusion is made based upon current knowledge, observation, examples and patterns
- ▶ a process of observing data, recognizing patterns, and making generalizations from observations

Conjecture: an educated guess; the conclusion drawn from observations, examples and pattern

Deductive Reasoning:

- ▶ a type of logical reasoning that uses accepted facts to reason in a step-by-step manner until we arrive at the desired statements
- ▶ a type of reasoning which makes use of accepted rules of logic and general statements to arrive at a conclusion

Parts of Deductive Reasoning:

- ▶ Hypothesis: the statement which is accepted or known at the beginning
- ▶ Conclusion: the statement drawn from the hypothesis

Law of Detachment (Modus Ponens)

Major Premise: If p is true, then q is true.

Minor Premise: p is true.

Conclusion: Therefore, q is true.

Law of Syllogism (Chain Rule)

Major Premise: If p is true, then q is true.

Minor Premise: If q is true, then r is true.

Conclusion: If p , then r .

Practice Exercises 2.7.2

A. Determine if the conjecture is *True* or *False* based on the given information.

- Given

The ages of the students in a Grade 8 class are 12, 13, 12, 12, 14, 13, 13, 13, 12, and 13.

Conjecture

All the students in the class are at least 12 years old.
- Given

D , E , and F are distinct points.

Conjecture

D , E , and F are collinear.
- Given

$\angle 1$ and $\angle 2$ are complementary angles.
 $\angle 2$ and $\angle 3$ are complementary angles.

Conjecture

$\angle 1 \cong \angle 3$
- Given

$\angle P$ and $\angle R$ are right angles.

Conjecture

$\angle P \cong \angle R$
- Given

\overline{AB} , \overline{BC} , \overline{CD} , and \overline{DA} .

Conjecture

A , B , C , and D are collinear points.

Lesson 2.7.2: Inductive and Deductive Reasoning

Inductive Reasoning:

- ▶ a type of reasoning where the conclusion is made based upon current knowledge, observation, examples and patterns
- ▶ a process of observing data, recognizing patterns, and making generalizations from observations

Conjecture: an educated guess; the conclusion drawn from observations, examples and pattern

Deductive Reasoning:

- ▶ a type of logical reasoning that uses accepted facts to reason in a step-by-step manner until we arrive at the desired statements
- ▶ a type of reasoning which makes use of accepted rules of logic and general statements to arrive at a conclusion

Parts of Deductive Reasoning:

- ▶ Hypothesis: the statement which is accepted or known at the beginning
- ▶ Conclusion: the statement drawn from the hypothesis

Law of Detachment (Modus Ponens)

Major Premise: If p is true, then q is true.

Minor Premise: p is true.

Conclusion: Therefore, q is true.

Law of Syllogism (Chain Rule)

Major Premise: If p is true, then q is true.

Minor Premise: If q is true, then r is true.

Conclusion: If p , then r .

Practice Exercises 2.7.2

A. Determine if the conjecture is *True* or *False* based on the given information.

- Given

The ages of the students in a Grade 8 class are 12, 13, 12, 12, 14, 13, 13, 13, 12, and 13.

Conjecture

All the students in the class are at least 12 years old.
- Given

D , E , and F are distinct points.

Conjecture

D , E , and F are collinear.
- Given

$\angle 1$ and $\angle 2$ are complementary angles.
 $\angle 2$ and $\angle 3$ are complementary angles.

Conjecture

$\angle 1 \cong \angle 3$
- Given

$\angle P$ and $\angle R$ are right angles.

Conjecture

$\angle P \cong \angle R$
- Given

\overline{AB} , \overline{BC} , \overline{CD} , and \overline{DA} .

Conjecture

A , B , C , and D are collinear points.

B. Draw a conclusion from each given situation and identify the kind of reasoning used.

- 5,10,15, 20. The next number is ____.
 - Coplanar points are points on the same plane. X , Y , Z are coplanar. Therefore, ____.
 - A regular polygon is equilateral. $ABCD$ is a regular quadrilateral. Therefore, ____.
 - Filipinos are peace-loving people. Eloisa is a Filipino. Therefore, ____.
 - S, M, T, W, T, ____, S. The letter in the blank should be ____.
- C. Supply the conclusion for the given hypothesis.
- If $\angle 1 \cong \angle 2$, then ____.
 - If $\overline{AB} = \overline{CE}$, then ____.
 - If $\angle B$ and $\angle E$ are complementary, then ____.
 - If $m\angle 3 + m\angle 5 = 180^\circ$, then ____.
 - If $\angle A$ and $\angle X$ form a linear pair, then ____.

Activity 2.7.2

A. Determine if the conjecture is *True* or *False* based on the given information.

- Given

$B(-5,0)$, $O(5,0)$, and $Y(0,0)$

Conjecture

$BY = YO$
- Given

$P(-3,0)$, $Q(1,3)$, and $B(-3,3)$

Conjecture

P , Q , and B are collinear points.
- Given

\overline{AB} , \overline{BC} , and \overline{CD} .

Conjecture

A , B , C , and D are collinear points.
- Given

$\overline{AC} \cong \overline{CD}$

Conjecture

C is the midpoint of \overline{AD} .

B. Draw a conclusion from each given situation and identify the kind of reasoning used.

- Niku is Danica's cousin. Donna is Danica's twin sister. Therefore, ____.
 - If a person does not get enough sleep, that person will be tired. Marcos does not get enough sleep. Therefore, ____.
 - 4, 8, 16, 32, ____, ____
 - All piano players are musicians. Fred is a piano player. Therefore, ____.
 - 1, 2, 4, 7, 11, ____
- C. Supply the conclusion for the given hypothesis.
- If $\angle B$ is a right angle, then ____.
 - If $m\angle 3 + m\angle 4 = 180^\circ$, then ____.
 - If \overline{PM} bisects $\angle APO$, then ____.
 - If $\overline{BP} \perp \overline{BC}$, then ____.
 - If $\triangle BOS$ is isosceles, then ____.

B. Draw a conclusion from each given situation and identify the kind of reasoning used.

- 5,10,15, 20. The next number is ____.
 - Coplanar points are points on the same plane. X , Y , Z are coplanar. Therefore, ____.
 - A regular polygon is equilateral. $ABCD$ is a regular quadrilateral. Therefore, ____.
 - Filipinos are peace-loving people. Eloisa is a Filipino. Therefore, ____.
 - S, M, T, W, T, ____, S. The letter in the blank should be ____.
- C. Supply the conclusion for the given hypothesis.
- If $\angle 1 \cong \angle 2$, then ____.
 - If $\overline{AB} = \overline{CE}$, then ____.
 - If $\angle B$ and $\angle E$ are complementary, then ____.
 - If $m\angle 3 + m\angle 5 = 180^\circ$, then ____.
 - If $\angle A$ and $\angle X$ form a linear pair, then ____.

Activity 2.7.2

A. Determine if the conjecture is *True* or *False* based on the given information.

- Given

$B(-5,0)$, $O(5,0)$, and $Y(0,0)$

Conjecture

$BY = YO$
- Given

$P(-3,0)$, $Q(1,3)$, and $B(-3,3)$

Conjecture

P , Q , and B are collinear points.
- Given

\overline{AB} , \overline{BC} , and \overline{CD} .

Conjecture

A , B , C , and D are collinear points.
- Given

$\overline{AC} \cong \overline{CD}$

Conjecture

C is the midpoint of \overline{AD} .

B. Draw a conclusion from each given situation and identify the kind of reasoning used.

- Niku is Danica's cousin. Donna is Danica's twin sister. Therefore, ____.
 - If a person does not get enough sleep, that person will be tired. Marcos does not get enough sleep. Therefore, ____.
 - 4, 8, 16, 32, ____, ____
 - All piano players are musicians. Fred is a piano player. Therefore, ____.
 - 1, 2, 4, 7, 11, ____
- C. Supply the conclusion for the given hypothesis.
- If $\angle B$ is a right angle, then ____.
 - If $m\angle 3 + m\angle 4 = 180^\circ$, then ____.
 - If \overline{PM} bisects $\angle APO$, then ____.
 - If $\overline{BP} \perp \overline{BC}$, then ____.
 - If $\triangle BOS$ is isosceles, then ____.