

Geometry BELL WORK

Write the *if-then statement*, the *converse*, the *inverse*, and the *contrapositive* of the conditional statement: "Dogs have tails."

If it is a dog, then it has a tail

C: If it has a tail, then it is a dog

I: If it is not a dog, then it does not have a tail

CP: If it does not have a tail, then it is not a dog.

Due today:

2.3 pg 109 # 1-17

2-4 Deductive Reasoning

We used inductive reasoning to analyze patterns and make conjectures.

Today we will define and use deductive reasoning.

deductive reasoning uses facts, rules, definitions, or properties to reach logical conclusions from given statements.

Determine whether each conclusion is based on *inductive* or *deductive* reasoning.

- a. Every time Katie has worn her favorite socks to a softball game, she has gotten at least one hit. Katie is wearing her favorite socks to a game tonight, so she concludes that she will get at least one hit.

inductive: follows a pattern
to reach a conclusion

- b. If John is late making his car insurance payment, he will be assessed a late fee of \$50. John's payment is late this month, so he concludes that he will be assessed a late fee of \$50.

deductive: follows a rule/policy
to reach a conclusion

Law of Detachment

The **Law of Detachment** lets us prove a conjecture. It states that:

If $p \rightarrow q$ is a true statement and p is true, then q is true.

Example

Given: If **a car is out of gas**, then **it will not start**.
Sarah's **car is out of gas**.

Valid Conclusion: Sarah's **car will not start**.

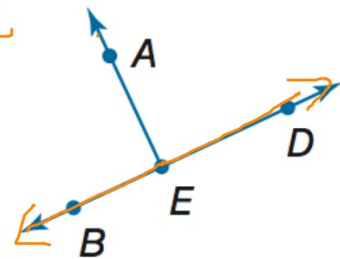
Determine whether each conclusion is valid based on the given information. If not, write *invalid*. Explain your reasoning.

Given: If two angles form a linear pair, then their noncommon sides are opposite rays.
 $\angle AED$ and $\angle AEB$ form a linear pair.

Conclusion: \overrightarrow{ED} and \overrightarrow{EB} are opposite rays.

$P \rightarrow Q$ T
P T
Q T

Valid: The if-then statement is true and the hypothesis is true, so the conclusion is true.



**Given: If Mika goes to the beach, she will wear sunscreen.
Mika is wearing sunscreen.**

Conclusion: Mika is at the beach.

Invalid

Law of Syllogism

The **Law of Syllogism** is another way to prove that a conditional statement is true.

It states that:

If $p \rightarrow q$ and $q \rightarrow r$ are true statements,
then $p \rightarrow r$ is a true statement.

Example

$$P \rightarrow Q$$

Given: If **you get a job**, then **you will earn money**.

If **you earn money**, then **you will buy a car**.

Valid Conclusion: If **you get a job**, then **you will buy a car**.

$$P \rightarrow R$$

Determine which statement follows logically from the given statements.

(1) If you do not get enough sleep, then you will be tired.

(2) If you are tired, then you will not do well on the test.

F If you are tired, then you will not get enough sleep.

G If you do not get enough sleep, then you will not do well on the test.

H If you do not do well on the test, then you did not get enough sleep.

J There is no valid conclusion.

Assignment:

2.4 pg 119 # 1-4 and # 7-9

