

Geometry 2.4

Use the law of detachment

Use the law of syllogism

conditional $A \rightarrow B$

hypothesis & conclusion

inductive reasoning look for pattern \rightarrow predict

deductive reasoning rules, def, procedures

valid follows rules

invalid doesn't follow rules

\rightarrow Law of detachment

\rightarrow Law of syllogism

} templates

Project due Tues. 3:30

Geometry folder in APPS

Save as *movie* (not save as *project*)

Reflection (individual) writing

due Wed. class



Real-World Example 1 Inductive and Deductive Reasoning

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.

D

if..then

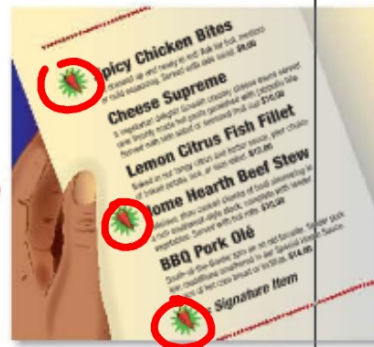
- b. If John is late making his car insurance payment, he will be assessed a late fee of \$50. John's payment is late this month, so he concludes that he will be assessed a late fee of \$50.

if late \$50

late
pay \$50

Guided Practice

- 1A. All of the signature items on the restaurant's menu shown are noted with a special symbol. Kevin orders a menu item that has this symbol next to it, so he concludes that the menu item that he has ordered is a signature item.
- 1B. None of the students who ride Raul's bus own a car. Ebony rides a bus to school, so Raul concludes that Ebony does not own a car.



Law of detachment

If you buy something at WalMart, you have to pay sales tax.

WM \rightarrow tax
bought @ WM
paid sales tax

if $A \rightarrow B$
A
B

major
premise
minor
premise
conclusion

if no gas → not start
no gas
not start

major premise: if...then
minor premise: this happened
conclusion: therefore...

KeyConcept Law of Detachment

Words 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.

rules

$$C \rightarrow W$$

If you consume too many calories,
you will gain weight.

C

W

Is the minor premise about the hypothesis? (required)

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

Conclusion: Mika is at the beach.

$$B \rightarrow S$$

S

invalid

Guided Practice

S → P

3. **Given:** If a figure is a square, then it is a polygon.
Figure A is a square.

—————

P

Conclusion: Figure A is a polygon.

valid

If you give a pig a pancake...
Chain of conditional statements
Can link first to last (if you don't break the chain)
Does this remind you of anything?

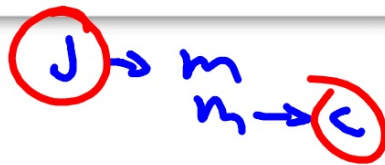
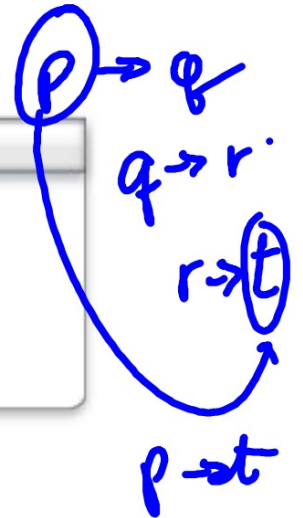
2 Law of Syllogism The **Law of Syllogism** is another valid form of deductive reasoning. This law allows you to draw conclusions from two true conditional statements when the conclusion of one statement is the hypothesis of the other.

KeyConcept Law of Syllogism

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

Example *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.



Chain together in a logical order:

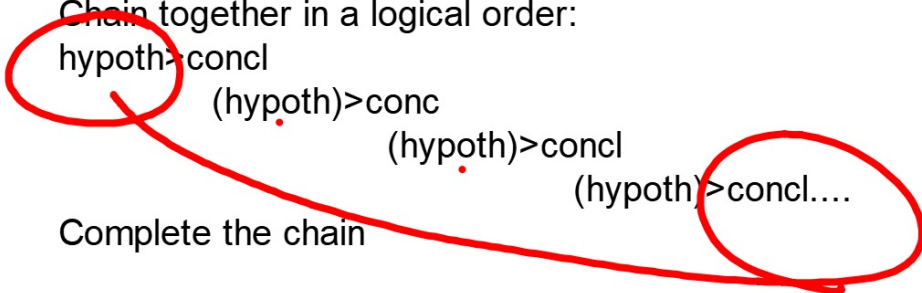
hypoth>concl

(hypoth)>conc

(hypoth)>concl

(hypoth)>concl....

Complete the chain



If you work hard, you will get good grades.

If you get good grades, you will be on the honor roll.

If you are on the honor roll, you will get a scholarship.

If you get a scholarship, you will go to college.

If you go to college, you will get a good job.

If you get a good job, you will make lots of money.

If you make lots of money, you will drive a nice car.

Connect the chain...

If you work hard,

Chain together...

Guided Practice



4. Determine which statement follows logically from the given statements.

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

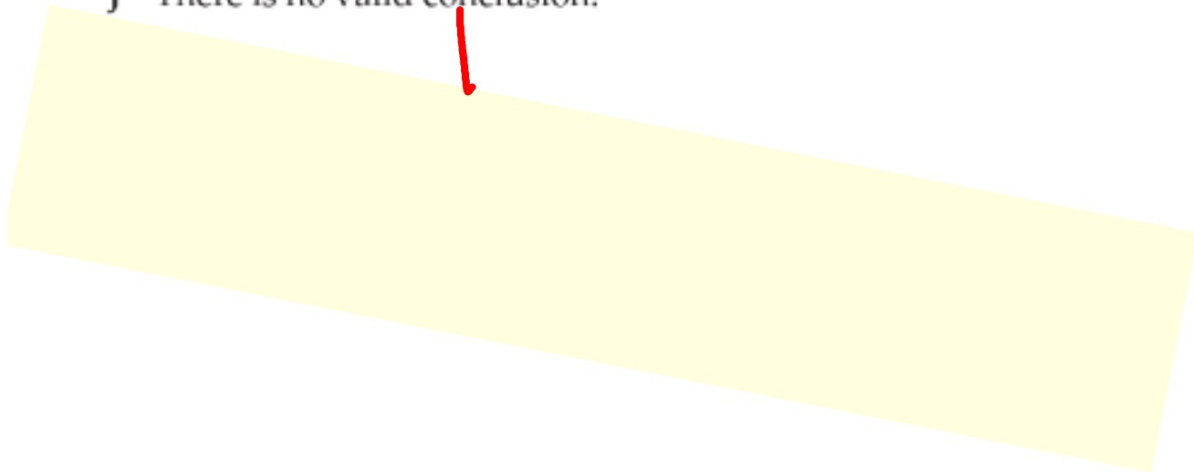
(2) If you are tired, then you will not do well on the test.

~~X~~ 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.



Do they chain together?



Standardized Test Example 4 Law of Syllogism

Determine which statement follows logically from the given statements.

(1) If you like musicals, then you enjoy theater productions.

$$M \rightarrow T$$

(2) If you are an actor, then you enjoy theater productions.

$$A \rightarrow T$$

- A If you are an actor, then you like musicals.
- B If you like musicals, then you are an actor.
- C If you do not enjoy musicals, then you are not an actor.
- D There is no valid conclusion.



Example 5 Apply Laws of Deductive Reasoning

Draw a valid conclusion from the given statements, if possible. Then state whether your conclusion was drawn using the Law of Detachment or the Law of Syllogism. If no valid conclusion can be drawn, write *no valid conclusion* and explain your reasoning.

Given: If you are 16 years old, then you can apply for a driver's license. Nate is 16 years old.

p: You are 16 years old.

q: You can apply for a driver's license.

$16 \rightarrow DL$ law of
 16 detachment

 DL

If you work hard get raise
got a raise

no valid cond.

If 21 you can vote
21

Tim can vote.

If cats can talk then purple.

purple

invalid

If moon is green then
dogs can fly.

moon is green
dogs can fly

L. O. D		premise
$A \rightarrow B$		major premise
A		minor "
<hr/>		
B		Conclusion

L. O. S.

$(A) \rightarrow B$
 $B \rightarrow C$
 $C \rightarrow (D)$

$A \rightarrow D$

11-33 odds
 35-40
 p122