

2-4 Deductive Reasoning

Deductive reasoning:	Inductive reasoning (2-1):
uses facts , rules, definitions , or properties to reach logical conclusions from conditional statements.	uses a number of <u>specific examples</u> to arrive at a conclusion (conjecture).

THINK: How does deductive reasoning apply to health?

How is deductive reasoning different from inductive reasoning?

inductive reasoning uses patterns to make an educated guess, which may or may not be true, deductive reasoning uses rules to reach a logical conclusion

Laws of Deductive Reasoning:

Two of many rules to analyze the pattern of an argument.

Law of Detachment: If $p \rightarrow q$ is a true conditional statement and p is true, then q is true.

A form of deductive reasoning that is used to draw conclusions from _____ conditional statements.

EXAMPLE: Given $p \rightarrow q$: If Jim goes to college, then he is a high school graduate.

P is true: Jim goes to UVA.

$\therefore q$ is true: \therefore Jim is a high school graduate. True, therefore it is valid

\therefore means therefore

YOU TRY:

1. **Given:** If 75% of the prom tickets are sold, then the prom will be held at the country club.

75% of the prom tickets were sold.

\therefore The prom will be held at the country club Valid or Invalid?

2. **Given:** If two angle are congruent, then they have the same measure.

$\angle C \cong \angle D$

$\therefore \angle C$ and $\angle D$ have the same measure Valid or Invalid?

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

Figure A is a polygon.

\therefore no valid conclusion can be made : it could be a triangle Valid or Invalid?

Law of Syllogism: If $p \rightarrow q$ and $q \rightarrow r$ are true conditional statements, then $p \rightarrow r$ is true.

Another valid form of deductive reasoning that allows you to draw conclusions from two true conditional statements when the **conclusion** of one statement is the **hypothesis** of the other. This law of logic similar to the **transitive** property of equality (If $a = b$, and $b = c$, then $a = c$).

EXAMPLE: Given: $p \rightarrow q$: If it is cold, then my car will not start.

$q \rightarrow r$: If my car will not start, then I will be late to school.

$\therefore p \rightarrow r$: \therefore If it is cold, then I will be late to school. True, therefore it is valid

YOU TRY:

4. **Given:** If you like musicals, then you enjoy theater productions.

If you like theater productions, then you are an actor.

\therefore If you like musicals, then you are an actor. Valid or Invalid?

5. **Given:** If you drive at 80 mph, then you are breaking the law.

If you break the law, you may be given a traffic citation.

\therefore If you drive at 80 mph, then you may be given a traffic citation. Valid or Invalid?

6. **Given:** If you do not get enough sleep, then you will be tired.

If you are tired then you will not do well on the test.

\therefore If you do not get enough sleep, then you will not do well on the test. Valid or Invalid?

2-4 Deductive Reasoning Practice

Determine if a conclusion can be reached from the two given statements using the law of detachment or the law of syllogism. If a conclusion is possible, state it and the law that is used. If a conclusion does not follow, state "no conclusion".

1. If Jim is a Texan, then he is an American.
Jim is a Texan.
Jim is an American (detachment)
2. If Spot is a dog, then he has four legs.
Spot has four legs.
no conclusion
3. If Rachel lives in Tampa, then Rachel lives in Florida.
If Rachel lives in Florida, then Rachel lives in the U.S.A.
If Rachel lived in Tampa, then Rachel lives in the U.S.A. (syllogism)
4. If October 12 is a Monday, then October 13 is a Tuesday.
October 12 is a Monday.
October 13 is a Tuesday. (detachment)
5. If Henry studies his algebra, then he passes the test.
If Henry passes the test, then he will get a good grade.
If Henry studies his algebra, then he will get a good grade. (syllogism)

Determine if statement 3) follows from statements 1) and 2) by the law of detachment or the law of syllogism. If it does, state which law was used.

6. 1) If the measure of an angle is greater than 90° , then it is obtuse.
2) $m\angle T$ is greater than 90° .
3) $\angle T$ is obtuse.
valid by law of detachment
7. 1) If Pedro is taking history, then he will study about World War II.
2) Pedro will study about World War II.
3) Pedro is taking history.
does not follow, no conclusion
8. 1) If Julie works after school, then she works in a department store.
2) Julie works after school.
3) Julie works in a department store.
valid by law of detachment
9. 1) If William is reading, then he is reading a magazine.
2) If William is reading a magazine, then he is reading a magazine about computers.
3) If William is reading, then he is reading a magazine about computers.
valid by law of syllogism
10. 1) A vocalist can read music. If a person is a vocalist, then she can read music.
2) Ann Marie can read music.
3) Ann Marie is a vocalist.
does not follow, no conclusion