# Notes: **DEDUCTIVE REASONING**

**Content Objective:** ***I will be able to apply deductive reasoning to find conclusions based on given data.***

| TERM | DESCRIPTION | EXAMPLE |
|---|---|---|
| **DEDUCTIVE REASONING** | **Deductive reasoning is the use of _____, _____, accepted _____, and the laws of _____ to form a logical argument.** | |

***Deductive Reasoning*** ***contrasts with inductive reasoning in that a specific conclusion is arrived from a general principle.***

| TERM | DESCRIPTION | EXAMPLE |
|---|---|---|
| **LAW OF SYLLOGISM** | **The conclusion of the first statement is the hypothesis of the 2nd statement.** | **1. If it snows today, then I will wear gloves.**<br>**2. If I wear gloves today, then my fingers will get itchy.** |
| | **The final statement is made up of the hypothesis of the first statement and the conclusion of the second statement.** | **Conclusion:**<br>**3. If it snows today, then my fingers will get itchy.** |
| **LAW OF DETACHMENT** | ***If the hypothesis of a true conditional statement is true, then the conclusion is also true.*** | ***1. If a point is a midpoint of segment, then it divides the segment into two congruent segments.***<br>***2. M is the midpoint of*** $\overline{AB}$.<br>***Conclusion:***<br>***3.*** _____ |

***NOTE:*** ***Not all Deductive Reasoning statements are valid.***
***For example:***
***1. If a man eats steak, then he is a linebacker.***
***2. John eats steak.***
***Conclusion:***
***3. Therefore, John is a linebacker.***

**EXAMPLE 1: USING THE LAW OF SYLLOGISM Determine a conclusion based on the following observations.**

1. Every time a batter reaches first base, the next batter hits a double.

2. Every time a batter hits a double, the runner on first scores.

3. Jon reaches first base.

Conclusion: _____

**QUICK CHECK:**

1. When the sun shines, the grass grows.

2. When the grass grows, the grass needs to be cut.

3. The sun shines.

Conclusion: _____

**EXAMPLE 2: USING THE LAW OF DETACHMENT Determine a conclusion based on the following observations.**

1. If an angle is less than 90°, then it is acute.

2. ∠A is less than 90°.

Conclusion: _____

## QUICK CHECK: USING THE LAW OF DETACHMENT

1. If two angles are right angles, then they are congruent.

2. $\angle X$ and $\angle Y$ are right angles.

Conclusion: _____

**EXAMPLE 3:**
Given the statements:

1. If the winds are above 20 knots, then I will not go sailing.
2. I am sailing.

Which conclusion must be true?

A) The winds are increasing in intensity.

B) The winds are above 20 knots.

C) The winds are not above 20 knots.

D) The winds are decreaing in intensity.

**QUICK CHECK:**
Given the statements:

1. If a number ends in 0, then it is divisible by 10.
2. If a number is divisible by 10, then it is divisible by 5.

Which conclusion must be true?

A) If a number ends in 5, then it is divisible by 10.

B) If a number ends in 0, then it is divisible by 3.

C) If a number ends in 0, then it is divisible by 5.

D) If a number ends in 0, then it is divisible by 8.

**QUICK CHECK:**
Given the statements:

1) If three points are non-collinear, then there is exactly one plane through the three points.
2) Points A, B, and C are non-collinear.

A) An infinite number of planes pass through pts. A, B, and C.

B) Only one plane passes through points A, B, and C.

C) No planes pass through pts. A, B, and C.

D) No conclusion can be reached.

## EXAMPLE 4:

**Solve the following logic problem, filling in the blanks at the end of the problem.**

Three Little Pigs

The three little pigs, as you know, built houses—one of straw, one of sticks, and one of bricks. By reading the six cues, figure out which pig built each house, the size of each house, and the town in which each house was located. Use a chart to keep track of your information and your logic.

| | Town | Size | Material |
|---|---|---|---|
| Patricia Pig | | | |
| Penny Pig | | | |
| Peter Pig | | | |

1. Penny Pig did not build a brick house.
2. The straw house was not medium sized.
3. Peter's house was made of sticks, and it was neither medium nor small.
4. Patricia Pig built her house in Pleasantville.
5. The house in Hillsdale was large.
6. One house was in a town called Riverview.

| | Town | Size of House | Material |
|---|---|---|---|
| Patricia Pig | _____ | _____ | _____ |
| Penny Pig | _____ | _____ | _____ |
| Peter Pig | _____ | _____ | _____ |