

Deductive Reasoning

Deductive Reasoning - Uses the laws of logic to reach a conclusion.

Law of Detachment - If $p \rightarrow q$ is true and p is true, then q is true.

$$\begin{array}{l} p \rightarrow q \\ p \\ \hline \therefore q \end{array}$$

Law of Syllogism - If $p \rightarrow q$ is true and $q \rightarrow r$ is true, then $p \rightarrow r$ is true.

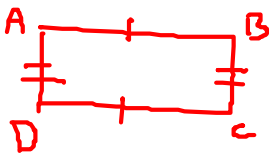
$$\begin{array}{l} p \rightarrow q \\ q \rightarrow r \\ \hline \therefore p \rightarrow r \end{array}$$

Directions: Determine if statement (3) follows from statements (1) and (2) by the Law of Detachment or the Law of Syllogism.

1. (1) If a quadrilateral is a rectangle, then its opposite sides are congruent. $p \rightarrow q$

(2) $\overline{AB} \cong \overline{CD}$ and $\overline{AD} \cong \overline{BC}$. q

→ (3) $ABCD$ is a rectangle. p



$\frac{q}{\therefore p}$
invalid

2. (1) If an angle is obtuse, then it is not acute. $p \rightarrow \sim q$

(2) $\angle 1$ is obtuse. p

→ (3) $\angle 1$ is not acute. $\sim q$

$$\begin{array}{l} p \rightarrow \sim q \\ p \\ \hline \therefore \sim q \end{array}$$

Law of Detachment

3. (1) Vertical angles are congruent. R is the X's P are V, then they are \cong .
- (2) If two angles are congruent, then their measures are equal.
- (3) If two angles are vertical, then their measures are equal.
- P R



Law of Syllogism

Directions: Determine if a valid conclusion can be reached from the two true statements using the Law of Detachment or the Law of Syllogism.

4. (1) If two angles are vertical, then they do not form a linear pair. $P \rightarrow \sim Q$
- (2) If two angles are vertical, then they are congruent. $P \rightarrow R$
- P $\sim Q$
- P R

No valid conclusion possible

5. (1) If two lines intersect to form a right angle, then they are perpendicular. $P \rightarrow Q$
- (2) ℓ and m are perpendicular. Q
- P Q
- Q

No valid conclusion possible

6. (1) If an angle is obtuse, then its measure is greater than 90° . $P \rightarrow Q$
- (2) $\angle 1$ is obtuse. P
- P Q
- P

∴ $\angle 1$ is greater than 90° .