

Concerning proposed construction of industrial facilities near schools:

Taking, for instance, that found on the West Virginia Department of Education website ([wvde.state.wv.us/policies/](http://wvde.state.wv.us/policies/)), Policy 6200, School Buildings and Sites, Legislative Rule Series 172, Title 126, section 202.06,

For the safety of students, **the [school] site shall be located away from** hazards and undesirable environments, such as:

- a. Railroads, arterial highways, heavily traveled streets, traffic and congestion
- b. Noise, toxic gas escapes from railroads, airports, and **odoriferous plants or industries**
- c. Natural barriers limiting accessibility and expandability, such as rivers, lakes, swamps, and protruding ridges
- d. High voltage transmission lines, booster or reduction stations, high pressure gas lines, and transformer stations
- e. Taverns, fire stations, bulk storage plants for flammable liquid, and **property zoned as industrial**

There may be some confusion over whether a policy such as the above - a school cannot be built near heavy industry - implies that heavy industry cannot be located near a school. One in fact does imply the other as shown below with simple truth tables:

Let H and S be defined as follows:

H: heavy industry

S: school

Basically, the above policy states that if H (heavy industry) exists, then S (school) cannot exist.

Using the symbols of truth tables, an arrow ( $\rightarrow$ ) is used for logical implication, connecting an antecedent with a conclusion. A squiggly line ( $\sim$ ) is used for negation.

Therefore, we have the following meanings:

$\sim S$             no school  
 $H \rightarrow \sim S$         if heavy industry, then no school

Therefore, the above policy can be written  $H \rightarrow \sim S$ .

Note that a statement of logical implication is true in every case EXCEPT when the antecedent is true and the conclusion is false.

Now, in determining whether heavy industry can be built near a school, we need to first state the two truths, that 1) we have a policy already stating that if heavy industry exists then no school (written  $H \rightarrow \sim S$ ), **and** 2) we have a school (written S).

Using the symbols of truth tables, an upside-down V (^) is used for the connector word "and".

Note that a compound statement using "and" is true if and only if both simple statements are true.

Basically, we need to construct a truth table to arrive at the truth values for the following argument:

$$[(H \rightarrow \sim S) \wedge S] \rightarrow \sim H$$

translated

[(if heavy industry leads to no school) and there is a school] then no heavy industry

H	S	$\sim S$	$H \rightarrow \sim S$	$(H \rightarrow \sim S) \wedge S$	$\sim H$	$[(H \rightarrow \sim S) \wedge S] \rightarrow \sim H$
T	T	F	F	F	F	T
T	F	T	T	F	F	T
F	T	F	T	T	T	T
F	F	T	T	F	T	T

The fact that the last column shows "True" for all situations means that we have a valid argument, the no heavy industry can be built near a school.