

## Logic Resource Sheet

This table is NOT given to you.

In symbols	This is called	Meaning	In set notation this is equivalent to
$p \wedge q$	conjunction	Both $p$ and $q$ at the same time	$A \cap B$ , the intersection
$p \vee q$	disjunction	Either $p$ or $q$ , or both	$A \cup B$ , the union
$p \underline{\vee} q$	exclusive disjunction	Either $p$ or $q$ , but not both	$A \cup B - A \cap B$
$p \Rightarrow q$	implication	One thing leads to another. In English it is usually stated as ' $p$ implies $q$ ' or 'if $p$ then $q$ '.	$A \subset B$ , subset
$p \Leftrightarrow q$	equivalence	Each statement implies the other statement (like a two-way implies relationship)	$A = B$

The following table IS given to you, but WITHOUT the last row of explanation.

$p$	$q$	$\neg p$	$p \wedge q$	$p \vee q$	$p \underline{\vee} q$	$p \Rightarrow q$	$p \Leftrightarrow q$
T	T	F	T	T	F	T	T
T	F	F	F	T	T	F	F
F	T	T	F	T	T	T	F
F	F	T	F	F	F	T	T
These are the four possible combinations of outcomes for the two propositions.		not $p$ (the opposite of $p$ )	both $p$ and $q$	$p$ or $q$ or both $p$ and $q$	$p$ or $q$ but not both	For this statement to be true, if $p$ is true then $q$ must also be true; if $p$ is false then $q$ can be either.	$p$ and $q$ should be the same for this to be true.

**Summary of the Truth Table ~ NOT given to you.**

Conjunctions ( $\wedge$ ) are only true when both statements are true.

Disjunctions ( $\vee$ ) are true as long as at least one statement is true.

Exclusive Disjunctions ( $\underline{\vee}$ ) are true when only one statement is true.

Implications (If  $\Rightarrow$  Then) are only false going from true to false.

Equivalence Statements (If and Only If  $\Leftrightarrow$ ) are true when the statements have the same truth value.

Negations ( $\neg$ ) have the opposite truth value