

If-Then Statements

The compound statement "If p , then q " is symbolized by $p \rightarrow q$.
 The compound statement formed by connecting statements "if-then" is called a **conditional statement**.
 The symbol for "if-then" is \rightarrow .

In a conditional statement, the statement before the \rightarrow connective is called the **antecedent**. The statement after the \rightarrow connective is called the **consequent**.
 antecedent \rightarrow consequent

Example 3: Let p and q represent the following simple statements:

p : A person is a father.

q : A person is a male.

Write each compound statement below in symbolic form.

- a. If a person is not a father, then that person is not a male. b. If a person is a male, then that person is not a father.

TABLE 3.5 Common English Expressions for		
Symbolic Statement	English Statement	Example p : A person is a father. q : A person is a male.
$p \rightarrow q$	If p then q .	If a person is a father, then that person is a male.
$p \rightarrow q$	q if p .	A person is a male if that person is a father.
$p \rightarrow q$	p is sufficient for q .	Being a father is sufficient for being a male.
$p \rightarrow q$	q is necessary for p .	Being a male is necessary for being a father.
$p \rightarrow q$	p only if q .	A person is a father only if that person is a male.
$p \rightarrow q$	Only if q , p .	Only if a person is a male is that person a father.

Example 4: Let p and q represent the following simple statements:

p : We suffer huge budget deficits.

q : We control military spending.

Write the compound statement below in symbolic form.

- a. Suffering huge budget deficits is necessary for not controlling military spending.

If-and Only-If Statements

If p and q represent two simple statements, then **the compound statement "p if and only if q" is symbolized by $p \leftrightarrow q$** .
 The compound statement formed by connecting statements with *if and only if* is called a **biconditional**.
 The symbol for *if and only if* is \leftrightarrow .
 The phrase *if and only if* can be abbreviated as *iff*.