

## Twelve ways to say: $p \Rightarrow q$ .

- (I) If  $p$ , then  $q$ .
- (II) If  $p$ ,  $q$ .
- (III)  $q$  if  $p$ .
- (IV)  $q$  when  $p$ .
- (V)  $p$  is sufficient for  $q$ .
- (VI)  $q$  is necessary for  $p$ .
- (VII) A sufficient condition for  $q$  is  $p$ .
- (VIII) A necessary condition for  $p$  is  $q$ .
- (IX)  $p$  implies  $q$ .
- (X)  $p$  only if  $q$ .
- (XI)  $q$  whenever  $p$ .
- (XII)  $q$  follows from  $p$ .

Try these with some everyday statements. For example:

$p$ : It rains.	$q$ : WWU's Red Square is wet.
$p$ : You score 100% on the final.	$q$ : You get an A in the class.
$p$ : It is sunny.	$q$ : We go to the beach.

Or some mathematical statements:

$p$ : $n$ is a positive integer.	$q$ : $2n^2$ is not a square number.
$p$ : A positive integer $n$ is divisible by 9.	$q$ : The sum of the digits in $n$ is divisible by 9.
$p$ : $n$ is a positive integer.	$q$ : $n(n+1)$ is even.
$p$ : $x^2 < x$	$q$ : $x > 0$ and $x < 1$ .