

Definition 3.23. [00Q] A formula is well formed if it meets all the rules in the list in [00G] and this additional rule: "given a well-formed formula ϕ where the variable x is free, a formula of the form " $\forall x, \phi$ ", or " $\exists x, \phi$ " is a well-formed formula."

We will say that a variable x is **free** in a well-formed formula if

- the formula is atomic and the variable x appears in it; or if
- the formula is of the form $\neg\alpha$ and the variable x is free in α ; or even if
- the formula is of the form $\alpha \wedge \beta, \alpha \vee \beta, \alpha \Rightarrow \beta, \alpha \iff \beta$ (or other logical connective introduced later) and the variable x is free in α or β .

So in the formulas $(\forall x, \phi)$ or $(\exists x, \phi)$, the variable x is no longer free; we will say that "the variable is quantified".