

# Notes

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The order of the quantifier words ("All", "there is", ...) and negation words must be the same as the order of the quantifier symbols and the negation symbol.

$$\exists x \forall y (S(x) \wedge P(x, y))$$
$$\equiv \exists x (S(x) \wedge \forall y P(x, y))$$
There exists a solid shape that points to all shapes.

$$\forall x \exists y \neg P(x, y) \equiv \forall x \neg \forall y P(x, y) \equiv \neg \exists x \forall y P(x, y)$$
No shape points to every shape. For all shapes there exists a shape that doesn't point to all shapes.  
All shapes do not point to all shapes.  
There does not exist a shape that points to all shapes.  
Every shape has a shape that it doesn't point to.

$\forall \neg$  translates to "no \_ does \_", NOT TO "every \_ does not \_"  
 $\neg \exists$  translates as "there does not exist" or "not any" or "no". DO NOT USE "not...some"

$$\exists x \forall y (C(y) \rightarrow \neg P(x, y))$$
Some shape...every circle...not  
There is a shape such that no circle is pointed to by it.  
There is a shape that points to no circle.  
There is a shape that does not point to any circle.

$$\exists (C(x) \wedge \forall (S(y) \rightarrow P(x, y)))$$
Some circle points to all of the solid shapes.

$$\neg \forall x \exists y (C(x) \rightarrow P(x, y)) \equiv \exists x (C(x) \wedge \forall y \neg P(x, y))$$