Language

Implications are not always stated exactly in the form, "If P is true, then Q is true."

The statements given below use alternative language to assert a conditional statement. For each one, determine the **hypothesis** and **conclusion**. Is the statement equivalent to the following statement?
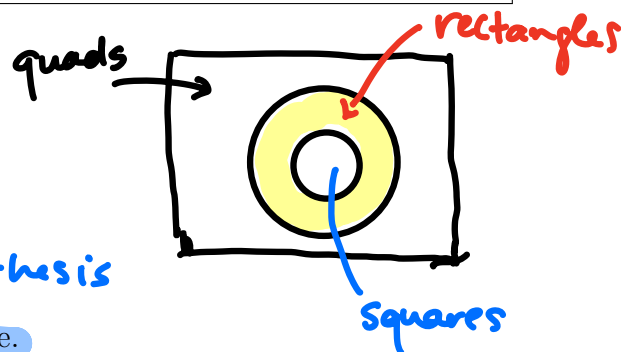
> P Q
> If *a quadrilateral is a square,* then *it is a rectangle.*

No 1. A quadrilateral is a square if it is a rectangle.

Conclusion if hypothesis

Yes 2. A quadrilateral is a rectangle whenever it is a square.

Conclusion whenever hypothesis

No 3. A quadrilateral is a square provided that it is a rectangle.

conclusion provided hypothesis

quads → rectangles

squares

Yes 4. For a quadrilateral to be rectangle, it is sufficient that it be a square.

For the conclusion to be true, it is sufficient that the hypothesis is true

the hyp. is "good enough" to show the conclusion

Yes 5. A quadrilateral being a square is a sufficient condition for it being a rectangle.

The hypothesis is a sufficient condition for the conclusion.

holds (but it may hold in other cases)

Yes 6. It is necessary that a quadrilateral be a rectangle for it to be a square.

It is necessary that the conclusion is true for the hypothesis to be true. (otherwise we have T→F)

No 7. For a quadrilateral to be a rectangle, it is necessary that it be a square.

For the hypothesis to be true, the conclusion is necessary.

("necessary" and "must" are synonyms)

No 8. A quadrilateral is a rectangle only if it is a square.

The hypothesis is true only if the conclusion is true.

Yes 9. A quadrilateral is not a square whenever it is not a rectangle.

This is the contrapositive ~Q→~P.

For any true conditional statement, the conclusion MUST hold when the hypothesis is true.