

# General Guidelines and Tips for Proof-Writing

## Understanding If \_\_\_\_, then \_\_\_\_ statements

Often we are proving an If \_\_\_\_, then \_\_\_\_ statement.

- Let 'P' stand for a statement and 'Q' stand for a statement.
  - Example:
    - P: "x is an odd number and y is an odd number."
    - Q: "x+y is an even number."
- We can combine these to make a new (larger) statement: "If P, then Q."
  - Example:
    - If P, then Q: "If x is an odd number and y is an odd number, then x+y is an even number."
- P is the given information. P is known to be true. P is called the *hypothesis*. This is information that can be (and should be) used in your proof.
- Q is what you are trying to prove. Q is *not yet* known to be true. Q is called the *conclusion*.

## Suggestions for Proof-Writing

1. **Familiarize yourself with the given (known) information.** This is what you have to work with. Often designated using 'Given: \_\_\_\_.' You will, more than likely, need it.
2. **Use diagrams.**
  - a. If a diagram is given, put the given information on the diagram.
  - b. If no diagram is given, then you probably will need to make your own diagram (especially if it is geometry 😊).
  - c. Label the diagram. Use the labels in your proof.
3. **Familiarize yourself with what you are trying to prove.** Often designated using 'Prove: \_\_\_\_.'
  - a. Be very clear (specific) for yourself on what you are trying to prove.
  - b. Do consider what you are trying to prove, but *do not* put on the diagram what you are trying to prove. (See next item.)
4. **Do not use what you are trying to prove in order to prove it.** This sounds obvious, but it is a common mistake to use what you are trying to prove midway through the proof.
5. **The last line of the proof should be what you are trying to prove.** Once you get to the point in the proof where you can logically conclude what you are trying to prove, *stop*. This is the end of the proof.
6. **The statements of the proof will be a logical progression** from the given information to what you are trying to prove.
7. **The reasons for each statement are the justification for the statement.** Every statement in a proof must have a reason (justification).

This page provides some general suggestions. It is important to look at examples of proofs and try to write some proofs yourself. There are additional things that could be said regarding if \_\_\_\_, then \_\_\_\_ statements. More could be added regarding indirect proofs and proof using mathematical induction.