

Example

You are about to leave for school in the morning and discover that you don't have your glasses. You know the following statements are true:

- (a) If I was reading the newspaper in the kitchen, then my glasses are on the kitchen table.
- (b) If my glasses are on the kitchen table, then I saw them at breakfast.
- (c) I did not see my glasses at breakfast.
- (d) I was reading the newspaper in the living room or I was reading the newspaper in the kitchen.
- (e) If I was reading the newspaper in the living room then my glasses are on the coffee table.

Where are the glasses?

Example

Answer

Let

RK = I was reading the newspaper in the kitchen.

GK = My glasses are on the kitchen table.

SB = I saw my glasses at breakfast.

RL = I was reading the newspaper in the living room.

GC = My glasses are on the coffee table.

Here is a sequence of steps you might use to reach the answer, together with the rules of inference that allow you to draw the conclusion of each step:

- (1) $RK \rightarrow GK$ by (a)
 $GK \rightarrow SB$ by (b)
 $\therefore RK \rightarrow SB$ by transitivity
- (2) $RK \rightarrow SB$ by the conclusion of (1)
 $\sim SB$ by (c)
 $\therefore \sim RK$ by modus tollens
- (3) $RL \vee RK$ by (d)
 $\sim RK$ by the conclusion of (2)
 $\therefore RL$ by elimination
- (4) $RL \rightarrow GC$ by (e)
 RL by the conclusion of (3)
 $\therefore GC$ by modus ponens

Thus the glasses are on the coffee table.