The Wumpus World is a classic problem used in artificial intelligence to demonstrate simple automated reasoning. Here's an overview of how to approach each aspect of the problem:

1. Knowledge Representation of Wumpus World Problem

In the Wumpus World, an agent explores a cave represented by a grid of rooms. The agent must avoid pits and a deadly Wumpus. The goal is to find gold and exit safely. The agent perceives its environment through breezes (near pits), stenches (near the Wumpus), and glitters (where gold is).

Representation:

- Let's denote:
    - *P(i,j)* for a pit at location (*i,j*).
    - *W(i,j)* for the Wumpus at location (*i,j*).
    - *G(i,j*) for gold at location (*i,j*).
    - *B(i,j)* for a breeze perceived at location (*i,j*).
    - *S(i,j)* for a stench perceived at location (*i,j*).
    - *Gl (i,j)* for glitter perceived at location (*i,j*).

The knowledge base can be represented using logical statements. For instance:

- *B(i,j)* is true if and only if there is a pit in an adjacent square:

  $B(i,j) \leftrightarrow (Pi+1,j \vee Pi-1,j \vee Pi,j+1 \vee Pi,j-1)$.

- Similar logical statements can be formulated for *S(i,j)* and *Gl (i,j)*.

2. Inference Rules for Wumpus World

The agent uses inference rules to deduce safe squares, the location of hazards, and the best actions to take. Some basic rules include:

- If a square is perceived with no breeze or stench, all adjacent squares are safe.
- If a stench is perceived but no breeze, the Wumpus may be in an adjacent square, but there are no pits adjacent.
- If a square has a breeze but no stench, there may be a pit in an adjacent square, but no Wumpus.

3. Solution for Wumpus World Problem Through Inference Rules

The solution involves the agent using its knowledge base and inference rules to navigate the grid safely. The agent maintains a mental map of safe locations and potential hazards. For example:

- The agent starts in (1,1)(1,1) and marks it safe.
- Upon perceiving a breeze, stench, or glitter, it updates its knowledge base.

- It uses inference to mark squares as safe or potentially dangerous and decides the next move, prioritizing unvisited safe squares.
- The process continues until the agent finds the gold and plans a safe return path to the entrance.

4. Entailment for Wumpus World Problem

Entailment in the Wumpus World involves deducing new knowledge from the existing knowledge base and inference rules. For instance, if the agent perceives a breeze in (1,2)(1,2) and no breeze in (2,1)(2,1), it can entail that (1,3)(1,3) and (2,2)(2,2) are potentially dangerous (may contain pits), while (3,1)(3,1) is safe.

Entailment is used continuously as the agent explores, acquiring new percepts that lead to new inferences about the state of the world, guiding the agent's actions towards the goal while avoiding hazards.