Give the problem state formulation for 8 puzzle problem

Theory	Here's the problem state formulation for the 8-puzzle problem:
	1. Initial State: Represented as a 3x3 grid, where each cell contains a number from 1 to 8, or a blank space (0). **2. Goal State:** A specific configuration of the tiles, typically arranged in ascending order with the blank space in the bottom right corner. **3. Operators:** Actions that can be performed to transition between states. In the 8-puzzle, the operators are moving the blank space up, down, left, or right, swapping its position with an adjacent tile. **4. Successor Function:** Given a state, generates the set of states that can be reached by applying a single operator. **5. Path Cost:** The cost associated with transitioning between states. In the 8-puzzle, each move typically has a cost of 1. **6. Solution:** A sequence of operators that transforms the initial state into the goal state.

	Additional Considerations:
	
	Heuristic Function: An estimate of the cost to reach the goal state from a given state. Used for informed search algorithms like A*.
	
	State Space Size: The 8-puzzle has a state space of 9!/2 = 181,440 states.
	
	Search Algorithm: Various search algorithms can be used to solve the 8-puzzle, including:
	    Breadth-First Search (BFS)
	    Depth-First Search (DFS)
	    A* Search
	    Iterative Deepening A* (IDA*)
	
	Minimum Step Count:
	The minimum number of steps required to solve any solvable 8-puzzle configuration is not fixed. It depends on the particular arrangement of tiles in the initial state.
	However, using an efficient algorithm like A* often leads to solutions that are close to the minimum possible number of steps.
	
	Additional Insights:
	While 31 steps might seem lengthy, it's worth noting that the 8-puzzle has a vast number of possible states (over 180,000). Finding a solution in a reasonable amount of time is a testament to the effectiveness of the A* algorithm.

Problem Formulation	**1. State:** Represented as a 3x3 grid, where each cell contains a number from 1 to 8, or a blank space (0). **2. Initial State:** The specific configuration of tiles at the beginning of the puzzle. Can be any arrangement of the tiles, as long as it's possible to reach the goal state from it.

3. Transition Model:

Defines how to move from one state to another.
In the 8-puzzle, the actions are moving the blank space up, down, left, or right, swapping it with an adjacent tile.

4. Actions:

The specific moves that can be performed:
Move blank up
Move blank down
Move blank left
Move blank right

5. Goal Test:

A function that determines if a given state is the goal state.
In the 8-puzzle, the goal state is typically when the tiles are arranged in ascending order with the blank space in the bottom right corner.

6. Path Cost:

The cost associated with each move.
In the 8-puzzle, each move typically has a cost of 1.

Example:
State: 7 2 4 | 5 0 6 | 8 3 1
Initial State: Same as above
Transition Model: Move blank up, down, left, or right
Action: Move blank right
Goal Test: Tiles in ascending order, blank in bottom right
Path Cost: 1 (for each move)