Worked Example 1 — Tiny Markov Chain (3 states)

Goal: encode a 3-state chain with transitions:
A→(A:1/2,B:1/4,C:1/4); B→(A:1/3,B:1/3,C:1/3); C→(C:1).

Dictionary: ranks {A=Ace,B=2,C=3}; suits carry destination bins (♣=A, ♠=B, ♦=C, ♥=unused).
Face-up = token present. Piles: one row per source.

Build:
• Make piles A,B,C. For A, place 4 face-up tokens: 2×♣,1×♠,1×♦.
• For B: 3 tokens 1×♣,1×♠,1×♦. For C: 1 token 1×♦.
Interaction:
• Blue deck lists source tokens row-wise. Red deck lists paired destinations; i-th Blue aligns to i-th Red suit.
Checks: P pass (row reversal keeps counts). M pass if suit bins independent of color. Δ pass (adjacent tweak). S pass if we only tighten declared bounds.
Readback: normalize per-row destination counts to probabilities.

Worked Example 2 — 3-State Controller (Idle/Heat/Cool)

Spec: States {Idle,Heat,Cool}. Input temp {Low,OK,High}. Outputs: heat_on,cool_on.
Policy: Idle→Heat if Low, Idle→Cool if High; Heat stays on Low else→Idle; Cool stays on High else→Idle.

Dict: ranks Idle=A, Heat=2, Cool=3. Suits encode input (♣=Low, ♠=OK, ♦=High). Parity: red=heat_on, black=cool_on. Cut separates state block from I/O.

Two-deck map:
• Blue enumerates (state,input). • Red gives next-state with parity flag for output.
Checks: P pass; M pass if we swap output semantics; Δ pass (local rule tweak); S: safety bound only tightens.
Readback: for each Blue row, paired Red row = target state; parity = which output bit is 1.

Worked Example 3 — Toy Reaction Network (A + B → C)

Stoichiometry: A + B → C; optional leak C→A (tiny).

Dict: suits species (♣=A, ♠=B, ♦=C, ♥=solvent). Rank encodes quantity bucket. Face-up=present.
Piles are compartments (reactor, environment). Cut separates before→after.

Before: reactor has ♣ and ♠ face-up. Move: rewrite pair (♣,♠) to one ♦ face-up (Δ-lift).
Optional leak via auxiliary token pile.

Two-deck view: Blue=pre multiset, Red=post. Row-wise alignment encodes rewrite.

Checks: P pass; M fails unless relabeled chemistry (declared); Δ pass; S: tighten max-C bound
only after evidence.
Readback: count species suits in reactor after move; conservation visible modulo leak.