

Puzzleforge — Concept Poster

Print this and pin it up — an at-a-glance map of the Puzzleforge cast and the ideas each one carries. Come back to it whenever you want to remember who teaches what.

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Meet the cast — and what each one teaches

Character	What they carry
Nestor	Recursion / decomposition — solves the big tower by first solving the smaller tower off to the side (Hanoi self-reference)
Minim	Optimality — refuses any solution longer than the fewest possible moves
Wend	State-space search — maps which positions are reachable before committing to a move
Evan	Parity / solvability — counts the tile-swaps mod 2 and knows at a glance if a scramble can ever be solved
Faro	Look-ahead / planning — looks several moves ahead to clear a path before touching a piece
Skiff	Constraint satisfaction — ferries across the river without ever leaving the wolf with the goat
Gill	GCD / number reasoning — measures an exact amount by pouring back and forth between two jugs
Gray	Binary / Gray-code — frees the rings by changing exactly one at a time in a fixed order
Vault	Reduction / monovariant — jumps one peg over another and removes it, shrinking the board toward a single survivor
Sprocket	The workshop keeper (mentor) — frames 'make your solving strategy visible' and normalizes being stuck

Key ideas at a glance

The big concepts this cast helps you master:

- recursion — solve the smaller tower first (Tower of Hanoi)
- optimality — the fewest moves ($2^n - 1$) and why it is the minimum
- sliding-tile (15-puzzle) — blank-adjacent moves and when a scramble is

solvable

- state-space search — states, moves, and which positions are reachable
 - look-ahead planning — clear a path by thinking several moves ahead (sliding-block / Rush Hour)
 - constraint satisfaction — never break the rule (wolf-goat-cabbage; missionaries-cannibals)
 - GCD / number reasoning — measure exact amounts by pouring between two jugs
 - binary / Gray-code counting — free the rings by changing exactly one at a time
 - reduction / monovariant — jump-and-remove toward a single survivor (peg solitaire)
 - recursion — self-similarity, base case, and the recursive trace
 - parity invariants — the mod-2 argument, generalized across puzzles
 - search strategies — breadth-first vs depth-first intuition
 - constraint satisfaction — modeling, pruning illegal states, and constraint propagation
 - optimality proofs — lower bounds and why you cannot do better
 - number reasoning — gcd, modular arithmetic, and binary behind puzzle moves
 - synthesis — mixed review connecting recursion, search, parity, constraints, optimality, gcd, and reduction
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