



Levels from rules, tuned by bots, finished by hand

Five shipped games, five kinds of level: a power climb, a match-3 journey, tower-defense waves, an idle island and a language puzzle. Every level here is real, read from the games' data files, and every number comes from bots that play the shipped rules.

How I build a level set

1. **Write the rules a level must obey**, as numbers:
what the weakest player must be able to do, what the best player should be tempted by, where a new idea first appears.
2. **Generate the set from those rules** (a Python layout script, a level formula), so the whole curve exists early and can be replayed.
3. **Measure it with bots** that play the real rules at human pace: win rate, stars, resources, tries.
4. **Fix the outliers by hand**, then re-measure. The data finds the walls; I decide what the fix should feel like.

Targets I tune to

- A new mechanic arrives alone, on a level the player is likely to win.
- Difficulty is a sawtooth: a spike (a gate, a boss, a hard climb), then a breather.
- No wall: the weakest realistic player wins most normal levels and can always progress.
- Skill shows: the best player earns visibly more (stars, paint, foil, time).

24

climbs, 3 lanes each
(Brushfall)

85

match-3 levels, 11
shapes (Arcana
Match)

12

sieges of 10 waves
(Arcana Siege)

22

build pads per
island (Skyport)

6

language puzzles
(Mouth of Silence)

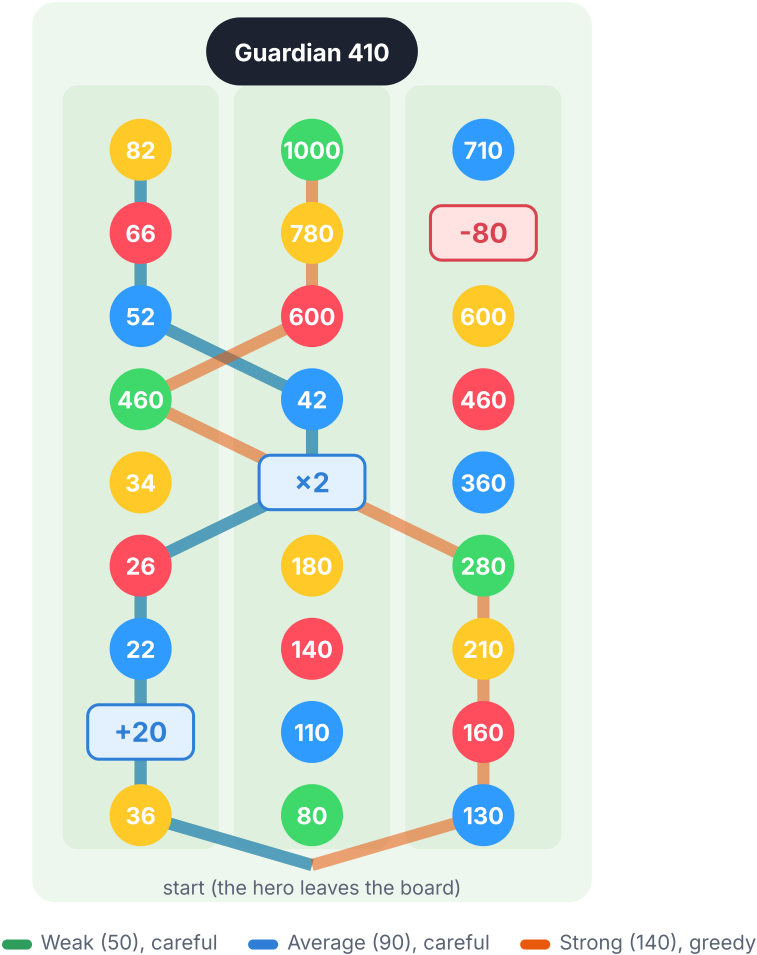
Contents

- 2 Brushfall: anatomy of a climb (three heroes, three lanes)
- 3 Brushfall: the chapter curve, and a problem fixed at a cost
- 4 Arcana Match: eleven board shapes and the gates
- 5 Arcana Match: 85 levels from one formula, and the walls the bot found
- 6 Arcana Siege: teaching with waves, and a campaign sawtooth
- 7 Cloudhaven Skyport: an island as a level
- 8 The Mouth of Silence: puzzle levels, one rule at a time

Playable at ueren.itch.io; documents at umuterendemirci.github.io.

Anatomy of a climb: “Gate Garden”

Level 5 of 24. The hero walks up three lanes and eats every monster smaller than itself; a monster bigger than the hero eats it. The 30-second match-3 charge before the climb decides how strong the hero starts.



The lane rule

Every level is laid out from three heroes leaving the board: weak (50 power), average (90) and strong (140). Each lane's monsters are a share of the power *the hero who would walk it* has on that row:

LANE	SIZED FOR	PROMISE
Left	Weak hero	Always a safe snack
Middle	Average hero	Just out of a weak hero's reach
Right	Strong hero	The feast; only a big board (or a shield) gets in

Because each lane grows with the hero who walks it, a hero who snowballs on one side can't simply cross over later: the other side has grown too. You can only move one lane a row, so every row is a choice between a safe snack, a rich meal and a danger.

Gates, placed by hand

+20 on the safe side early (row 2) rescues a slow start; **×2** in the middle (row 5) is the ad moment, worth reaching for; **-80** on the rich side (row 8) taxes greed late, where it hurts most.

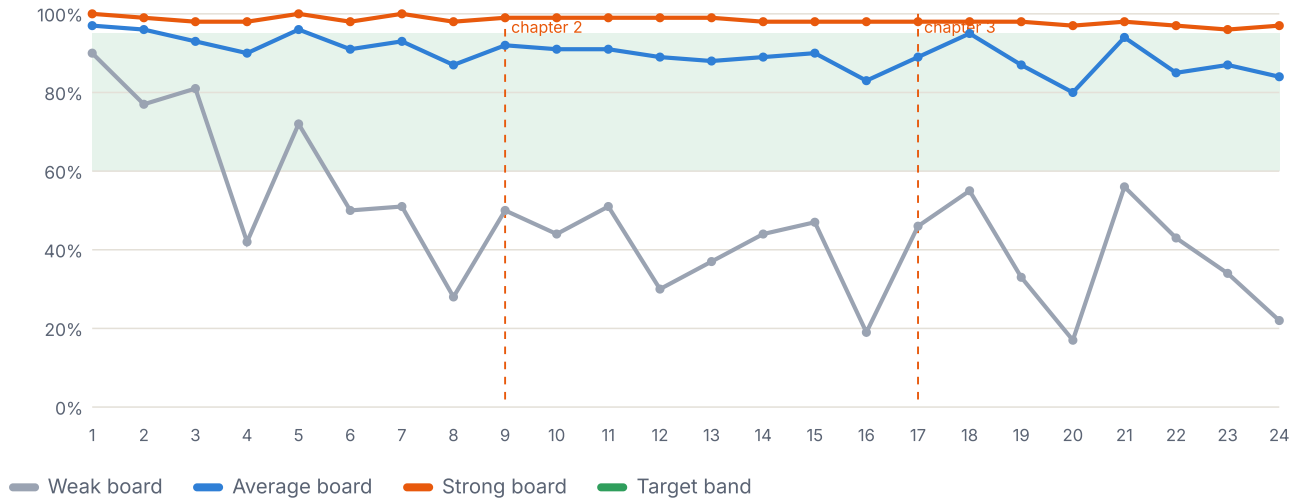
What the bots say

72% weak wins (guardian 410, weak arrives with 508)	96% average wins, 2.3 stars	2,265 strong, greedy: power at the guardian
--	---------------------------------------	---

The guardian is set just under what a **careful weak player** brings up the safe side, not the perfect route: a weak board wins narrowly, and every extra point of charge shows up as lane choices, not just a bigger number.

24 climbs: a sawtooth with two hard levels a chapter

Win rate per climb, 300 climbs per player per level. The band is the target for normal climbs (60–95% for a weak player); the dips are the hard climbs, sized for an average board, which a weak player replays.

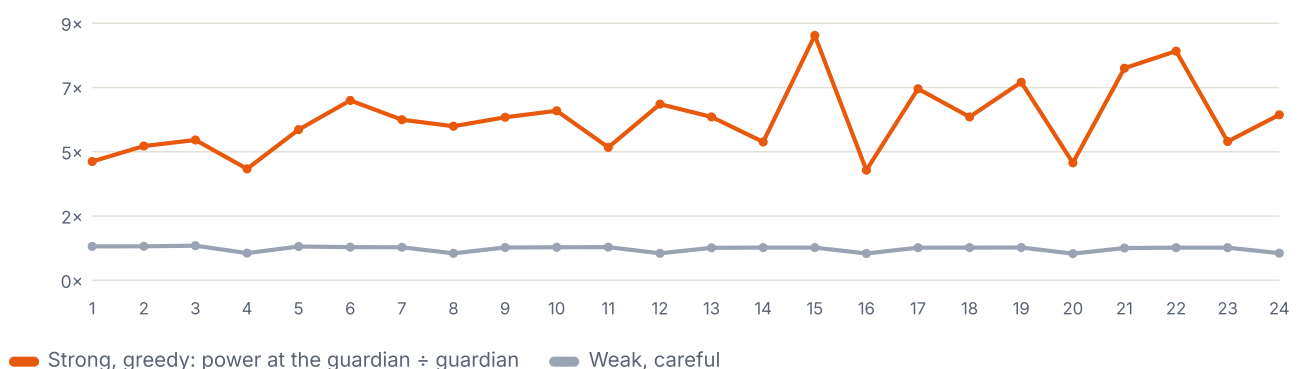


Pacing inside a chapter

- **One new idea at a time:** gates from the first climb, minus gates from the third, the first hard climb on the fourth; restorations arrive between climbs.
- **Every 4th and 8th climb is hard** (sized for an average board): the dips above. Weak players win 17–42% of them and come back with a better charge.
- **Colour cycles follow the painting:** chapter 2's monsters drop the yellow, blue and green the Wheat Field needs.

A problem, measured and fixed

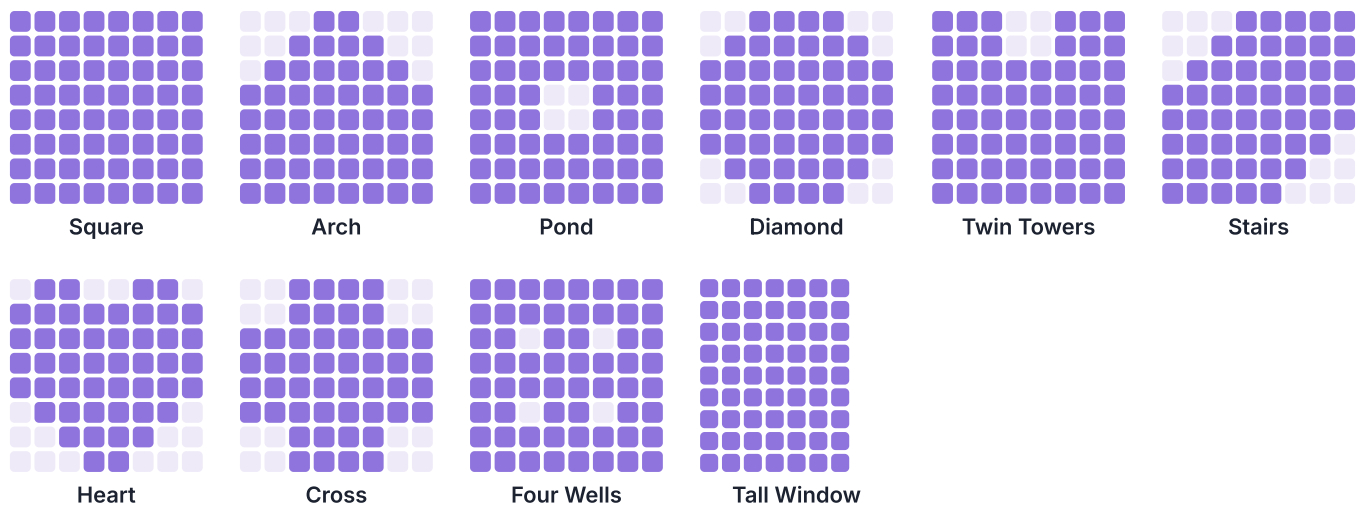
A playtest found strong heroes reaching thousands of power. The data agreed: a greedy strong hero met the guardian with a median 22× its power. The cause was the eat rule: a meal added the monster's full power, and the rich lane sits just beyond the average hero, so a strong hero nearly doubled every row. Now a meal adds at most 30% of the hero's power and the ×2 gates left the rich lane: the median is 6× (a careful weak hero about 1.2×).



What it cost, and the next iteration: weak players now win 33–90% of normal climbs, below the band on most of them (they were 53–95%). They are eaten on the way up, not by the guardian, so a lower guardian doesn't help. Next I'd trace where weak heroes are eaten and re-lay the safe lane for them, then check stars, the economy and the Grand Climb tiers again.

Eleven board shapes, one rotation

Levels 1–4 teach on a plain 8×8 square. From level 5 the board takes the next shape in an eleven-entry rotation, so the journey keeps looking new without hand-placing 85 boards.



The ten shapes as defined in the game's code (BoardShapes.cs); the plain square appears twice in the rotation, which makes eleven.

Rules for the shapes

- **Eleven, not twelve:** the rotation drifts against the four-level chapters, so every shape lands on a gate at some point.
- **Goals scale with open cells:** a 52-cell Arch asks for about 80% of a square's goal.
- **Holes in the middle break cascades** (Pond, Four Wells): those shapes take a smaller goal ($\times 0.8$) and fewer blockers.
- **Gravity slides tiles diagonally** around holes, and no fixed blocker may touch another or a hole, so every cell always refills. A test deals and plays every level of the journey to prove it.

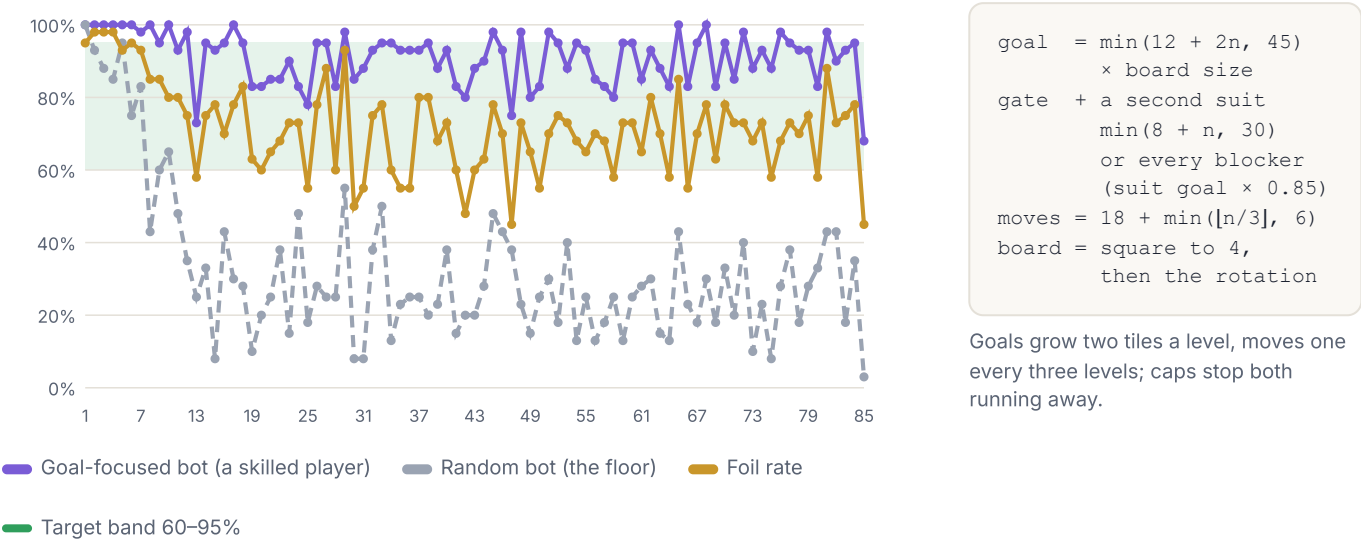
Gates: a blocker that fits the card

GATE	BLOCKER	WHY IT FITS
II · High Priestess	Veils	Her curtain spills onto the road
V · Hierophant	Shackles	Old rules bind
VII · Chariot	Stone Seals	Slabs across the road
XIII · Death	Stone Seals	Gravestones
XIV · Temperance	Thick veils	Water poured slowly

Each blocker is introduced by Pip, the narrator, in the card's own terms, on a gate the player has a whole chapter of practice for. The mechanic arrives as story, not as a tutorial screen.

85 levels from one formula

The whole Fool's Journey is generated from a few rules, then every level is played by bots (40 games each). Hand-made levels can replace any of them; the formula is the floor, not the ceiling.



The walls the bot found

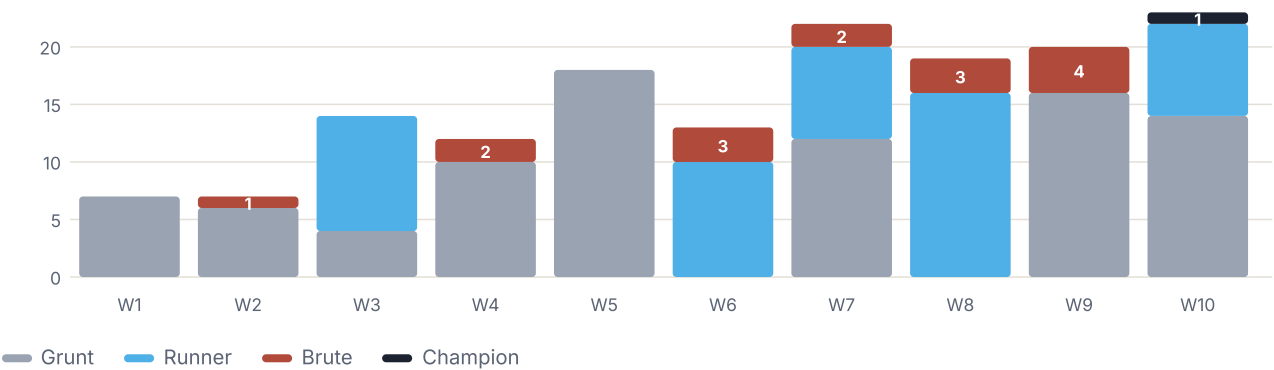
- **Late levels stalled** with every tile equally likely. A sweep of spawn weights chose **1.4×** for goal suits: level 18 went from **33% to 85%**, while foil stayed clearly harder.
- **Holey shapes were walls** (43-65%), thick veils on small boards 35%, shackles on Four Wells 40-45%. Fixes, each re-simulated: smaller goals on holey shapes, capped blocker counts, 15% less suit goal on blocker gates.
- **Result:** suit levels 75-100% (average 92%), gates 68-100% (average 89%); the random bot wins only 25% after level 40, so thinking matters.

The first chapters

LV	ROLE	BOARD	GOALS	MOVES	BOT
1	Prologue	Square	14 Wands	18	100%
2	Suit	Square	16 Cups	18	100%
3	Suit	Square	18 Swords	19	100%
4	Suit	Square	20 Pentacles	19	100%
5	Gate	Arch	18 Cups + 11 Swords	19	100%
6	Suit	Pond	19 Wands	20	100%
7	Suit	Diamond	21 Cups	20	98%
8	Suit	Square	28 Swords	20	100%
9	Gate	Twin Towers	24 Wands + 4 Veils	21	95%
10	Suit	Stairs	26 Pentacles	21	100%

Teaching with waves

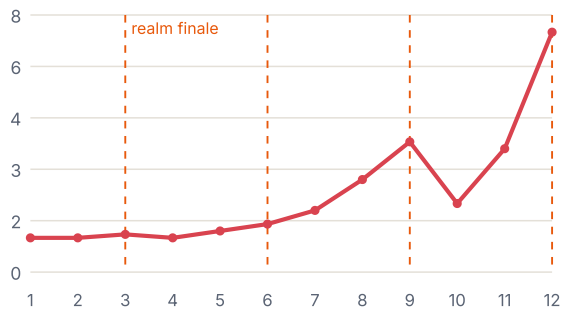
Siege 2, “The Magician's Ford”, introduces the armoured Brute: Fire and Tide glance off its armour, so the player has to find the Blade. Ten waves, read from the game's wave scripts.



How the waves teach

- **Wave 1: no Brute.** A grunt warm-up so the board and road are familiar again.
- **Wave 2: one Brute, alone, late** (6 s in), behind a short screen of grunts, with one tip: “Armoured: use the Blade”. The answer is a tower the player already owns.
- **Wave 3: no Brute either,** but a rush of runners, the Tide's job: the player keeps practising the old answer.
- **Wave 5: a breather** of grunts only, after the first real test in wave 4.
- **Waves 6–9: Brutes build from three to four,** mixed with runners, so the player splits attention between speed (Tide) and armour (Blade).
- **Wave 10: the champion,** the Ford Warlord: a Brute grown huge, with the realm's first boss music.

The campaign sawtooth



Average runs until each siege first falls, from a career bot that starts with nothing, banks gold and buys upgrades (100 careers). Each realm's finale is a wall; the next siege, with a new enemy and fresh upgrades, is a breather. Judgement at 7 tries is the number to watch in a playtest.

Playtest-driven: a professional at a mobile studio found the road too demanding; mashing won 87%. The road now walks only when the player moves: mashing fell to 10%, slow thinkers rose from 10% to 50%.

One new question per realm, always answered by a tower the player owns

REALM	NEW ENEMY	THE QUESTION IT ASKS	THE ANSWER	FINALE
Greenwood	Brute (60% armour)	Fire and Tide glance off	The Blade, specials	The Devil
Sunscorched Road	Shieldbearer	The first direct hit does nothing	Splash, many small hits	The Tower
Moonlit Marsh	Acolyte (heals)	The crowd mends itself	Strike the healer first	Death
Frozen Summit	Broodmother (splits)	Killing it makes three more	Kill it early, keep the Tide ready	Judgement

Armour and shields are mirror images: armour rewards one big Blade strike, a shield rewards many small hits, so no single colour is ever the right answer.

An island as a level

In an arcade idle game the level is the space and the order things open in. Cloudbhaven has 22 build pads in three fenced zones; each pad appears when the one before it in the chain is bought, so the next goal is always in view.



Every pad on a new player's timeline (simulator medians). Orange dots mark the gaps over 3½ minutes: the longest wait for a new player is 4:54. Zones are fenced, shaded and named before they open.

PAD	COST	NEW	EXPERT	PAD	COST	NEW	EXPERT
Bigger bag	10	0:23	0:14	Faster bag drop	450	25:41	24:00
Customs officer	280	2:01	1:27	Open the Promenade	800	29:19	27:35
Open the Terminal	300	3:56	3:45	Café	500	29:21	27:37
Security	150	4:46	4:31	Faster security	600	31:10	29:14
Bag drop	220	6:44	6:10	Souvenir stall	750	34:10	32:10
Ticket clerk	300	9:47	9:08	Bigger airships	1300	38:41	36:15
Faster customs	250	11:58	11:09	Faster tickets	700	40:20	37:54
More flights	450	15:55	15:08	Second customs desk	900	42:12	39:18
Guard	400	18:22	17:27	Second security lane	1100	44:48	41:16
Porter's cart	300	20:27	19:08	Even more flights	1800	48:12	43:54
Porter	550	23:52	21:52	Grand Liner dock	1800	53:05	47:16



Cloudbhaven from above: the Harbour at the bottom, the Terminal and Promenade fenced.

Four kinds of pad, interleaved

- **Demand** (more flights, bigger airships, the Liner) and **staff** pay back in 5–17 minutes.
- **Capacity** (faster and second counters) barely shows alone but keeps queues short as demand grows.
- **New counters and zones** dip income for a few minutes (one more queue) and open the next purchases.

How it got here

Everyone first finished in 15 minutes: income was capped by the timetable, so skill didn't matter. Demand upgrades and climbing prices made it 52; slower staff made the harbourmaster matter but 46% of travellers turned grumpy; capacity to match demand brought that to 10%. A hands-on player now finishes about six minutes before a new one.

One rule per puzzle

A narrative puzzle adventure whose only verb is reading. Lyssia copies words of Kha'shul, a constructed language, and speaks them at glowing places. Each puzzle is a level that teaches exactly one grammar rule.

#	PLACE	RULE TAUGHT	ANSWER	WORDS KNOWN	DESIGNED NEAR MISSES
1	The fallen bridge	Declare: STATE-ROOT	Kel-Duun the bridge stands up	4	Mur-Duun: the stone goes quiet. Rystak: "Great. Now it's quiet and broken."
2	The fire	No negation: declare the opposite	Mur-Iss the fire is still	8	Kel-Iss feeds it. Caelus: "I asked for <i>less</i> fire, scholar. My face paint is melting."
3	The mist gap	Compounds: STATE-ROOT-ROOT	Tor-Vash-Duun mist-stone holds	8	Tor-Vash holds "like wet paper"; Kel-Vash lifts it. Vesper: "Now it's in my face. Helpful."
4	The Black Mirror	Self-definition	Ghar-Oth the truth remains	9	Ghar-Sael "I remain": "No. I wouldn't survive the fire. Nobody does. That's the point of the question."
5	The Sanctuary's orbits	Coordinates: to the self	Rhen-Sael the rings turn to her	10	Rhen-Duun: Caelus: "Only the crystal tablets twitched. The rest ignored you. Books have opinions."
6	The escape	Review under pressure	Mur-Duun, Kel-Duun... stall and repel Sentinels	10	Time slows to 15% while the notebook is open

The level design rules

- **Introduce, practise, combine:** each rule is taught by a carving, used once, then needed alongside the earlier ones.
- **The choice space grows slowly:** 4 words at the bridge, 8 at the mist, 9 at the Mirror, 10 in the Sanctuary. The notebook never shows a word Lyssia hasn't copied.
- **Failure is content:** every point lists 2–3 near misses that do something harmless and get a reaction. A grammar slip gets a one-line lesson. Nothing is ever lost.
- **Rests between peaks:** the camp sits between the jungle and the Throat, the densest stretch of teaching.

Rewritten after a playtest

The prologue's star chart (read a beat code in the constellations, then plot the quickest course along one-way winds) was "much harder than the language puzzles". The rules stayed; the information became visible:

- beats write themselves out under the stars;
- every choice shows its own beats;
- a wrong answer says why;
- every island carries a mark (unmarked ones became "calm").

56 EditMode tests check the puzzles' data: the grammar, that every point's answer exists, that the star chart's key is unambiguous and its quickest route avoids danger, and that the glass floor's safe route exists.