



The Midnight Hollow



COMPLETE TO COLLECT
Emerald Crystal
Level 2 · 4 Glints



Midnight at the river

In Moorhaunt, one of the Manyfold's strange worlds, Luna Tessell finds a small river hollow reflecting midnight at noon.

"You can't step in the same river twice," says the lockkeeper, a small soot-dark Moorwink with a cap and keys. At each bell, he proposes replacing half the well-mixed water with ordinary water. Luna will test his remedy before he posts a sign. Her proof goes to the Jewelhouse, where a proven insight can be distilled into a jewel.

This hollow's curse has an exact rule: **any positive amount of cursed water makes its whole surface reflect midnight**. It lifts only when no cursed water remains. The curse stays with cursed water and never spreads to ordinary water.

The lockkeeper's procedure

These rules apply only to this hollow.

Start: Before Bell 1, there are exactly 64 litres: 16 cursed and 48 ordinary.

Drain: Release half—32 litres—downstream. This removes exactly half of each kind. Released water never returns.

Mix: At each bell, mix completely. Every portion has the same cursed and ordinary fractions as the whole.

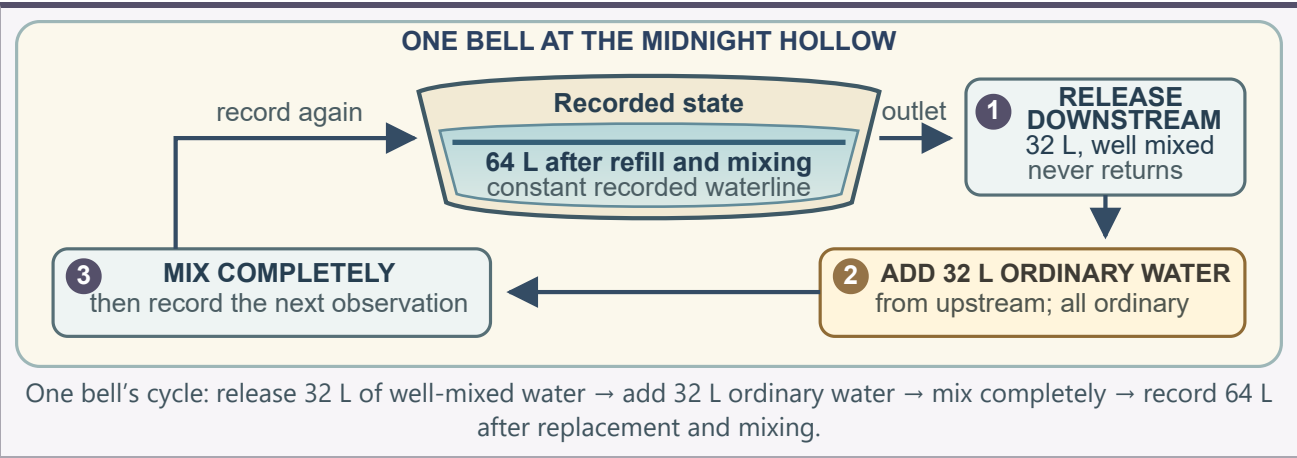
Refill and record: Add 32 litres of ordinary upstream water. Mix completely again, then record. The total is again 64 litres.

At every recorded bell: The total is exactly 64 litres. Use this total for percentages.

Water is continuously divisible: Any positive fractional amount can remain exactly, with no smallest drop or rounding to zero.

Nothing else adds, removes, or changes either kind: ignore other flows, evaporation, and leaks.





Part 1 **Begin Luna's field record**

Complete all eight empty amount cells.

Observation time	Cursed water (litres)	Ordinary water (litres)
Start, before Bell 1	16	48
After Bell 1		
After Bell 2		
After Bell 3		
After Bell 4		

Below the table, state the pattern for the amount of cursed water in words or an equation.



Part 2 Find the first bell past 99%

Find the **first bell** after which more than 99% of the water is ordinary. Use the work area or separate paper if helpful.

Complete the Threshold Proof record for your answer and the bell immediately before it. Give both exact water amounts at each bell and a percentage or inequality showing whether it qualifies. Explain why no earlier bell qualifies.

Use exact amounts, fractions, or terminating decimals. Do not decide from a value rounded to a whole percent.

Recorded-bell reference: Total = 64 L. Use exact values.

Optional scratch work

Threshold Proof record

Bell immediately before the answer	First qualifying bell
Bell number _____	Bell number _____
Cursed water (litres) _____	Cursed water (litres) _____
Ordinary water (litres) _____	Ordinary water (litres) _____
Exact percentage or inequality comparison _____	Exact percentage or inequality comparison _____

Why does no earlier bell qualify?



Part 3 Can the bells lift the curse?

Could any finite number of bells remove all the cursed water and lift this curse? Write a claim and a short explanation. Base your explanation on what one more halving does to a positive amount, not on a rounded measurement display.

Part 4 Correct the sign

The lockkeeper wants to put up this sign as soon as more than 99% of the water is ordinary:

More than 99% ordinary. Curse lifted.

Write a corrected sign and a brief explanation for Luna's field record. Connect the investigation to the saying "you can't step in the same river twice." Include:

- the fixed river hollow and its constant 64-litre total at every recorded observation;
- what changes from one observation to the next; and
- why less than 1% cursed water is different from no cursed water, and what that means for the midnight reflection.

Corrected sign

Luna's field record

