



## Problem of the Month

### Problem 6: Cobbling cards

March 2026

#### Hint

1. Property (iv) tells you that there must be at least four symbols. Let  $A, B, C$ , and  $D$  be four symbols satisfying that no three of them lie on the same card. Property (ii) tells you that each pair of these four symbols must appear on a distinct card. Start with these cards and see if you can build the deck from there, adding new symbols and new cards as necessary to satisfy the four properties of a Cobble deck.
2. As in the hint for Question 1, each Cobble deck must have a distinct card for each pair of the four symbols satisfying Property (iv). Start with those cards and try to build a Cobble deck without getting to seven cards. What goes wrong?
3. Start by proving that for any two cards in a Cobble deck, there is a symbol that does not appear on either card. Then see if you can use that symbol to create a kind of dictionary between the symbols on one of the cards and the symbols on the other card.
4. Cobble decks have a feature that you can change statements about cards into statements about symbols. See if you can first prove the counterpart to Property (iv): In a Cobble deck, there are four cards with the property that no three of them contain the same symbol. Once you have this, imitate your solution from Question 3.
5. Suppose each card has  $n$  symbols, and each symbol appears on  $n$  cards. Try to count the number of cards in the Cobble deck in terms of  $n$ .

*Challenge.* This is an open problem. I have no hints to give.

---

---