Lesson 7

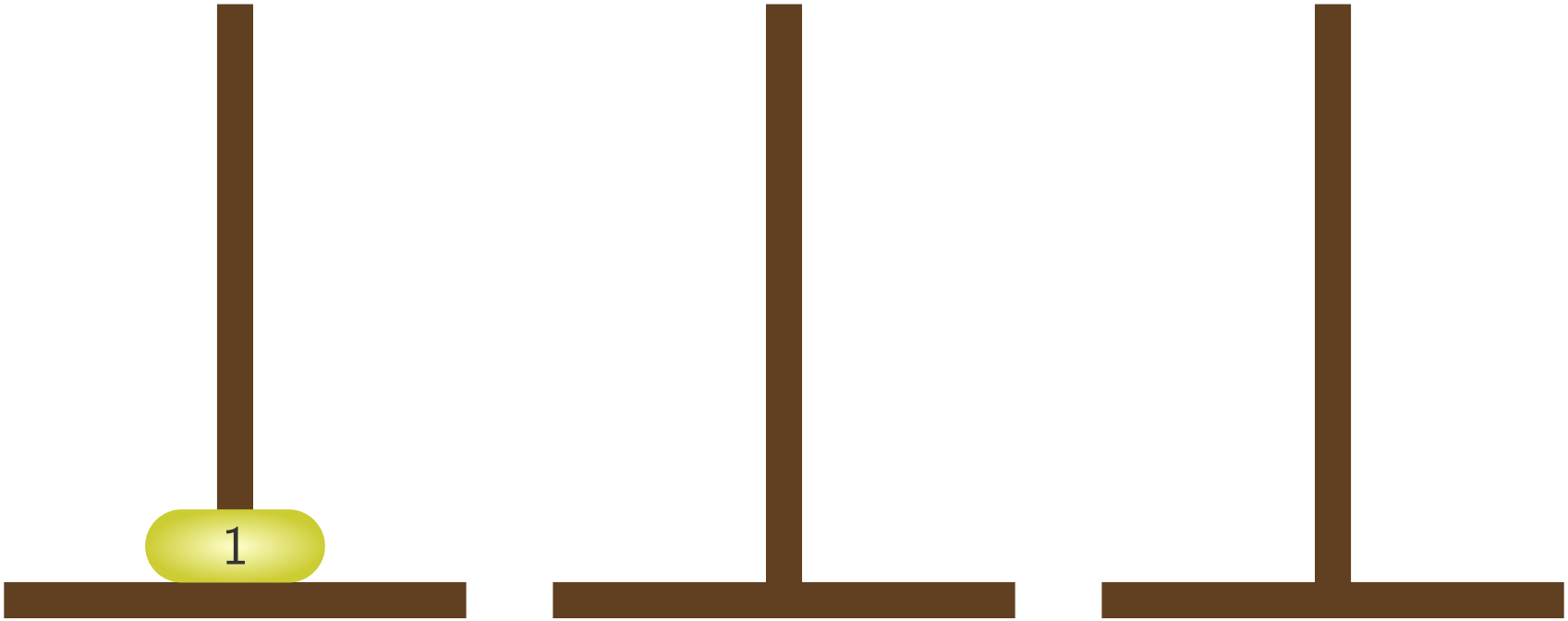
Recursion - problem of Hanoi towers

Structured programming

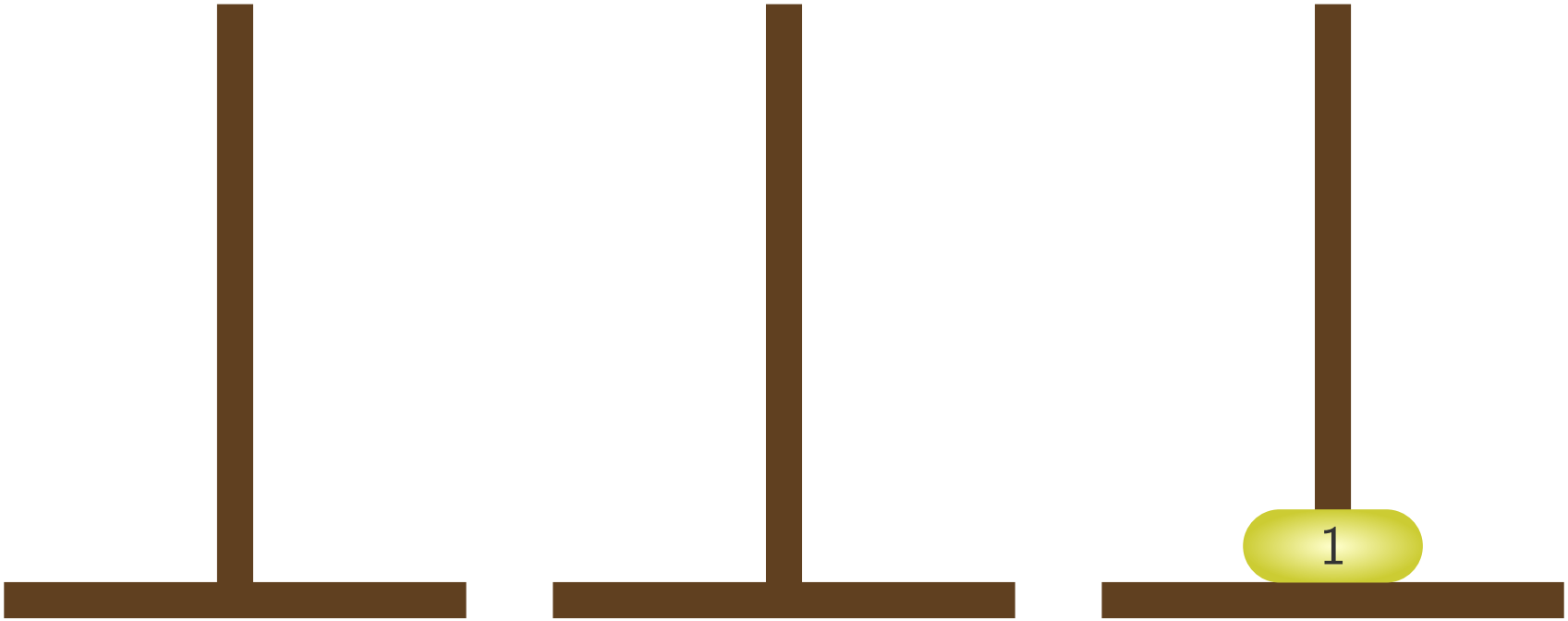
Problem of Hanoi towers

Легендата вели: Во големиот храм Brahma во Benares, под сводот кој го покрива центарот на светот постои месингана чинија во која има три вертикално поставени дијамантски прачки. На едната од нив има 64 диска од чисто злато со различен пречник секој со отвор во средината поставени на дијамантска прачка во вид на кула, со најголемиот диск на дното и најмалиот на врвот. Свештениците ги пренесуваат дисковите еден по еден помеѓу дијамантските прачки, според безусловниот закон на Brahma: Никогаш не смее да се постави поголем врз помал диск. (Секогаш се зема дискот од врвот и се преместува на некоја од останатите две прачки.) На почетокот на светот сите 64 диска ја формираат кулата на Брама на една од прачките. Кога и последниот диск ќе биде пренесен, формирајќи ја повторно кулата на Брама но сега на друга прачка, ќе дојде крајот на светот и сé ќе се претвори во прав. Модерната верзија на проблемот на Ханојските кули ја поставил Edouard Lucas, француски математичар околу 1883 година.

Hanoi towers – 1 pole

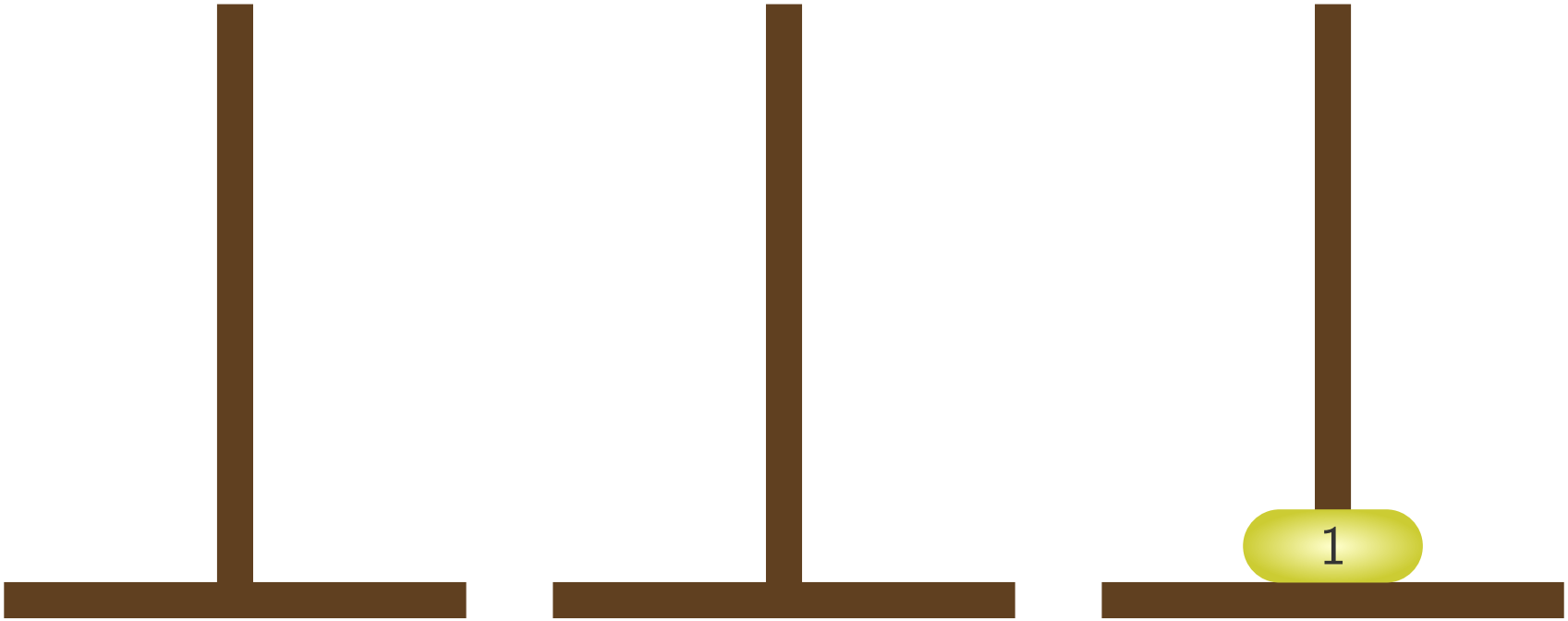


Hanoi towers – 1 pole

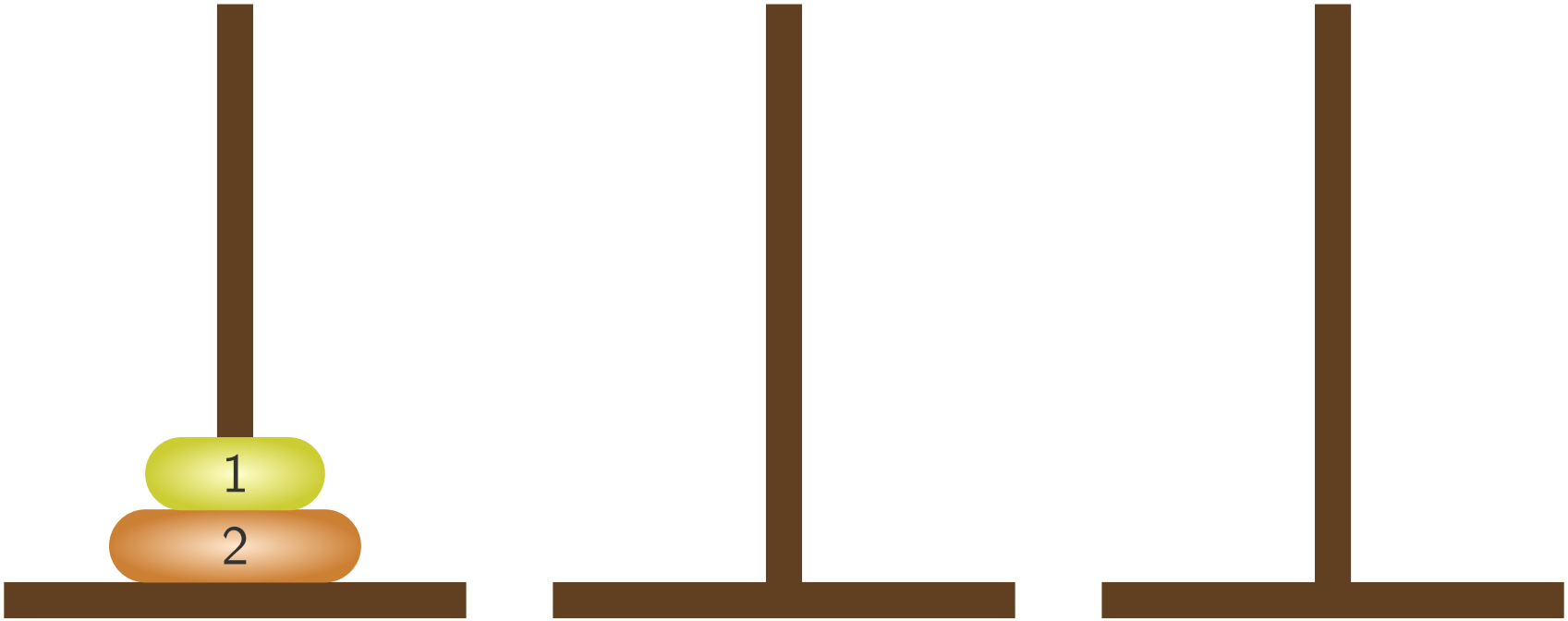


Disk is moved from pole 1 to pole 3.

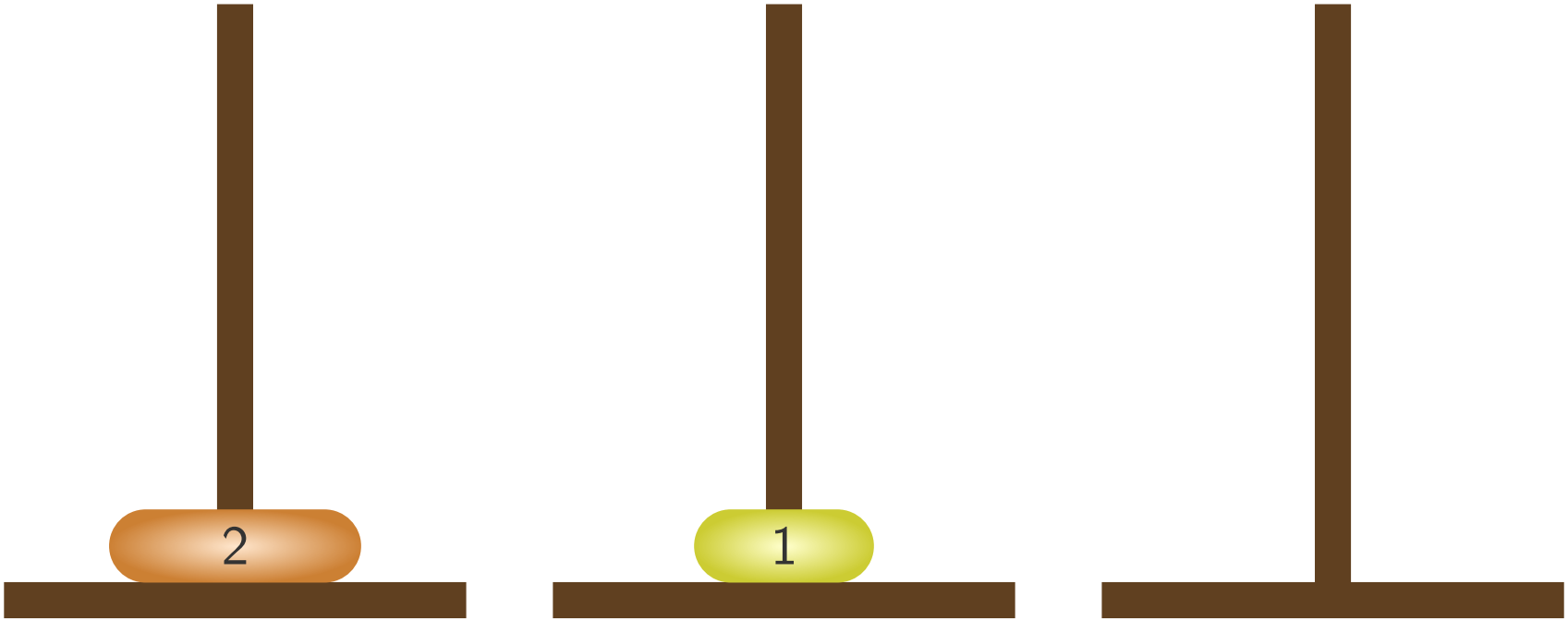
Hanoi towers – 1 pole



Hanoi towers – 2 poles

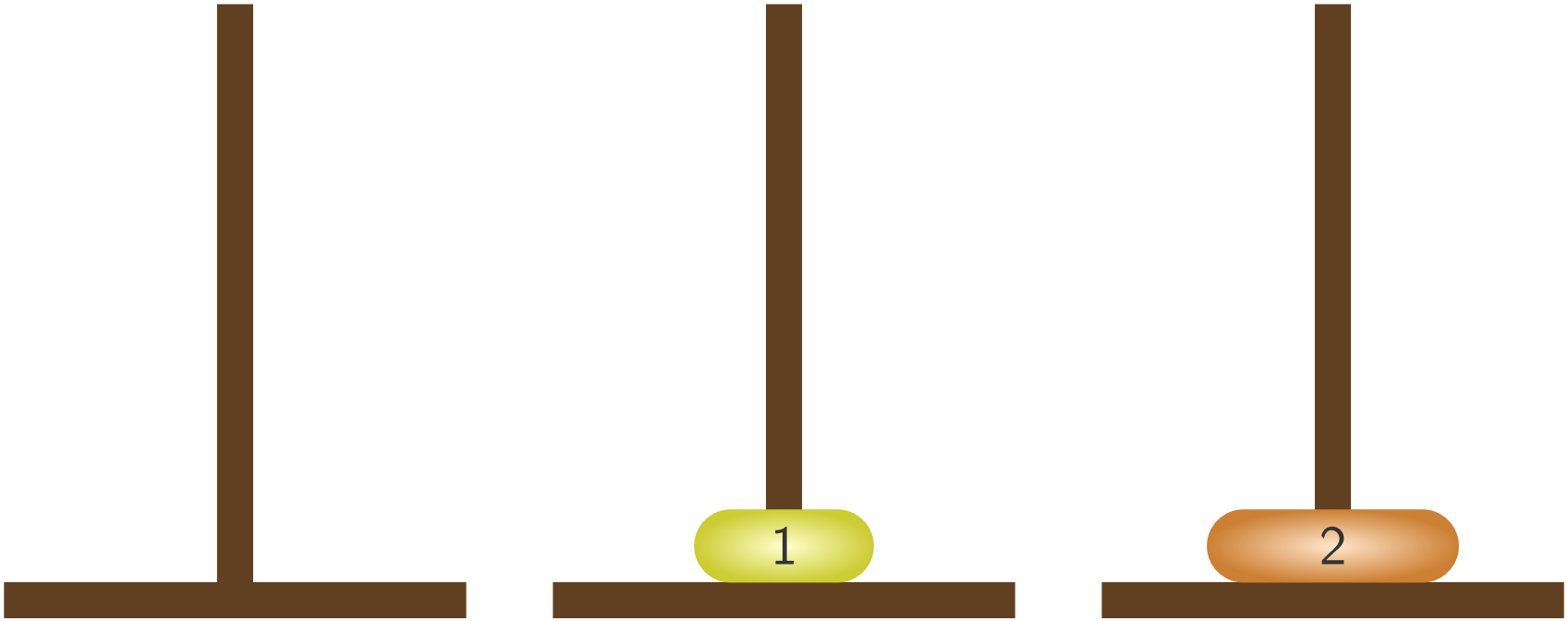


Hanoi towers – 2 poles



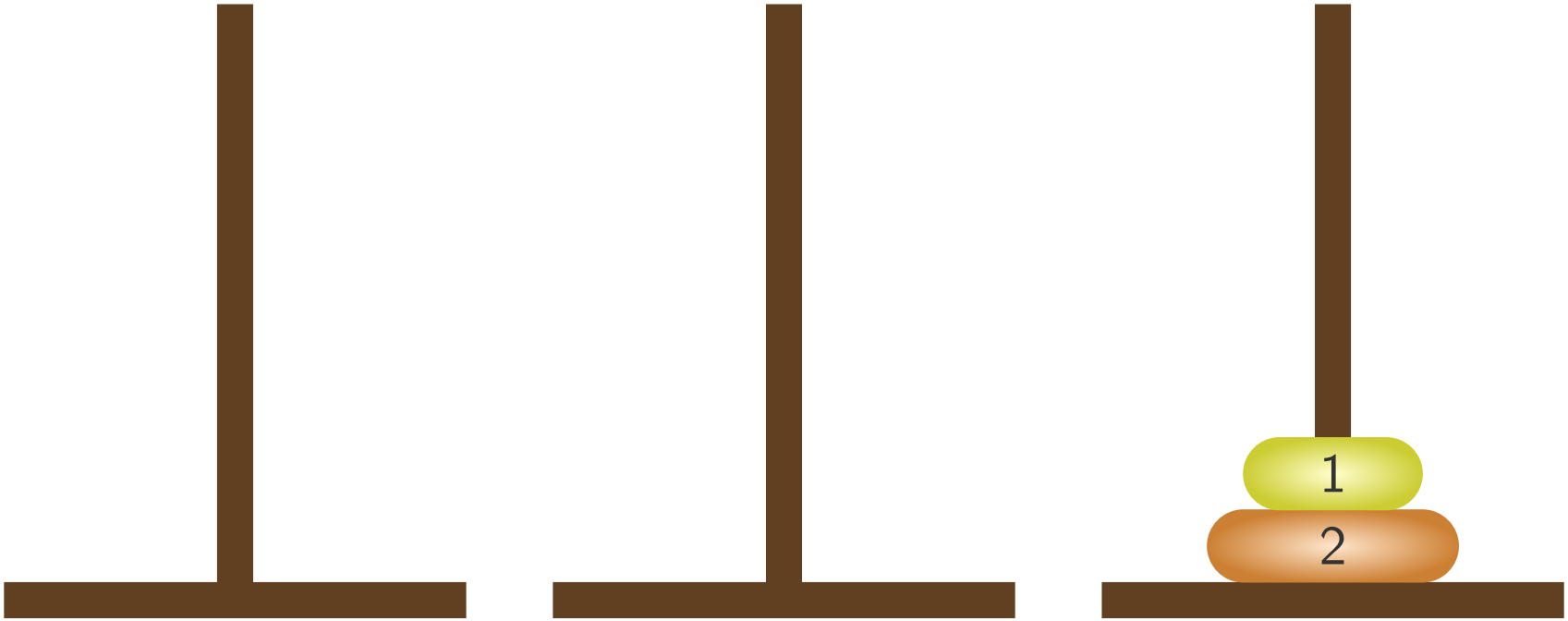
Disk is moved from pole 1 to pole 2.

Hanoi towers – 2 poles



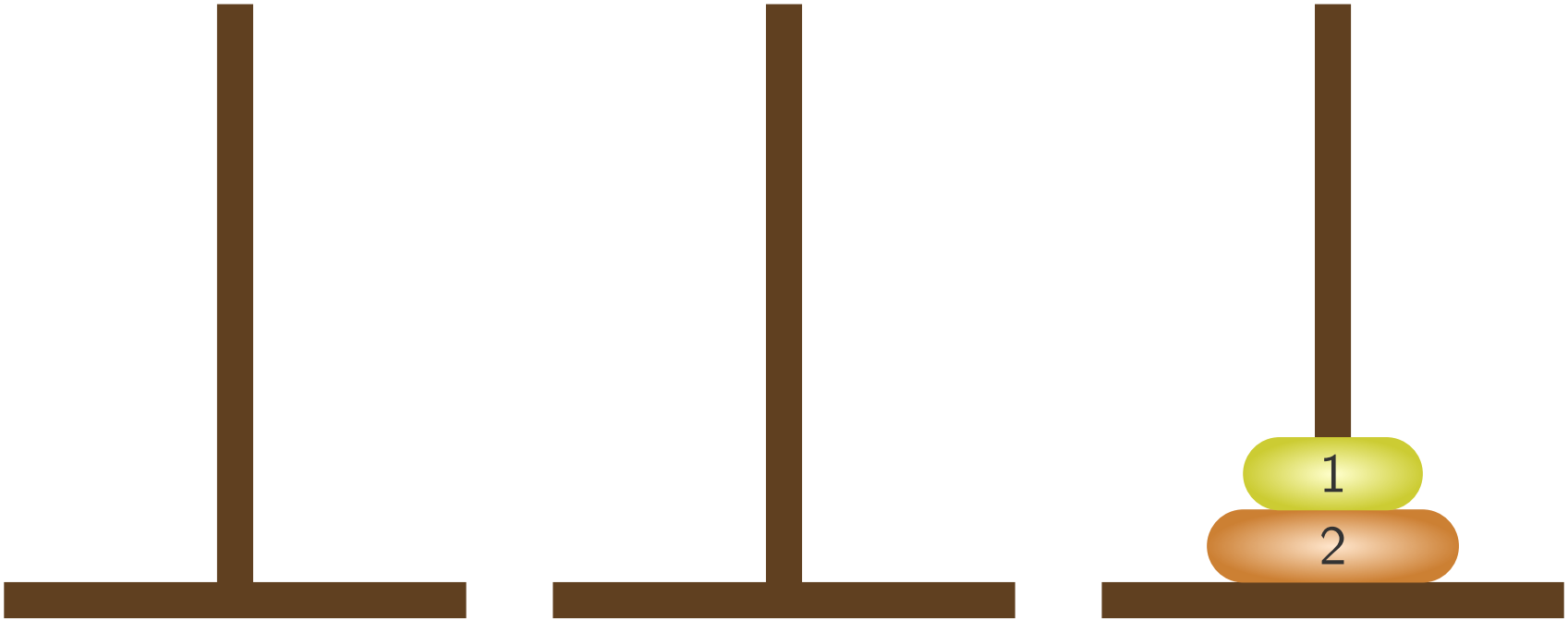
Disk is moved from pole 1 to pole 3.

Hanoi towers – 2 poles

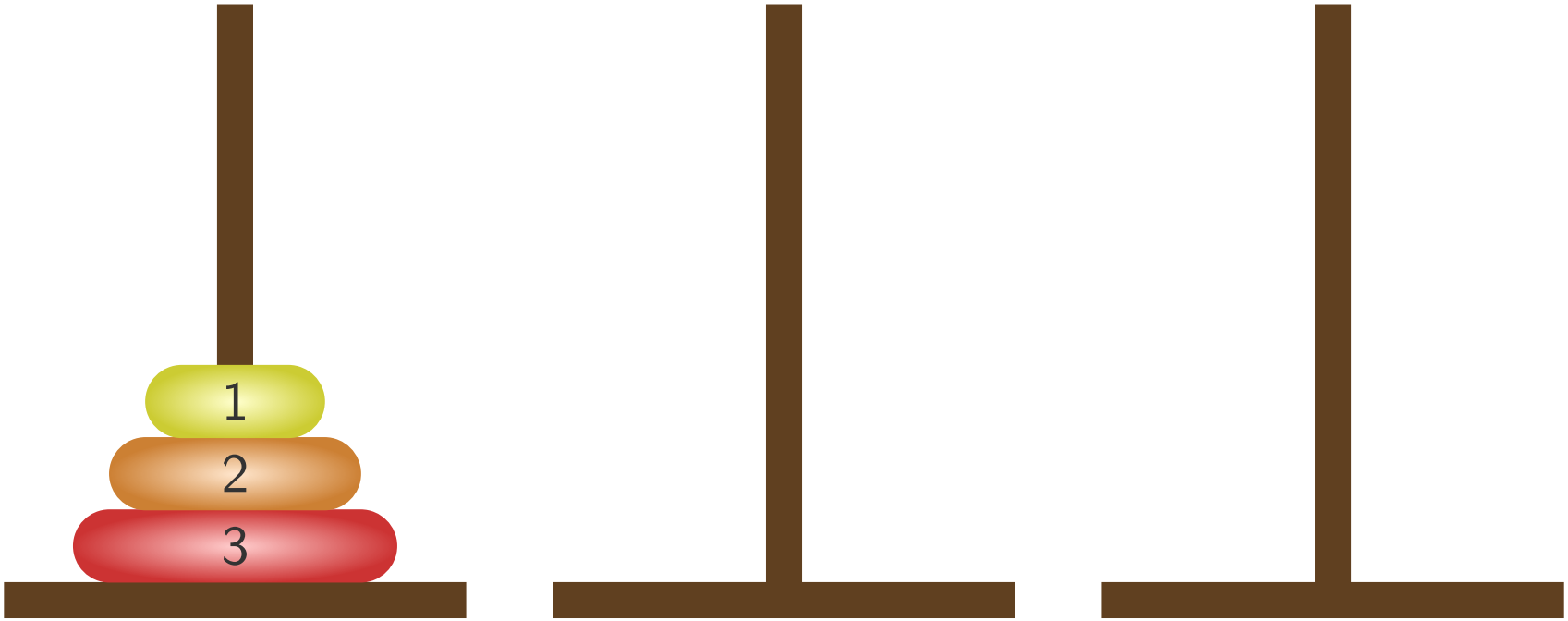


Disk is moved from pole 2 to pole 3.

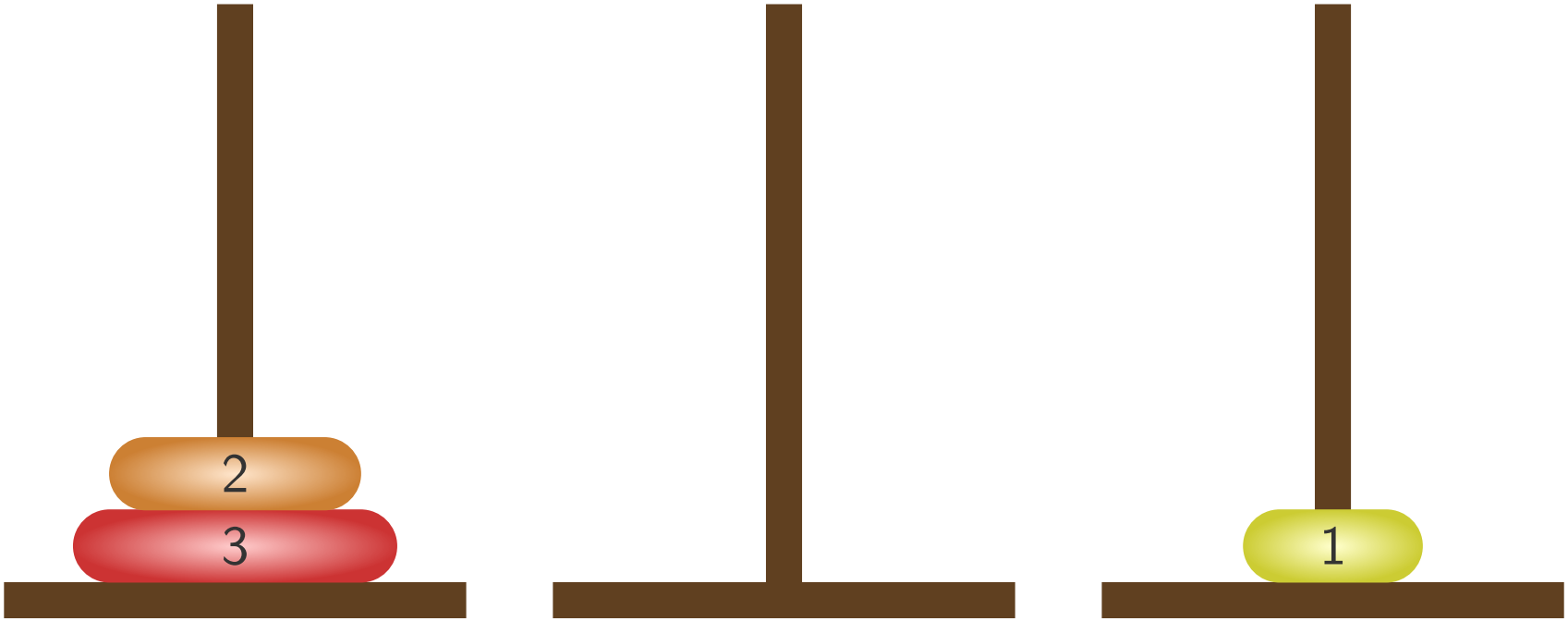
Hanoi towers – 2 poles



Hanoi towers – 3 poles

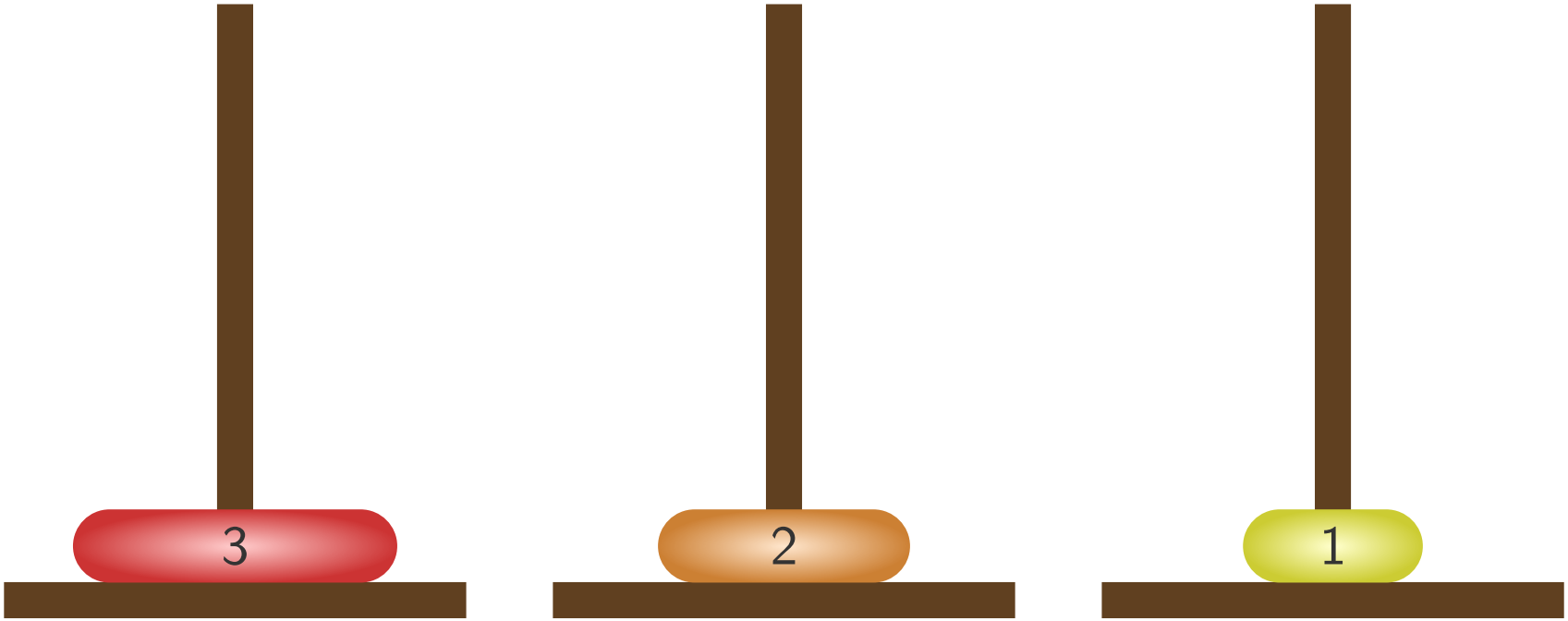


Hanoi towers – 3 poles



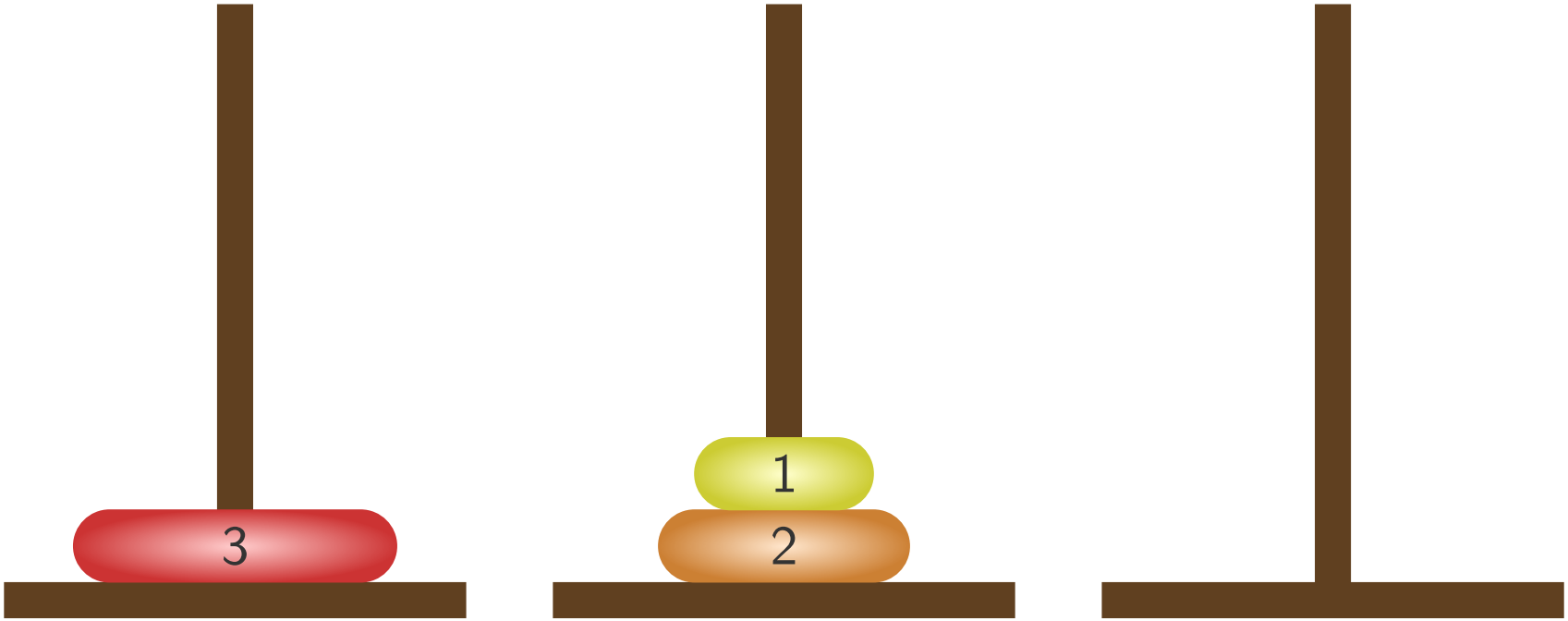
Disk is moved from pole 1 to pole 3.

Hanoi towers – 3 poles



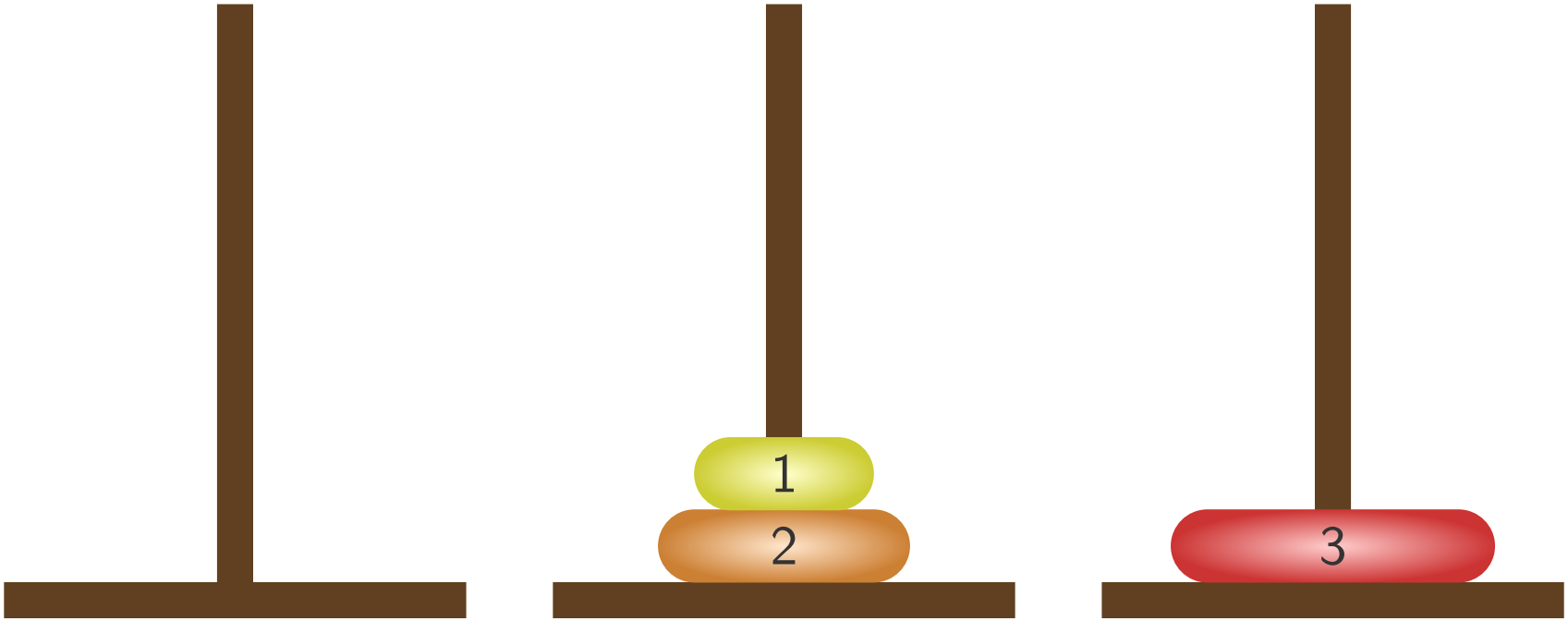
Disk is moved from pole 1 to pole 2.

Hanoi towers – 3 poles



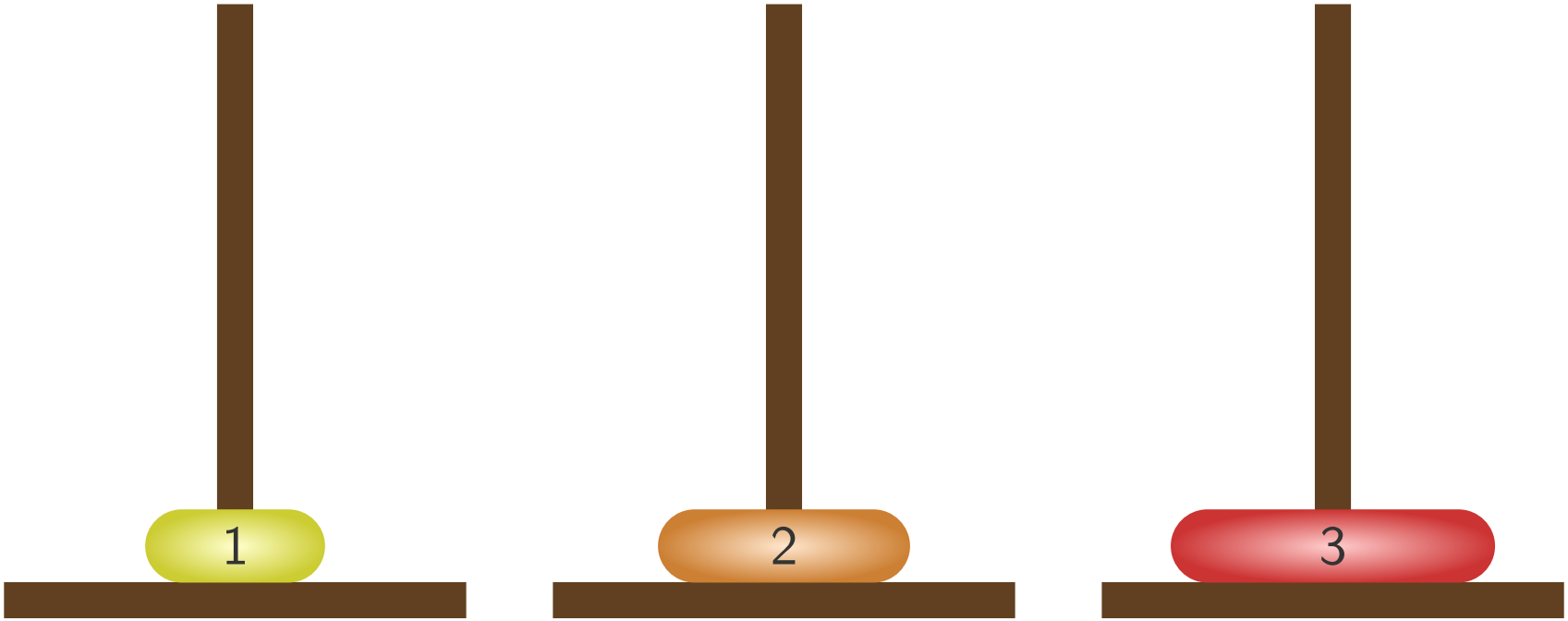
Disk is moved from pole 3 to pole 2.

Hanoi towers – 3 poles



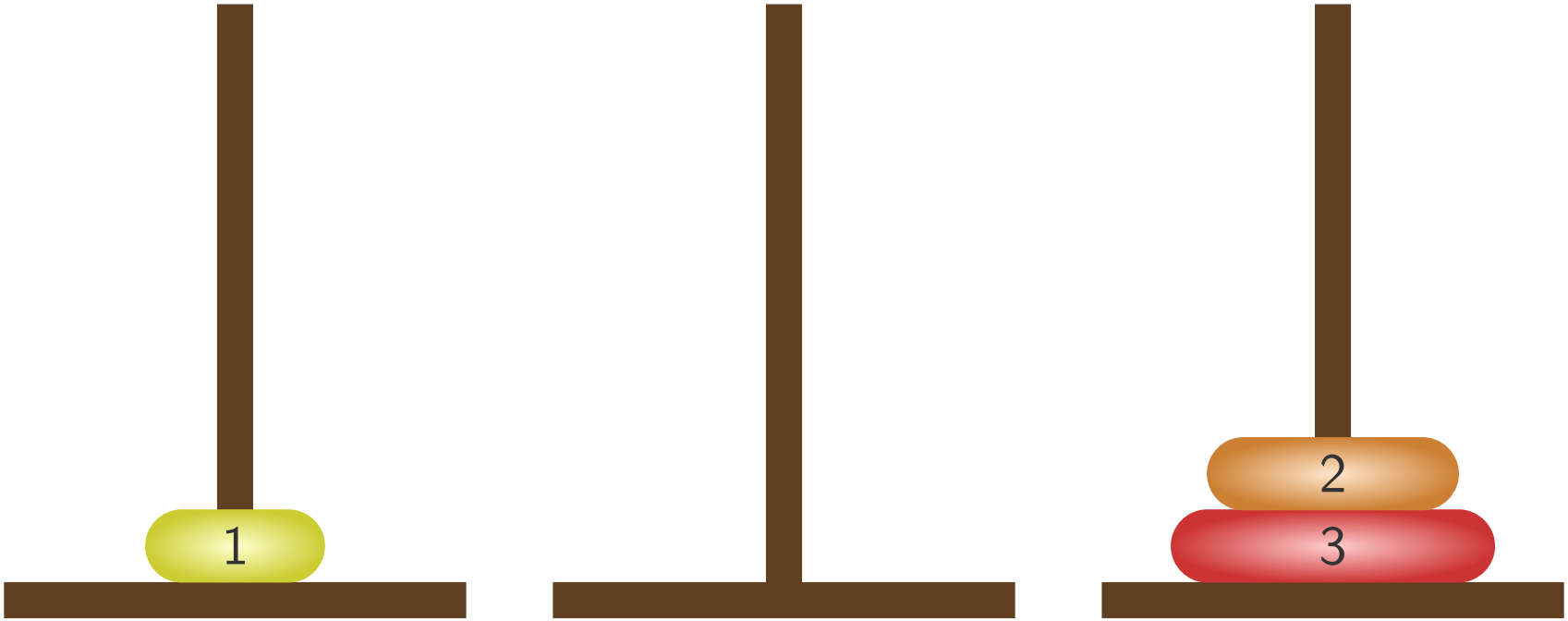
Disk is moved from pole 1 to pole 3.

Hanoi towers – 3 poles



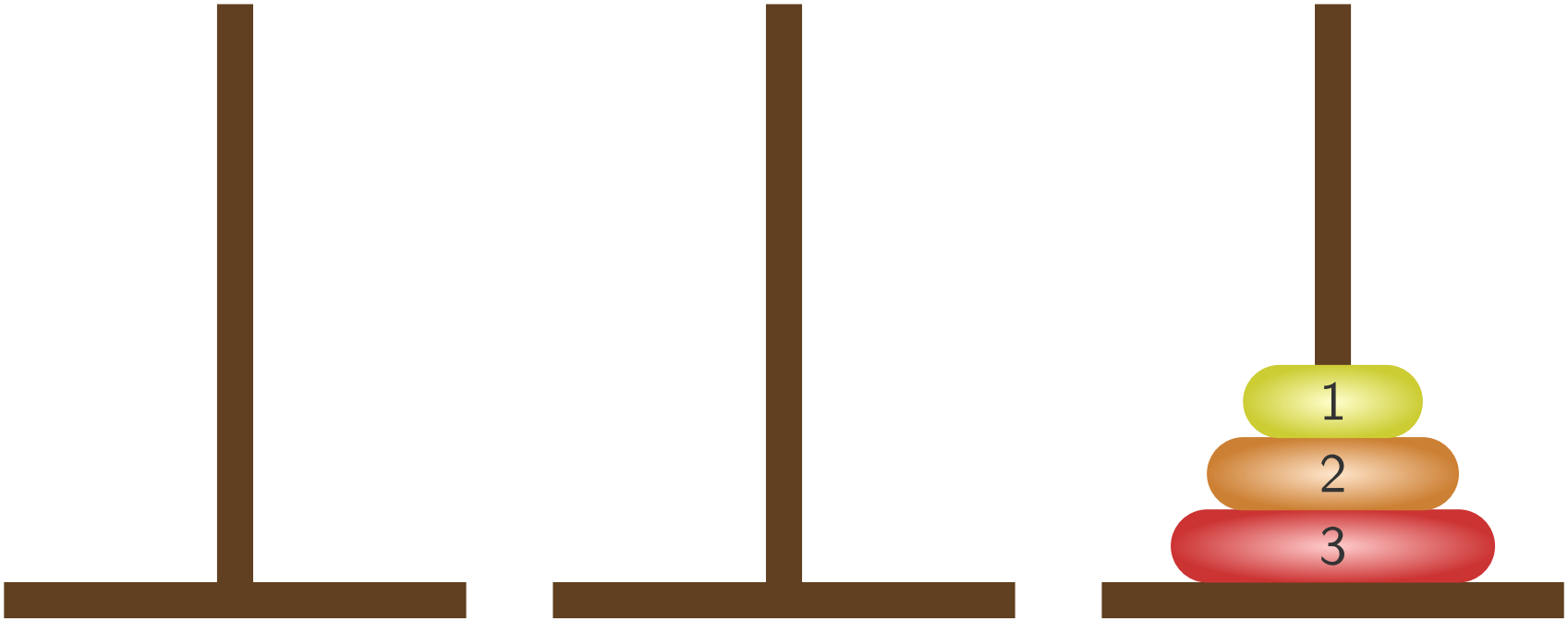
Disk is moved from pole 2 to pole 1.

Hanoi towers – 3 poles



Disk is moved from pole 2 to pole 3.

Hanoi towers – 3 poles



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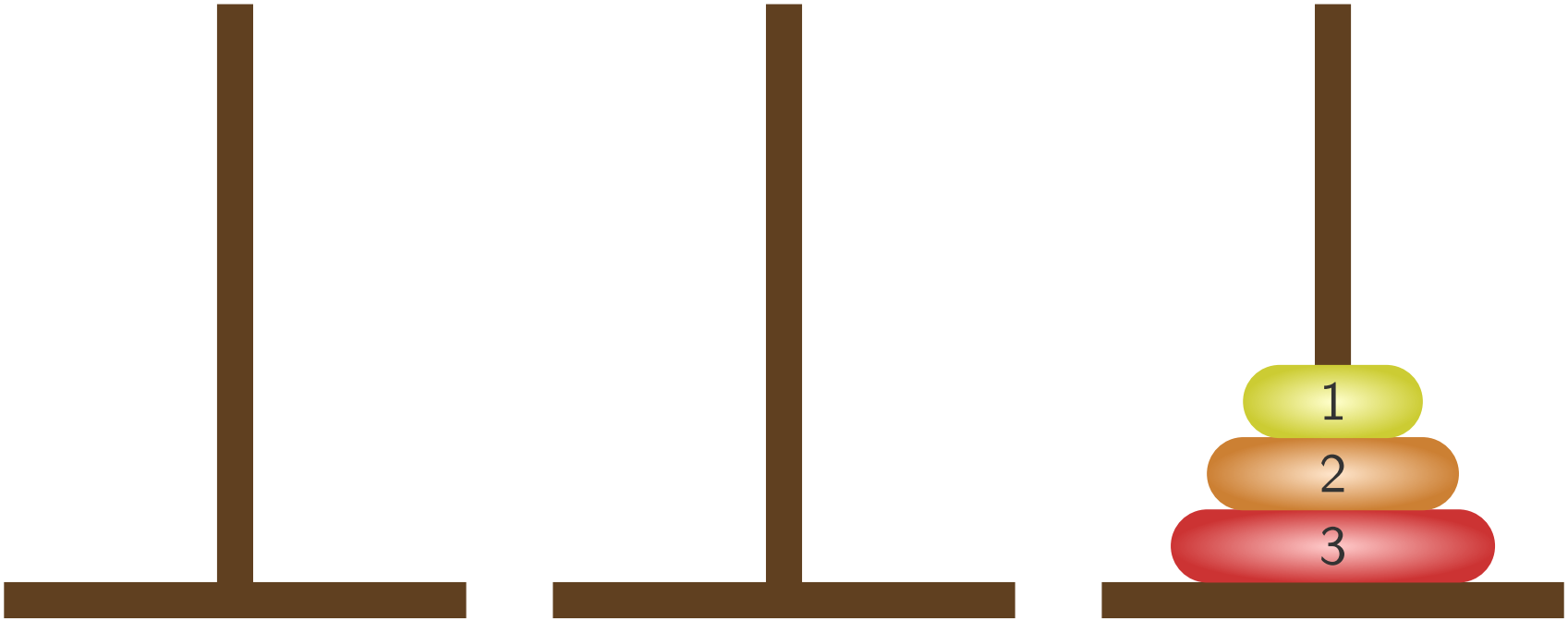
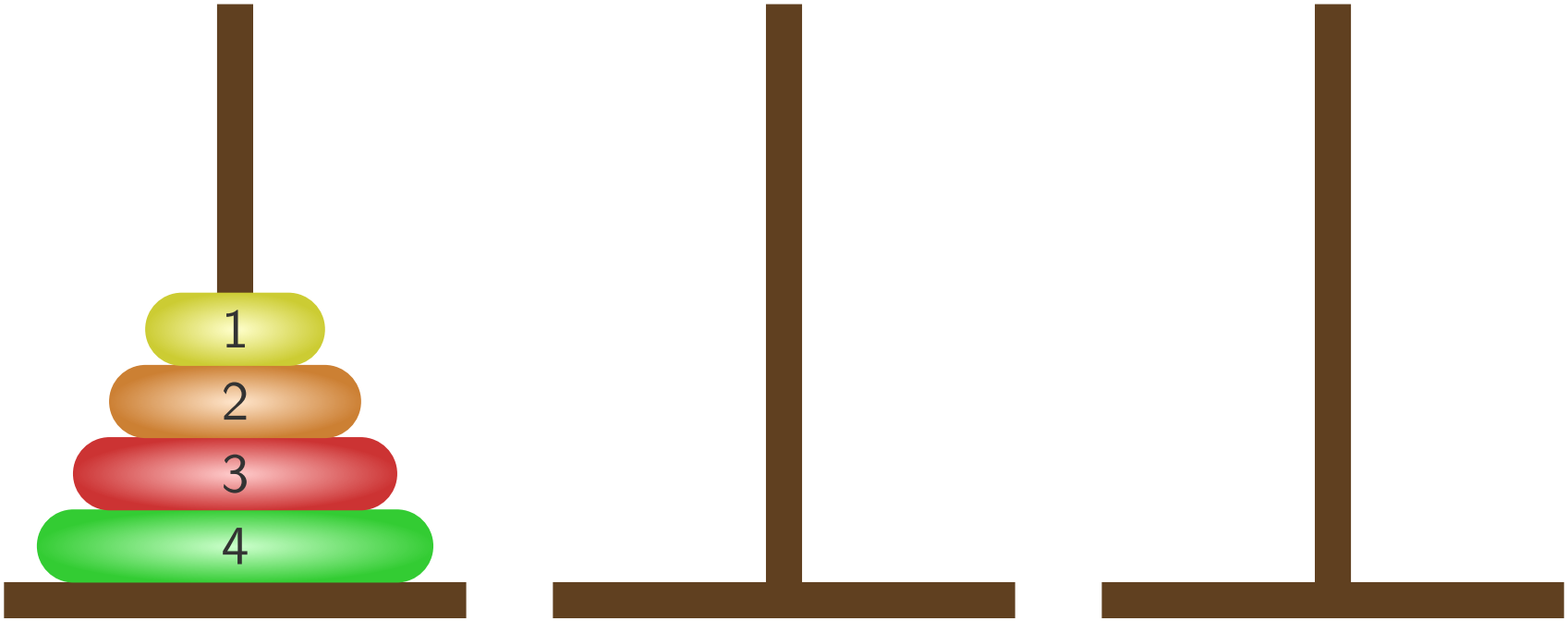
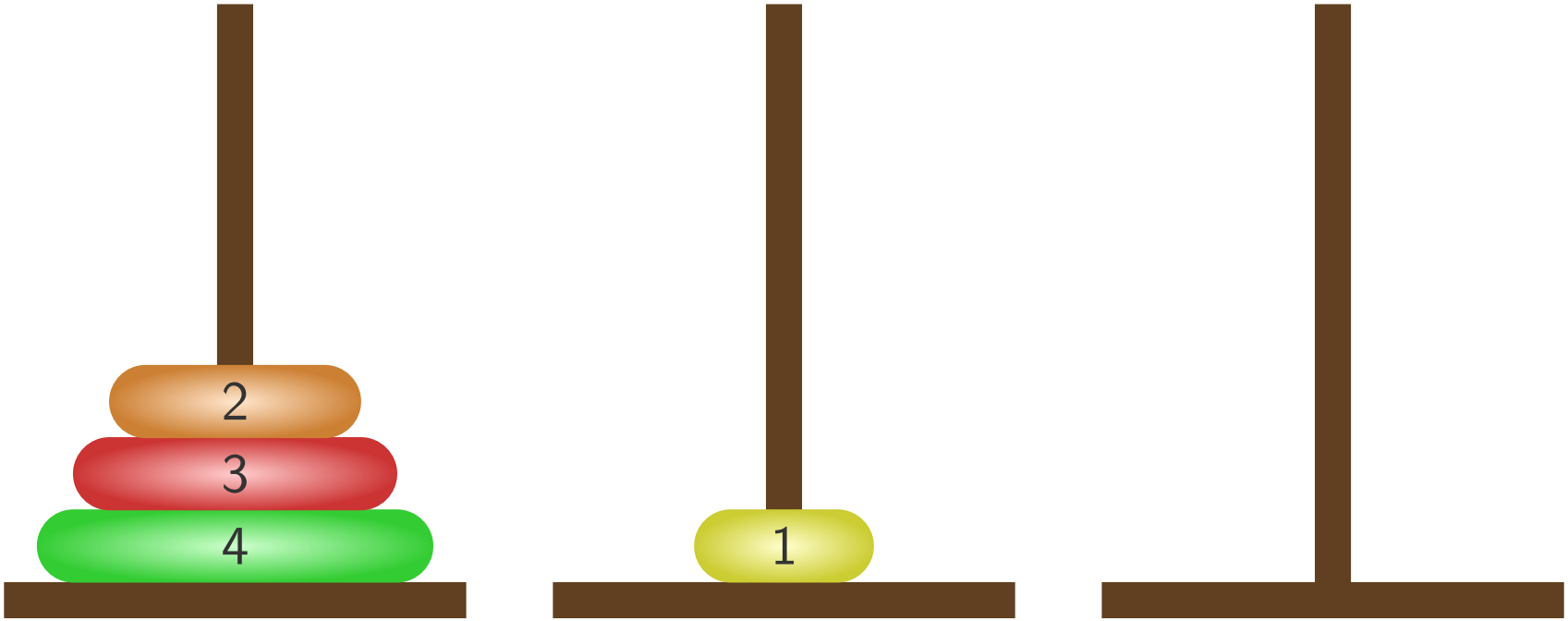
Hanoi towers – 3 poles



Hanoi towers – 4 poles

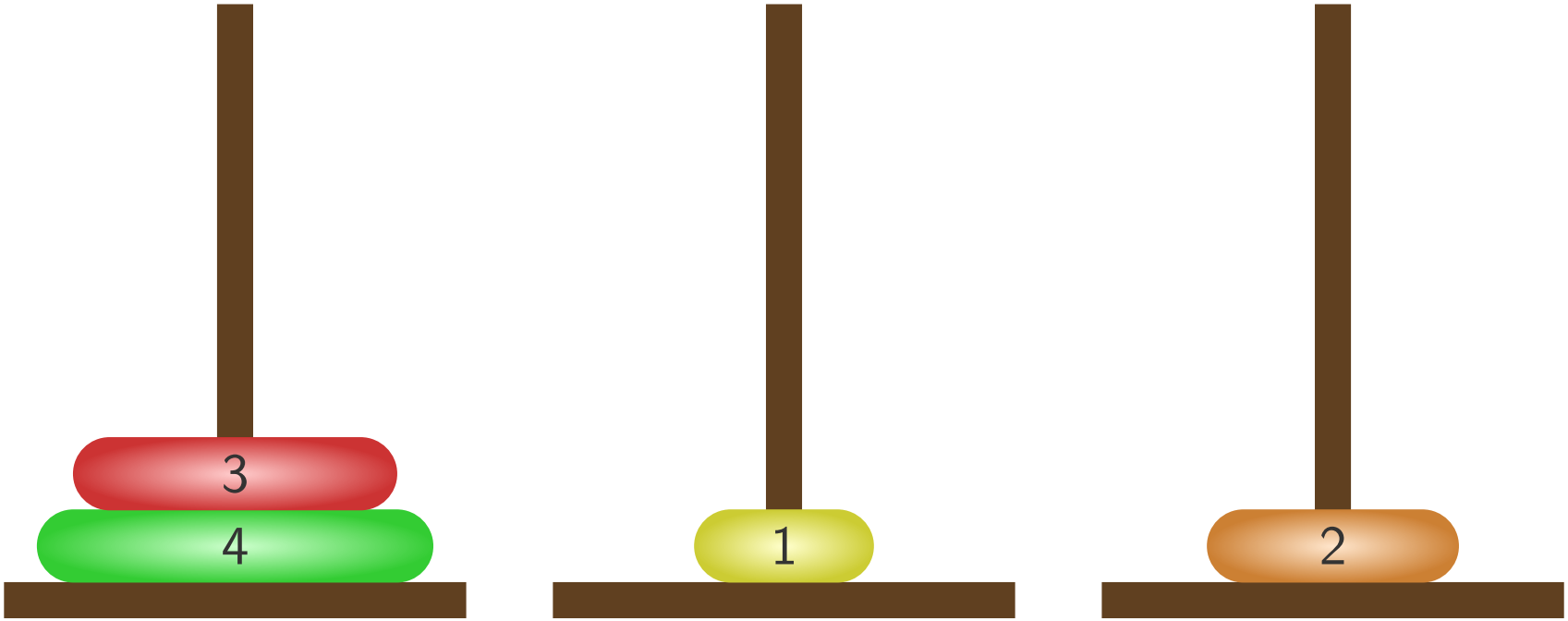


Hanoi towers – 4 poles



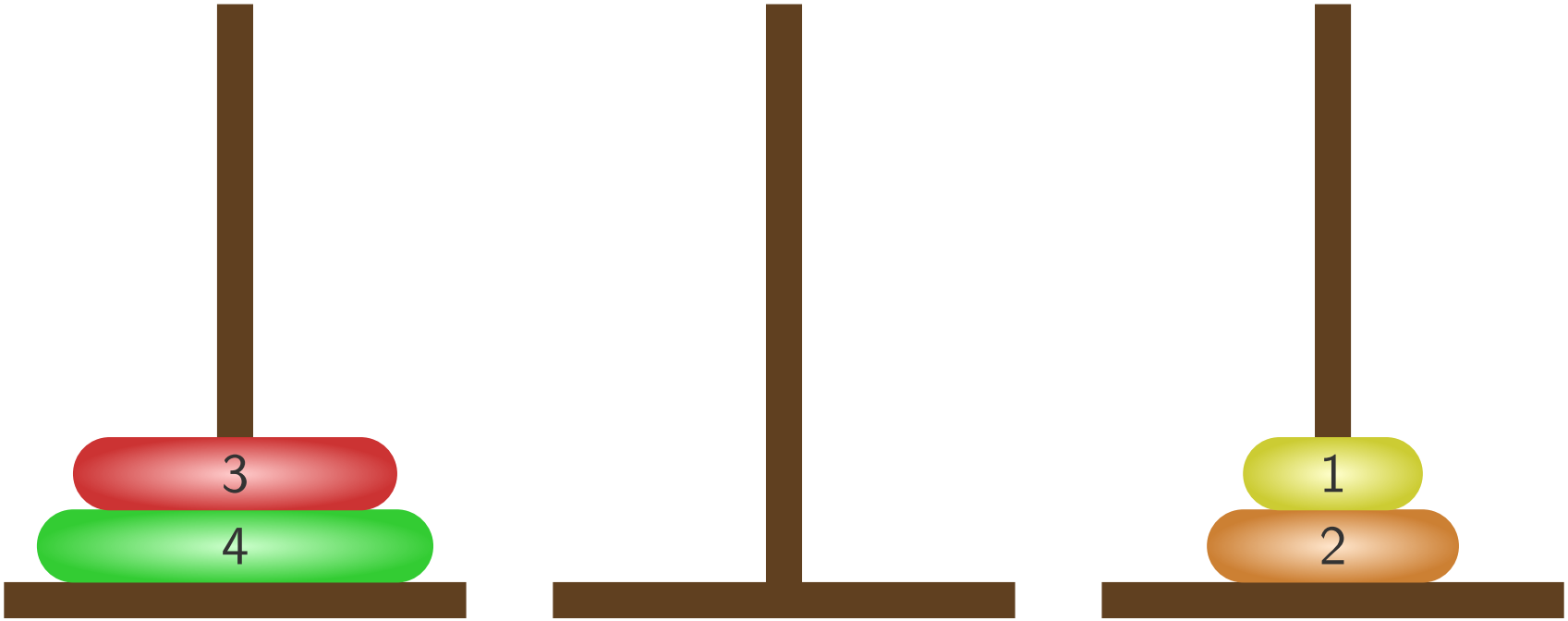
Disk is moved from pole 1 to pole 2.

Hanoi towers – 4 poles



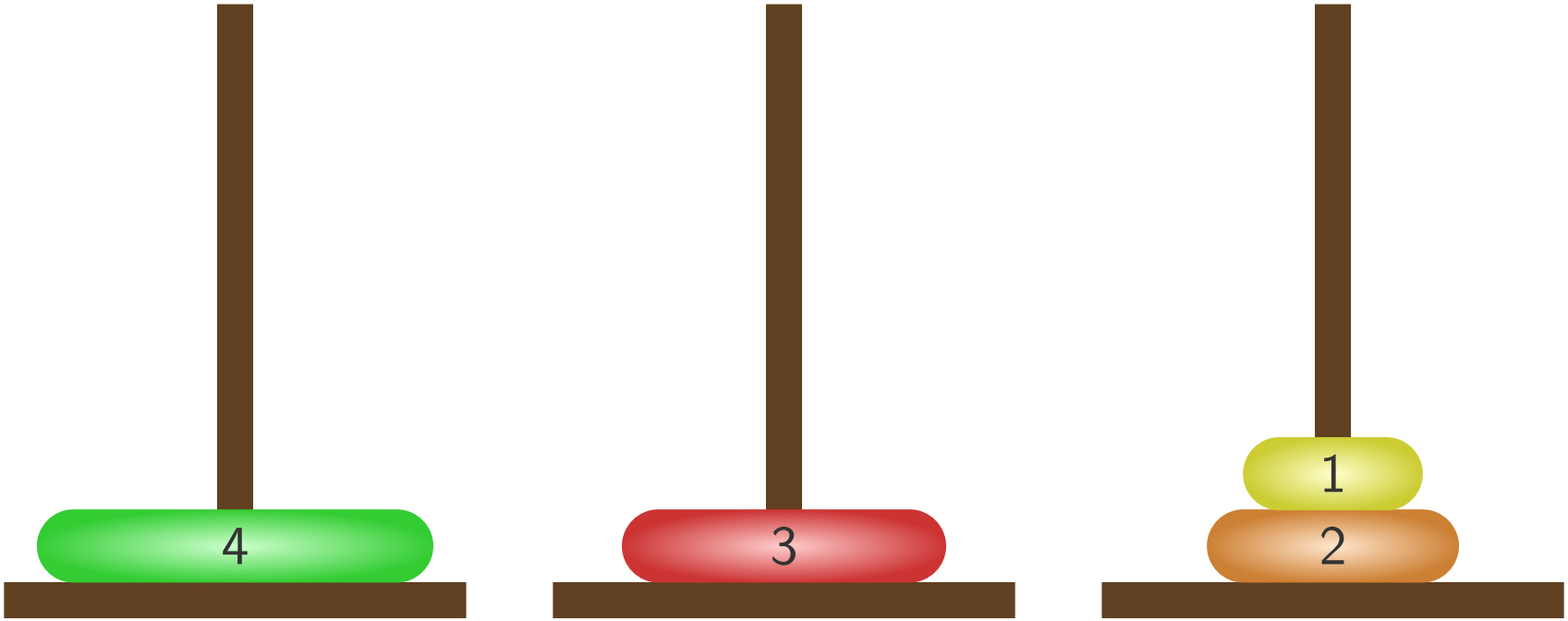
Disk is moved from pole 1 to pole 3.

Hanoi towers – 4 poles



Disk is moved from pole 2 to pole 3.

Hanoi towers – 4 poles



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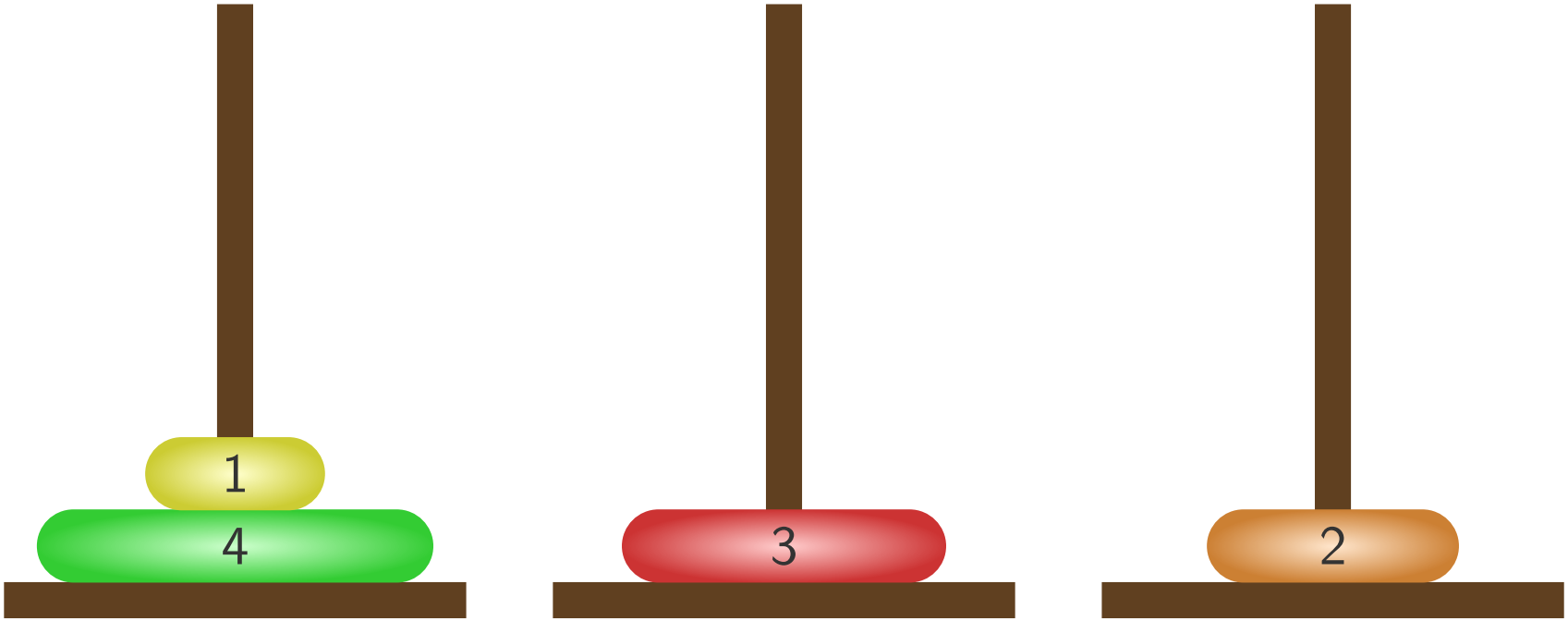
Hanoi towers – 4 poles



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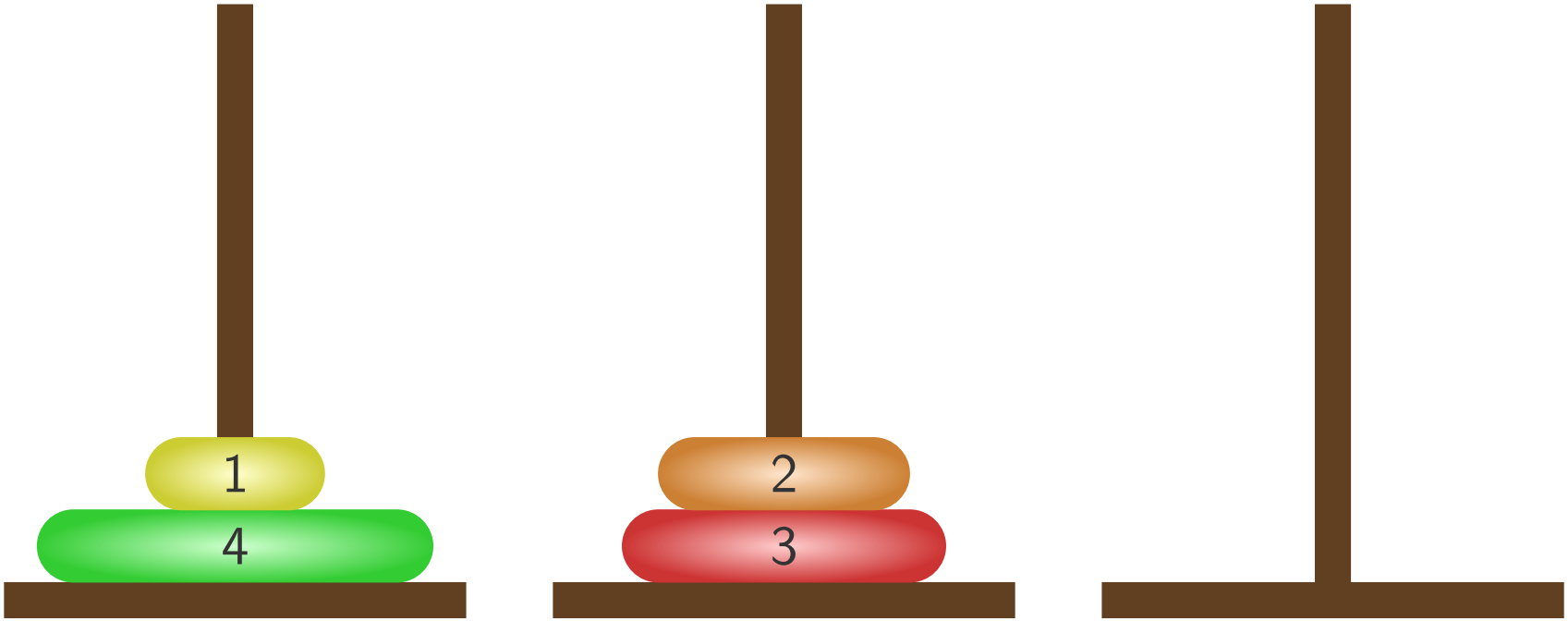
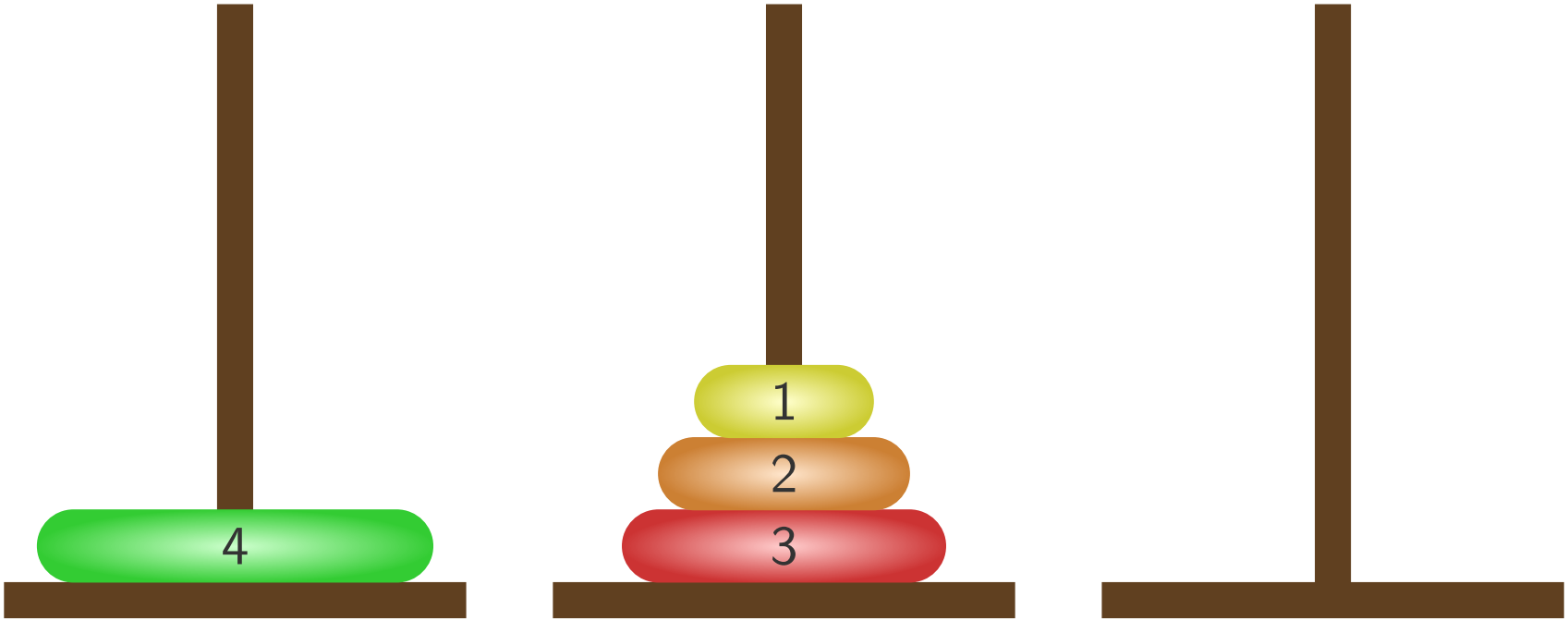
Hanoi towers – 4 poles



Disk is moved from pole 3 to pole 2.

Hanoi towers – 4 poles



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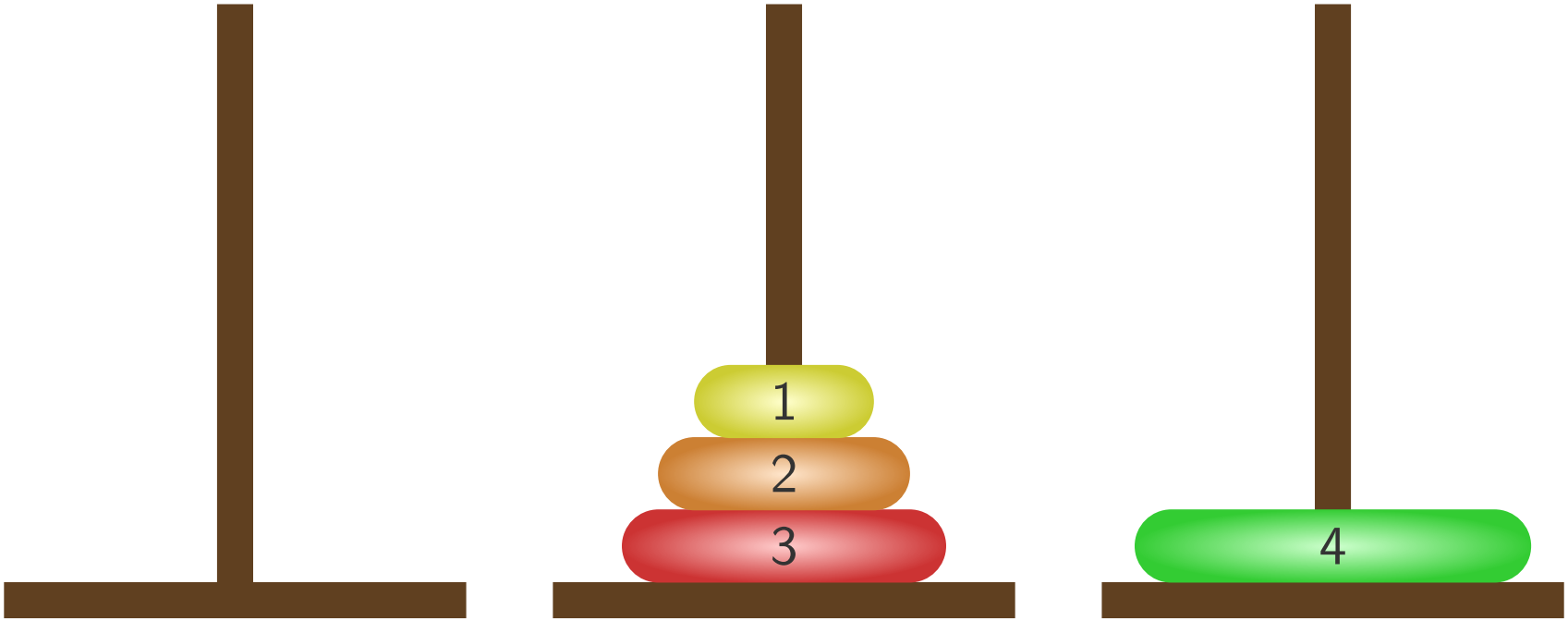
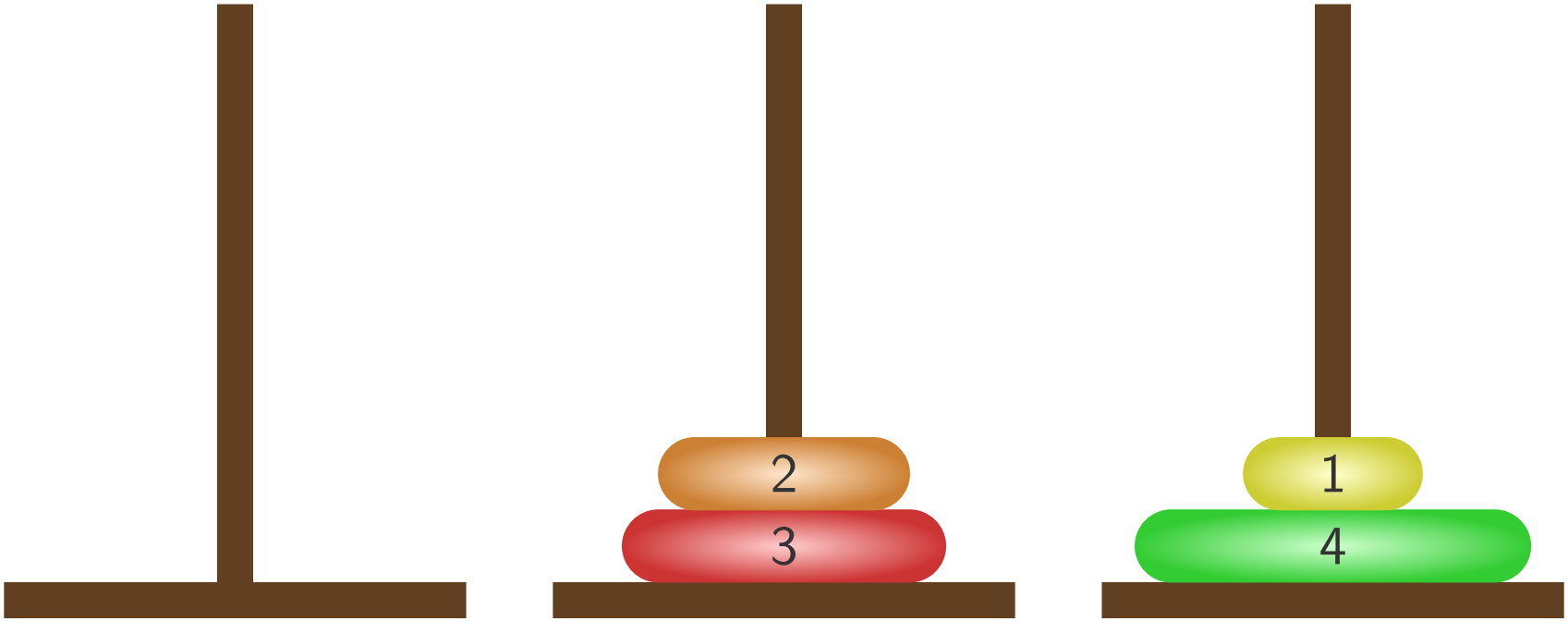
Hanoi towers – 4 poles



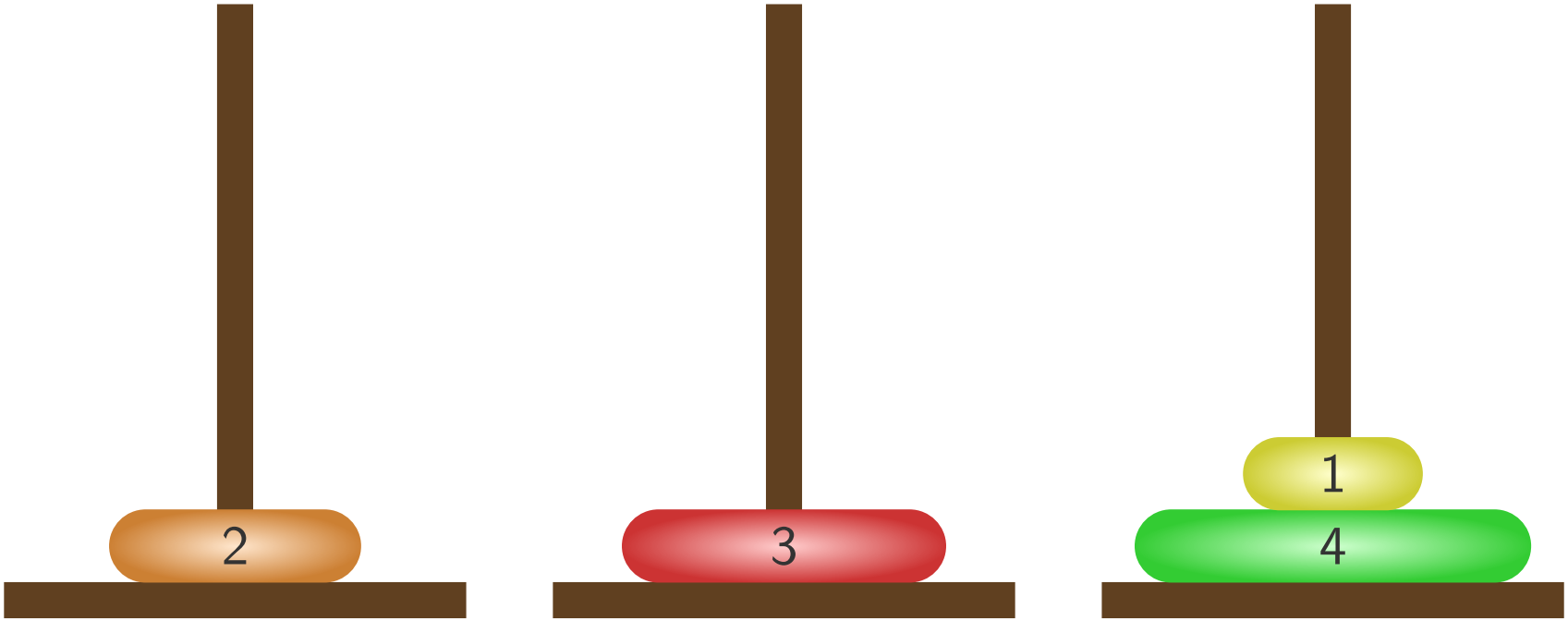
Disk is moved from pole 1 to pole 3.

Hanoi towers – 4 poles



Disk is moved from pole 2 to pole 3.

Hanoi towers – 4 poles



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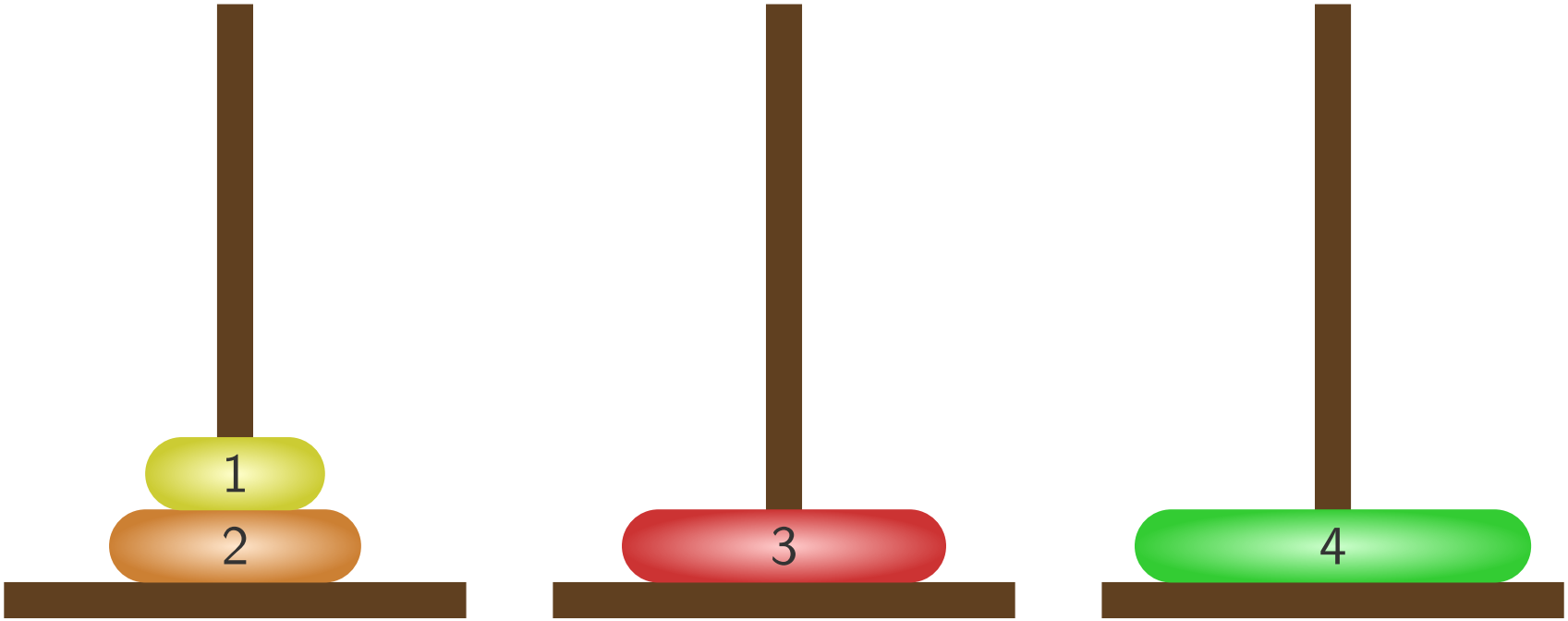
Hanoi towers – 4 poles



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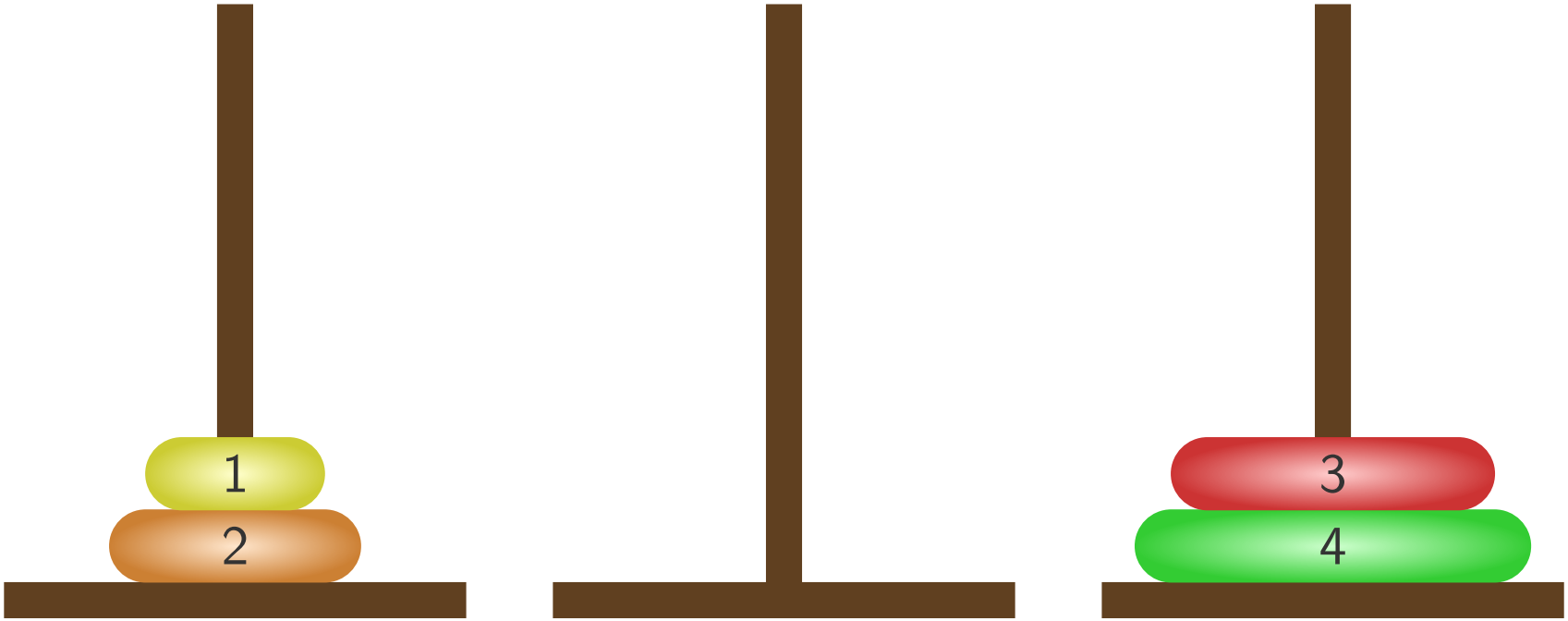
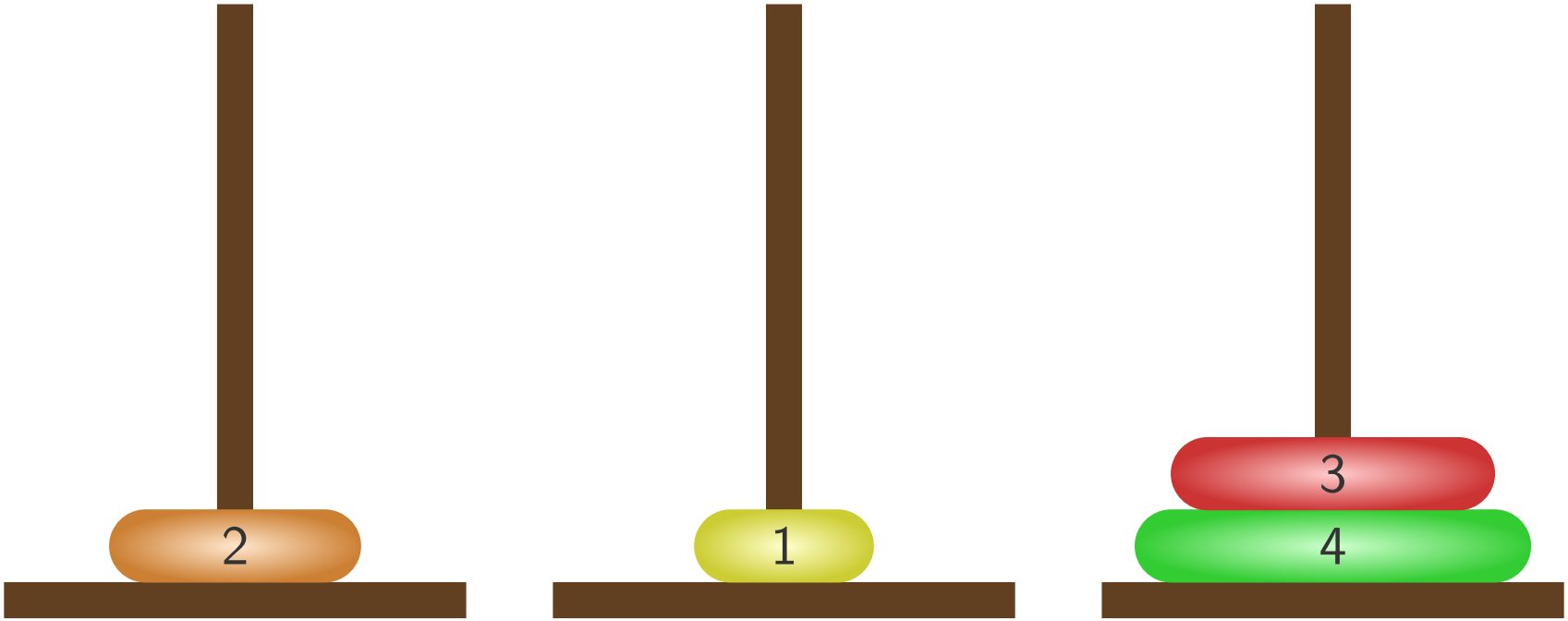
Hanoi towers – 4 poles



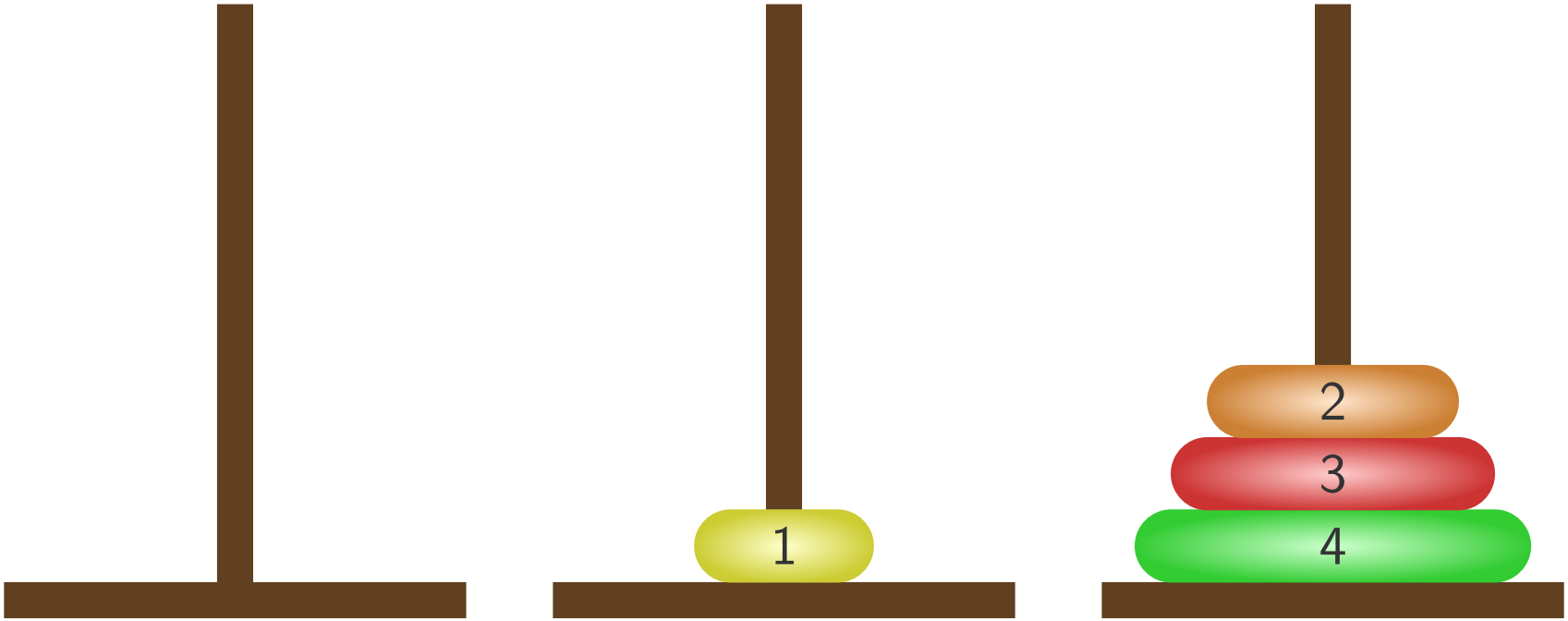
Disk is moved from pole 2 to pole 3.

Hanoi towers – 4 poles



Disk is moved from pole 1 to pole 2.

Hanoi towers – 4 poles



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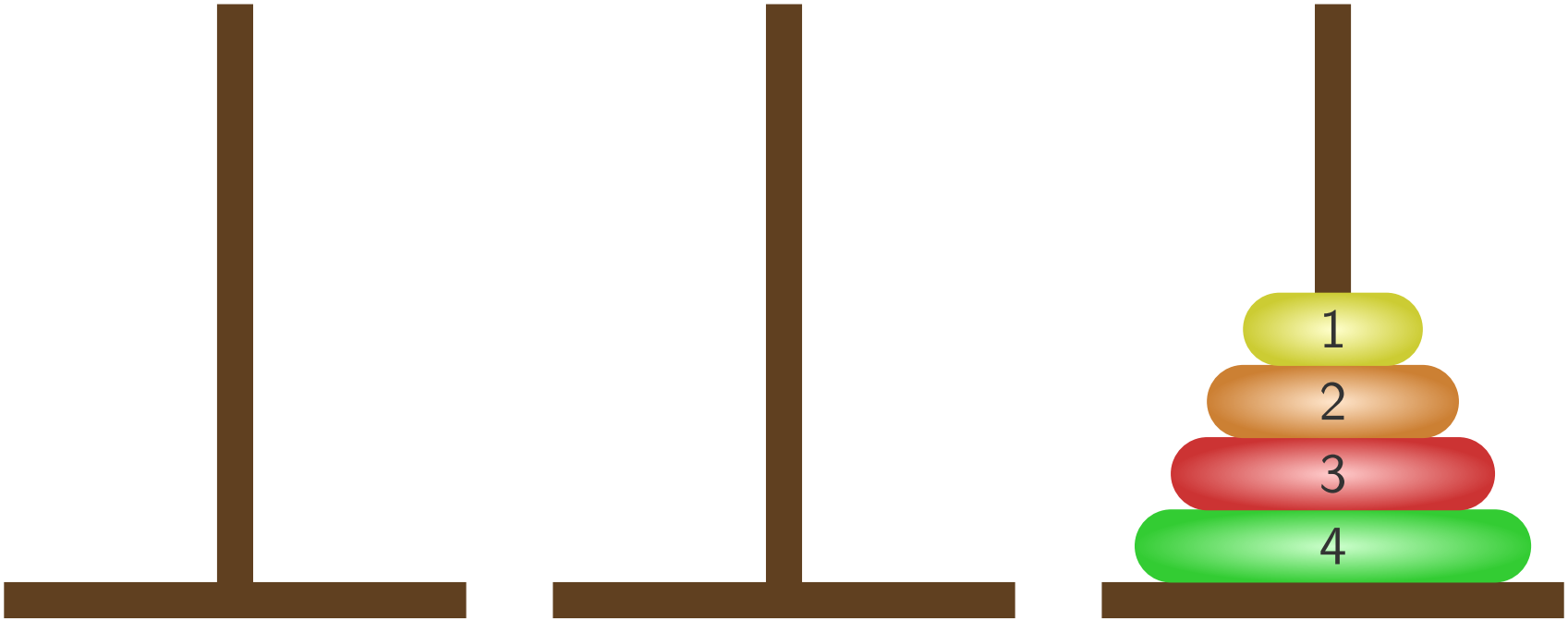
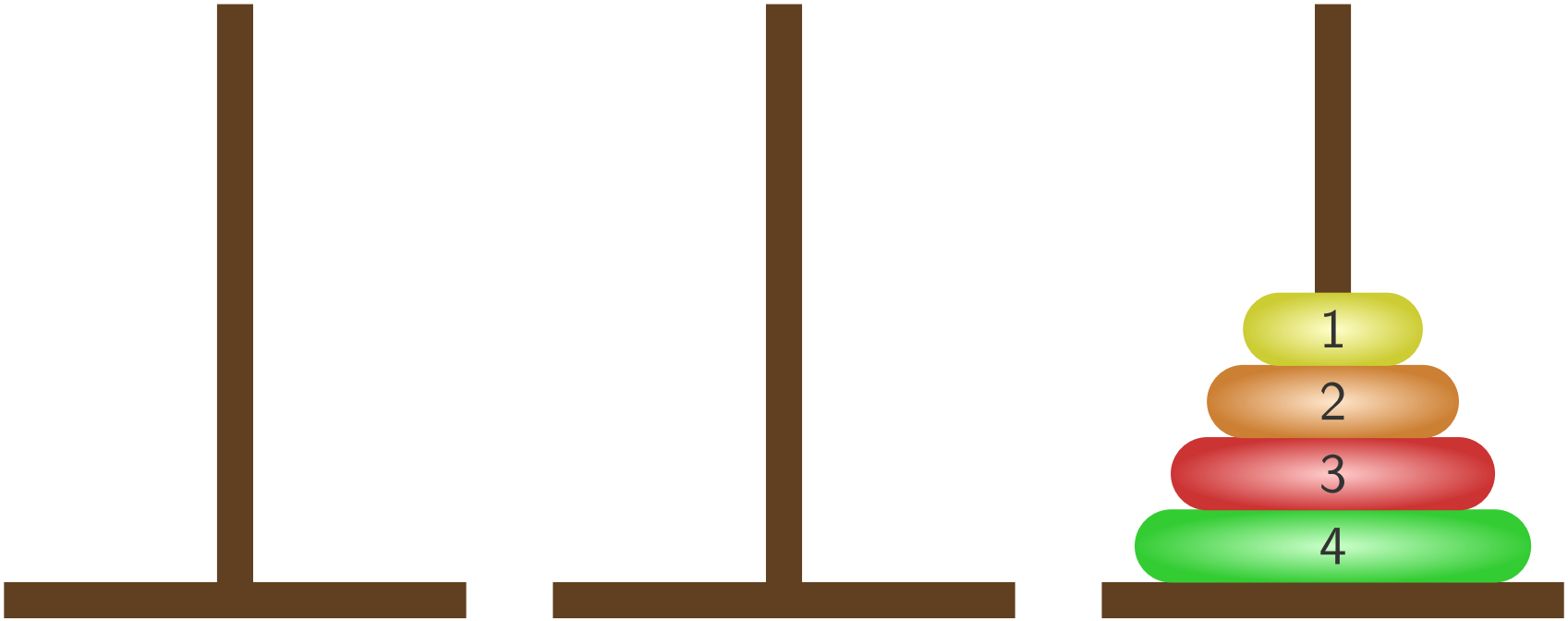
Hanoi towers – 4 poles

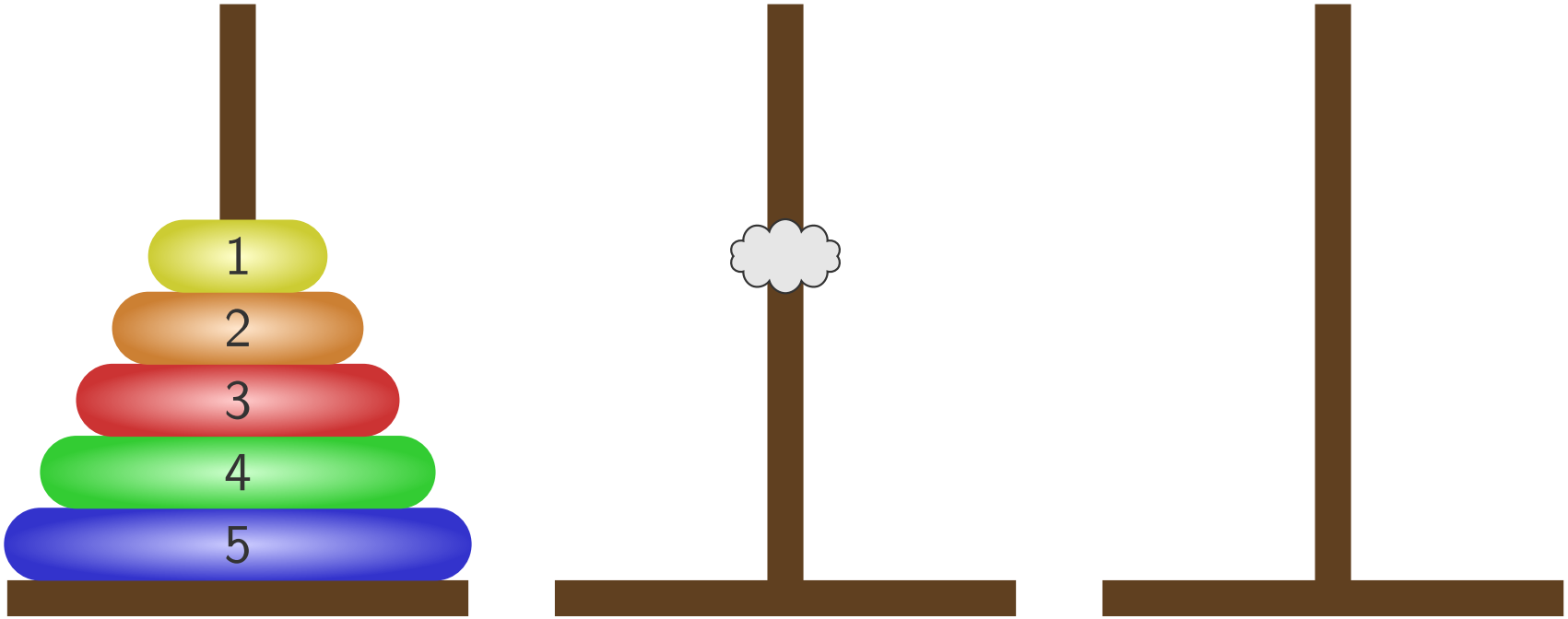


Disk is moved from pole 2 to pole 3.

Hanoi towers – 4 poles



Hanoi towers – 5 poles



Solution

```c
#include <stdio.h>
void hanoi(char from, char to, char other, int n) {
    if(n > 0) {
        hanoi(from, other, to, n - 1);
        printf("%c -> %c\n", from, to);
        hanoi(other, to, from, n - 1);
    }
}
int main() {
    int n;
    printf("Enter number:\n");
    scanf("%d", &n);
    hanoi('A', 'C', 'B', n);
    return 0;
}
```