Stacked Deck  (Si Stebbins, 1898)
A predictable deck of cards that looks disordered.

This was first published by Horatio Galasso in 1593.

The ordering illustrated above and presented at right is also revealed at the end of a video posted by Furrukh Jamal presenting two related magic tricks.

Such a deck can be cut many times, but not shuffled (seasoned illusionists could use false shuffling).
The value of the \( N^{th} \) card from the top (face down) is:

\[
x = B + 3N \pmod{13}
\]

Here, \( B \) is the value of the \textit{bottom card}. The following numerical convention is used (\textit{modulo} 13):

With the numerical code for suits given at the bottom of our main table, if \( S \) is the suit of the bottom card, then the suit of the \( N^{th} \) card is simply:

\[
y = S + N \pmod{4}
\]

For example, if the bottom card is the jack of diamonds (\( B=11, S=0 \)) then the tenth card (\( N=10 \)) is a \textit{deuce} (since 11+3.10 is 41, which is equal to 2 modulo 13). It's the deuce of \textit{hearts} because \( 0+10 \) is equal to 2 modulo 4.

One trick is to have a spectator cut the deck. You secretly look at the bottom card and call the card 3 units higher in the next suit (from the "CHaSeD" sequence Clubs, Hearts, Spades, Diamonds) before revealing the \textit{top} card.
Find a Specific Card by Counting:

Conversely, the position $N$ of the card $x$ of suit $y$ can be obtained from the Chinese Remainder Theorem (a result $N=0$ would denote the bottom card). Since $3N$ is $x-B$ modulo 13, $N$ is $-4(x-B)$ modulo 13 (HINT: $-4\times3$ is $-12$ or $+1$ modulo 13). With that value of $N$ modulo 13 and the value of $N$ modulo 4 (namely $y-S$) we may apply our explicit formula to solve the Chinese Remainder Problem and obtain $N$ modulo $52 = 4\times13$, namely:

$$N = 13 \text{ bezout (13,4) (y-S)} - 4 \text{ bezout (4,13) 4 (x-B)}$$

Since $\text{bezout (13,4)} = 1 \pmod{4}$ and $\text{bezout (4,13) 4} = 1 \pmod{13}$, that expression boils down to the following easy-to-memorize formula:

$$N = 13 \pmod{y-S} - 4 \pmod{x-B} \pmod{52}$$

The existence of such a formula makes the above far more flexible than other stacking schemes which lack arithmetic regularity (including the infamous "Eight Kings CHaSeD" stack, which is merely based on the mnemonic sentence: "Eight Kings threa-tened to save nine fair ladies for one sick knave" standing for the order $8K3T2795Q4A7J$).

For example, if the bottom card is the jack of diamonds ($B=11, S=0$) then the queen of hearts ($x=12, y=2$) is at the following position (modulo 52):

$$N = 13 (2-0) - 4 (12-11) = 22$$

The king of spades is at $N = 13 (3-0) - 4 (13-11) = 31$

The queen of diamonds is at $N = 13 (0-0) - 4 (12-11) = -4 = 48$

The ace of clubs is at $N = 13 (1-0) - 4 (1-11) = 53 = 1$ (Isn't it?)

Preparation: Here's a quick method to arrange the deck as above:

1. Sort separately the 13 cards of each suit face up, highest on top.
2. Cut the 4 heaps so their respective top cards are: $\text{A♣}, 4\spadesuit, 7\spadesuit, 10\spadesuit$
3. Build the whole deck (face up) from top cards in the order: $\text{♣ ♥ ♠ ♦}$