Let x_i be the number on a clock at position of number $i \in \{1, 2, \dots, 12\}$ on a ordinary clock, $y_i = (x_i + x_{i+1}) \mod 13$ for $i \in \{1, 2, \dots, 11\}$ and $y_{12} = (x_{12} + x_1) \mod 13$ and $s = y_1 + y_2 + \cdots + y_{12}$. Then we know that:

$$s \equiv y_1 + y_2 + \cdots + y_{12} \equiv 2(x_1 + x_2 + \cdots + x_{12}) \equiv 12 \cdot 13 \equiv 0 \pmod{13}$$

Consequently, if we show that there exists a solution when $s = 13$ and that there is no solution for $s = 0$, the smallest possible sum is $s = 13$. For $s = 13$, the solution is:

$$(x_1, x_2, \dots, x_{12}) = (1, 12, 2, 11, 3, 10, 4, 9, 5, 8, 6, 7)$$

However, if $s = 0$, then every $y_i = 0$, thus:

$$y_i \equiv y_{i+1} \pmod{13}$$
$$x_i + x_{i+1} \equiv x_{i+1} + x_{i+2} \pmod{13}$$
$$x_i \equiv x_{i+2} \pmod{13}$$

This holds iff $x_i = x_{i+2}$ which is a contradiction. Hence, the smallest value Sylva can find is $s = 13$.