

A property of the Rubik's cube is its injectivity in the moves performed.

(Injectivity for a function is that $f(A)=f(B)$ implies $A=B$)

In the previous sequence used:

D,E,A,B,C,A,B,C, we can say that the E should equal to C, as if we reversed the algorithm, A should get to C, so therefore $E=C$. Repeat this after $E=C$ to get $D=B$, and we're done!