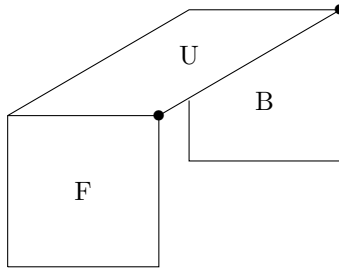
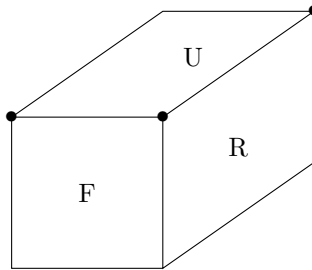


Read move sequences left to right. Moves are counterclockwise, inverses are clockwise. Rotation +1 is counterclockwise, -1 clockwise.



$(FU^{-1}B)^3$: Interchanges dots, fixes other corners with some rotation.

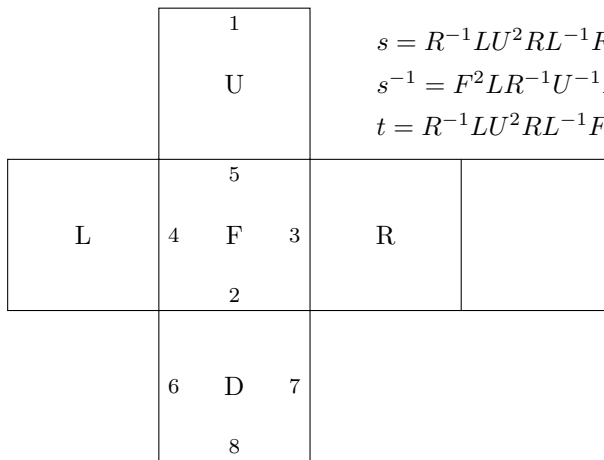
$(FU^{-1}B)^9$: Interchanges dots, fixes other corners with no rotation.



$(RUF)^4$: Rotates dots +1, fixes other corners with no rotation.

$(F^{-1}U^{-1}R^{-1})^4$: Rotates dots -1, fixes other corners with no rotation.

These leave center square orientations fixed.



$$s = R^{-1}LU^2RL^{-1}F^{-1}R^{-1}LURL^{-1}F^2$$

$$s^{-1} = F^2LR^{-1}U^{-1}L^{-1}RFLR^{-1}U^2L^{-1}R$$

$$t = R^{-1}LU^2RL^{-1}FR^{-1}LU^{-1}RL^{-1}F^2$$

These fix center square orientation:

ts flips the orientation of 3 and 5, fixes all else.

$sD^{-1}s^{-1}D$ flips 2, 6, all else stable.

$sDs^{-1}D^{-1}$ flips 2, 7, all else stable.

$sD^2s^{-1}D^2$ flips 2, 8, all else stable.

These do not:

s flips the orientation of 1,2, cycles $3 \rightarrow 4 \rightarrow 5$, fixes all else.

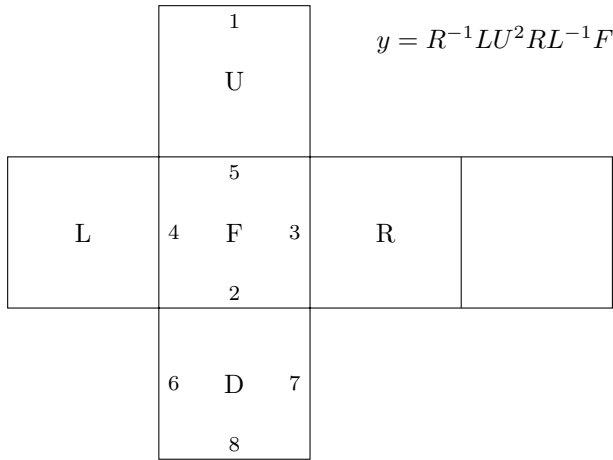
t is similar but cycles $3 \rightarrow 5 \rightarrow 4$.

s^3 flips 1,2, all else stable.

| | | |
|---|---|---|
| 2 | | |
| | F | |
| 3 | | 1 |

$FRF^{-1}R^{-1}F^{-1}U^{-1}FU$: cycles corners $1 \rightarrow 2 \rightarrow 3$, other corners unchanged, some edges move. This leaves orientation of center squares fixed.

Inverse is $U^{-1}F^{-1}UFRFR^{-1}F^{-1}$.



$$y = R^{-1}LU^2RL^{-1}F^2$$

y cycles $5 \rightarrow 1 \rightarrow 2$, fixes all else except orientations of U, F centers. y^2 cycles $5 \rightarrow 2 \rightarrow 1$, fixes everything else.