$\boxed{BA^2}$ has $1 \to 7$, $2 \to 6$, $3 \to 5$, $4 \to 8$,
$5 \to 1$, $6 \to 4$, $7 \to 3$, $8 \to 2$,

$(1735)(2648)$

$BA^2 = A^2B$

$\boxed{BAB}$ has $1 \to 2$, $5 \to 6$, $3 \to 4$, $7 \to 8$,
$2 \to 3$, $8 \to 5$, $4 \to 1$, $6 \to 7$

$(1234)(5678)$

$BAB = A$

$\boxed{B^2A}$ $1 \to 4$, $2 \to 1$, $3 \to 2$, $4 \to 3$
$5 \to 8$, $6 \to 5$, $7 \to 6$, $8 \to 7$

$(1432)(5876)$ (known from $B^2 = A^2$)

$B^2A = A^3$

$\boxed{B^3}$ $1 \to 7$, $5 \to 1$, $3 \to 5$, $7 \to 3$,
$2 \to 6$, $8 \to 2$, $4 \to 8$, $6 \to 4$

$(1735)(2648)$

$B^3 = A^2B = BA^2$

(known from $B^2 = A^2$)