The tables below show the group of triangle symmetries, along with a "mystery group" whose operation is defined by the second table.

Let $\boldsymbol{D}_6$ = ($\{S_i\ , S_{1R}\ , S_{2R}, {}_FS_i,, {}_FS_{1R}\ , {}_FS_{2R}\}$, *) represent the group of triangle symmetries (traditionally called the *dihedral group on six elements*).

S_i --- Do nothing S_{1R} --- Rotate 120° clockwise

S_{2R} --- Rotate 240° clockwise ${}_FS_i$ --- Vertical flip

${}_FS_{1R}$ --- Vertical flip followed by 120° clockwise rotation

${}_FS_{2R}$ --- Vertical flip followed by 240° clockwise rotation

When filling in the table, apply the symmetry in Row *A* before the symmetry in Column *B*.

*	S_i	S_{1R}	S_{2R}	${}_FS_i$	${}_FS_{1R}$	${}_FS_{2R}$
S_i	S_i	S_{1R}	S_{2R}	${}_FS_i$	${}_FS_{1R}$	${}_FS_{2R}$
S_{1R}	S_{1R}	S_{2R}	S_i	${}_FS_{2R}$	${}_FS_i$	${}_FS_{1R}$
S_{2R}	S_{2R}	S_i	S_{1R}	${}_FS_{1R}$	${}_FS_{2R}$	${}_FS_i$
${}_FS_i$	${}_FS_i$	${}_FS_{1R}$	${}_FS_{2R}$	S_i	S_{1R}	S_{2R}
${}_FS_{1R}$	${}_FS_{1R}$	${}_FS_{2R}$	${}_FS_i$	S_{2R}	S_i	S_{1R}
${}_FS_{2R}$	${}_FS_{2R}$	${}_FS_i$	${}_FS_{1R}$	S_{1R}	S_{2R}	S_i

Let ***G*** = ({A, B, C, D, E, G}, ⊙) be the group whose operation is defined by the following table. (You may assume that ***G*** is a group.)

⊙	***A***	***B***	***C***	***D***	***E***	***G***
A	*B*	*A*	*D*	*C*	*G*	*E*
B	*A*	*B*	*C*	*D*	*E*	*G*
C	*G*	*C*	*B*	*E*	*D*	*A*
D	*E*	*D*	*A*	*G*	*C*	*B*
E	*D*	*E*	*G*	*A*	*B*	*C*
G	*C*	*G*	*E*	*B*	*A*	*D*

The group $\boldsymbol{G}$ is actually the "same" as the dihedral group $\boldsymbol{D}_6$.

TASK 1: On your own, think about how to demonstrate that these two groups are the same.

TASK 2: Share your thoughts with your group, come to a consensus, and demonstrate that these two groups are the same. What does "same" mean?