

All: page 37: 5, 6, 7, 8 (me)

G1: page 37: 14, 15, page 57: 41, 44

G2: page 37: 16, 17, page 57: 42, 43 (me)

(In other words, do: page 37: 5, 6, 7, 8, 16, 17, page 57: 42, 43)

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Exercise 5

For $n \geq 3$, describe the elements of D_n . (Hint: You will need to consider two cases: n is even and n is odd.)

The elements of D_n are just reflections and rotations of the n -gon.

If n is even, D_n will have $n - 1$ rotations, n reflections, and the identity, for a total of $2n$ operations.

If n is odd, D_n will have $n - 1$ rotations, n reflections, and the identity, for a total of $2n$ operations.

How many elements does D_n have?

$2n$

Exercise 6

In D_n , explain geometrically why a reflection followed by a reflection must be a rotation.

Exercise 7

In D_n , explain geometrically why a rotation followed by a rotation must be a rotation.

Exercise 8

In D_n , explain geometrically why a rotation and a reflection taken together in either order must be a reflection.

Exercise 16

Describe the symmetries of a parallelogram that is neither a rectangle nor a rhombus. Describe the symmetries of a rhombus that is not a rectangle.

Exercise 17

Describe the symmetries of a non-circular ellipse. Do the same for a hyperbola.

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Exercise 42

Suppose F_1 and F_2 are distinct reflections in a dihedral group D_n such that $F_1F_2 = F_2F_1$.

Prove that $F_1F_2 = R_{180^\circ}$

Exercise 43

Let R be any fixed rotation and F any fixed reflection in a dihedral group.
prove that $R^k F R^k = F$