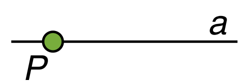
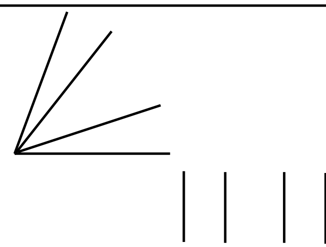
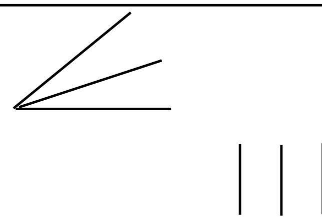
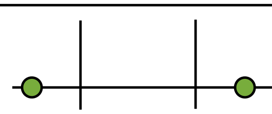
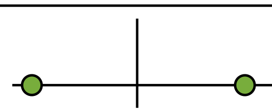
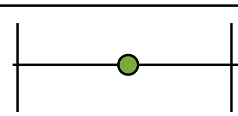
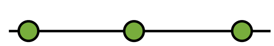
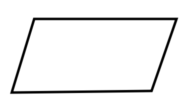
Geometry and Groups, a Dictionary

Geometric statements about points and lines	Picture in R x R	Equivalent algebraic statements
point P lies on line a (or a passes through P)		$R_P \circ R_a = R_a \circ R_P$ $R_P \circ R_a$ is an involution
a is perpendicular to b	$a \perp b$	$R_a \circ R_b = R_b \circ R_a$ $R_a \circ R_b$ *is an involution*
a, b, c, d concurrent and $\angle(a, b) = \angle(d, c)$ OR no two of a,b,c,d intersect and dist(a, b) = dist(d, c).		$R_a \circ R_b = R_d \circ R_c$
a, b, c are concurrent and the line b bisects $\angle(a, c)$ OR no two of a,b,c intersect and dist(a, b) = dist(b, c).		$R_a \circ R_b = R_b \circ R_c$
b and d are $\perp$ to PQ and dist(P, b) = dist(d, Q)		$R_P \circ R_b = R_d \circ R_Q$
b is the $\perp$ bisector of PQ		$R_P \circ R_b = R_b \circ R_Q$
b II d and P is equidistant from the lines b and d		$b \neq d$ and $R_d \circ R_P = R_P \circ R_b$
M is the midpoint of AC		$R_A \circ R_M = R_M \circ R_C$
AB = DC and AB || DC		$R_A \circ R_B = R_D \circ R_C$

Bachmann's Axioms, Table from "*A New Look at Geometry*" by Irving Adler