The GAP BRAID routine due to K. Magaard, S. Shpectorov and H. Völklein (Experiment. Math. 12 (2003)) enabled the calculation of possible automorphism groups of curves, and polynomial equations for the corresponding curves, for small genus $g$ (K. Magaard, T. Shaska, S. Shpectorov, H. Völklein, in Communications in arithmetic fundamental groups (2002)). We seek an equation in terms of thetanulls for each group, defining the locus $\mathcal{M}(g, G)$ of curves with automorphism group $G$ in the moduli space, by expressing the equation of the curve by thetanulls (Thomae’s formulas). In genus 2 (joint work with T. Shaska and S. Wijesiri, Albanian J. Math. 1 (2007)), the formulas in part are elegantly related to classical work by Jacobi and others, in part are pages long, calculated by computer using a characterization of the loci in terms of Igusa invariants (T. Shaska, J. Symbolic Comput. 31 (2001)). In genus 3 (joint work with T. Shaska) we succeed in special cases and we give characterizations of a curve in $\mathcal{M}(3, G)$ in terms of Jacobian splitting (up to isogeny) and elements of finite order in the Jacobian. (Received September 11, 2008)