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Mental constructions for the group isomorphism theorem.

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Summary: The group isomorphism theorem is an important subject in any abstract algebra undergraduate course; nevertheless, research shows that it is seldom understood by students. We use APOS theory and propose a genetic decomposition that separates it into two statements: the first one for sets and the second with added structure. We administered a questionnaire to students from top Chilean universities and selected some of these students for interviews to gather information about the viability of our genetic decomposition. The students interviewed were divided in two groups based on their familiarity with equivalence relations and partitions. Students who were able to draw on their intuition of partitions were able to reconstruct the group theorem from the set theorem, while those who stayed on the purely algebraic side could not. Since our approach to learning this theorem was successful, it may be worthwhile to gather data while teaching it the way we propose here in order to check how much the learning of the group isomorphism theorem is improved. This approach could be expanded to other group homomorphism theorems provided further analysis is conducted: going from the general (e.g., sets) to the particular (e.g., groups) might not always be the best strategy, but in some cases we may just be turning to more familiar settings.

Classification: H45 C35

Keywords: APOS theory; equivalence relation; genetic decomposition; group isomorphism theorem

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