

## **Spatial abilities and high performance in transformational geometry**

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This study aimed to investigate the cognitive profile of students with high performance in transformational geometry. A sample of 166 primary school students (grades 4 to 6) was given two tests to measure transformational geometry and spatial abilities. RASCH analysis was used to create a scale of performance in transformational geometry. The scale was interpreted as a hierarchy of five levels of abilities: wholistic image, motion of an object, mapping of an object, mapping of the plane, and self-regulated mapping of the plane. Only 6% of the students seem to be at the highest performance levels. Further analyses suggest that these students have significantly higher spatial abilities than students who are at the lower levels. We discuss the way in which spatial abilities differentiate students' abilities and reasoning over the levels of transformational geometry performance. We also explore the qualitative differences in the geometrical thinking of students who exhibit the highest level of spatial abilities. Special attention is given to the only student who reached the top level of the scale, whose characteristics are above the high achievers' group average scores. This student's spatial flexibility in solving transformational geometry tasks is depicted with examples from a clinical interview.

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