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Making logarithms accessible – operational and structural basic models for logarithms.

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Summary: Logarithms have a reputation for being difficult and inaccessible. As an analysis of their historical, mathematical and educational background suggests, this problem might be due to the way in which logarithms are interpreted and explained in textbooks: as the inverse of exponents. If this conclusion is right, additional interpretations of logarithms are required. By combining the theoretical construct of 'Grundvorstellungen' (translated as 'basic models') and the distinction between operational and structural conceptions, I identify and elaborate four interpretations of logarithms: (i) the basic model of 'multiplicative measuring', (ii) the basic model of 'counting the number of digits', (iii) the basic model of 'decreasing the hierarchy level', and (iv) the basic model of 'inverse exponent'. Three models (i–iii) reflect operational conceptions and interpret logarithms in contexts familiar to students. In combination with (iv), a structural basic model, this paper argues on a theoretical level that they could help to make logarithms accessible and understandable to students. Following the tradition of 'Stoffdidaktik' ('subject-matter didactics'), the study thus aims to unpack some of the content knowledge required for the teaching of logarithms.

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