

Abstract Submitted
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What Physicist Mean By The Equals Sign In Undergraduate Education DINA ZOHRABI ALAEE, Department of Physics, College of Arts and Sciences, Kansas State University, Kansas 66506, KELLIANNE KORNICK, Department of Physics, Rochester Institute of Technology, Rochester, NY 14623, ELEANOR C. SAYRE, Department of Physics, College of Arts and Sciences, Kansas State University, Kansas 66506, SCOTT V. FRANKLIN, Department of Physics, Rochester Institute of Technology, Rochester, NY 14623 — Mathematical concepts and tools have an important role in physics. Faculties want students to think critically about mathematics and the underlying fundamental concepts, rather than simply memorizing a series of equations and answers. The equals sign – ubiquitous in problem solving – carries different conceptual meaning depending on how it is used; this meaning is deeply tied to cultural practices in problem solving in physics. We use symbolic forms to investigate the conceptual and cultural meanings of the equals sign across physics contexts. We built and validated a rubric to classify the ways that physics students use the equals sign in their written work. Our categories are causality, assignments, definitional, balancing, and just math. We analyze students use of the equals sign in their written homework and exam solutions in an upper-division electrostatics course. We correlate the kinds of equal signs within problem solutions with the difficulty of the problem. We compare they ways students use the equals sign to their course lectures and textbook.

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