

PS.A-SA-9.10: Symbolic Manipulation Fluency Predicts Introductory Physics Students' Mathematical Preparedness*

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Whether it is rearranging a kinematics equation or applying Newton's second law, introductory physics students are often asked to solve problems that require the manipulation of symbols. After analyzing nearly 7,000 mathematics diagnostics administered at four large state universities, we find that many introductory physics students struggle with basic algebra to a degree that could impact their course performance. Correct-response rates on algebra problems drop significantly when numeric coefficients are replaced with symbols. Even the replacement of one type of symbol (Latin letters) with a less-familiar type (Greek letters) seems to have a significant negative effect on performance. We also find that performance on symbolic-type algebra problems is highly correlated with performance on trigonometry, geometry, and graphing problems. We will report our analysis of these results while providing an overview of our recent findings.

*Supported in part by NSF DUE #1504986 and #1914712