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College physics students' mathematical difficulties suggest need for awareness and action at the high school level DAVID E. MELTZER, DAKOTA H. KING, Arizona State University — We report results of a four-year multi-institutional study of physics students' mathematical difficulties that have implications regarding K-12 instruction and teacher preparation. We have administered over 5000 written diagnostic tests in introductory college physics courses, and carried out problem-solving interviews. The test items are at the level of high school mathematics, including algebra, trigonometry, and graphing. We have found that substantial difficulties with these basic mathematical operations are widespread, and that performance on problems using symbols for constants is consistently worse than on problems using numbers. Our results suggest that high school students planning to take college physics may need increased awareness of the mathematical skills expected of college physics students, and that they and their teachers (and prospective teachers) could benefit from methods for improving those skills before arrival at college. In collaboration with Ohio State University, we are working to develop and test an online instructional tool that will provide opportunities for regular, targeted practice to address these mathematical difficulties. This tool may have utility at the K-12 level as well as at the college level.

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