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Expanding the FCI to Eevaluate Conceptual Mastery of Energy, Momentum, and Rotational Dynamics ALEX CHEDIAK, California Baptist University, KATRINA HAY, Pacific Lutheran University — Normalized gain on the Force Concept Inventory (FCI) has deservedly become a widely accepted assessment tool to evaluate conceptual mastery in a high school, college, or university-level mechanics course. Left out of this assessment, however, are important physics concepts typically presented in the same course. Conservation of energy and momentum as well as rotational motion receive scant (if any) coverage on the FCI (or, for that matter, the Mechanics Baseline Test). Yet these concepts are foundational for popular majors such as mechanical engineering, where high failure rates are often a concern. A revised assessment tool is presented, one that incorporates the strengths of the FCI (and preserves the straightforward multiple choice format), but assesses these other mechanics-related concepts. Ten additional questions are included, inspired in part by material from the Physics Education Group at the University of Washington and in part by the authors' own experiences with common student misperceptions. The questions are given as pre- and post tests at the authors' institutions, California Baptist University and Pacific Lutheran University, in both calculus-based and algebra-based mechanics courses, exploring breadth of applicability for our findings. We present normalized gain data for the traditional thirty FCI questions and for our ten additional questions.

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