

Abstract

We report on students' thinking in the context of calorimetry in an introductory calculus-based physics course. Student responses to a variety of questions in diverse contexts (see Figs. 1-4) demonstrated overall good performance (> 60% correct responses), although only about half of all students were able to provide correct answers with satisfactory explanations. Student response patterns varied significantly depending on the context of the question and often seemed to rely on algorithmic or "rule-based" reasoning. Interviews with students suggested that difficulty with algebraic manipulations was a significant contributor to incorrect responses. Strikingly, both unhelpful algorithmic reasoning and unnecessary algebraic manipulations were characteristic of students having *good* conceptual understanding, as well as students lacking such understanding.