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## Increasing active student participation in the classroom through the use of "flash cards"

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Large lecture classes make it difficult to maintain high levels of student-faculty interaction; in these classes, students traditionally play a relatively passive role. We have been making use of techniques for increasing active student participation in the lecture classroom, and for raising the level of interaction between students and instructors. A central element in these methods is the use of "flash cards" which allow students to instantaneously indicate to the instructor their responses to multiple-choice questions. Students use  $8.5 \times 11$  inch flash cards, labeled "A," "B," "C," "D," "E," and "F" to signal their responses to the instructor. Flash-card questions emphasize qualitative and proportional reasoning, solution strategies for problems, order of magnitude estimates, etc. Responses provide feedback to the instructor on student misconceptions, and pace of student understanding. Here we show an example of how we break down a conventional problem into conceptual elements—a so-called "problem dissection"—which can then be formed into flash-card questions. ©1997 American Institute of Physics.

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