In the Classroom

The Tile Game

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A simplified method of teaching dimensional analysis to students that can be used in a liberal arts, nonmathematical chemistry course is presented in the form of a game or puzzle that can be played by the student. This game is designed to counter the mathematical anxiety that many students bring to such courses. The result of the game is that certain concepts in chemistry relating to numbers can be taught in a fun interactive manner.

Introduction

Boise State University offers a course called Concepts of Chemistry which satisfies the university core science requirement. Although this course is intended as a nonmathematical presentation of chemistry, certain chemistry concepts require number manipulation. The trick to overcoming this is to let the students in the course solve certain problems in a mechanical way that requires only multiplication or division rather than formal algebra.

The dimensional analysis method allows students with little or no algebra background to solve many of the problems encountered in chemistry. Dimensional analysis uses conversion factors (fractions whose numerators and denominators are equivalent) to change the units from one form to another. For
example, the problem of how many inches are in 1 mile can be readily solved by this method if a student knows the conversion factors of $5,280$ feet $= 1$ mile and $12$ inches $= 1$ foot.

$$1 \text{ mile} \times \frac{5,280 \text{ feet}}{1 \text{ mile}} \times \frac{12 \text{ inches}}{1 \text{ foot}} = 63,360 \text{ inches}$$

Unfortunately, when this method is taught, especially to nonscience majors, many of the students are intimidated by the algebraic nature of the presentation. The purpose of the Tile Game is to convince these students that dimensional analysis is really just an easy way to solve problems. The game has been used effectively for helping students in any first-year chemistry course, regardless of the mathematics prerequisite for the course.

**The Tile Game**

*Object of the Tile Game*

The objective of the game is to change the starting pattern of dots into the desired pattern by using the smallest possible number of tiles.

*Rules of Play*

You must match the starting pattern of dots with the identical pattern of dots in the lower half of the first tile that is played. In multiple tile solutions, each subsequent tile must have its lower pattern of dots match the pattern of dots on the upper half of the previous tile. They match diagonally from upper left to lower right as shown in the one tile solution to the game. Play continues until the target pattern is present as the upper half of the last tile played.