Dimensional Analysis: A Mathematics Tool to Dissect the Circulatory System

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In the fall of 1999, NASA announced that it had lost the $125 million Mars Climate Orbiter because the scientists guiding the satellite made their calculations using metric measures, while the computer controlling the orbiter had been programmed using English units. Through all the years of design, testing, and simulations, no one had sensed that anything was wrong until the craft disappeared. Units are what give numbers meaning. Attach the wrong units to the numbers and even the most precise calculation is worthless. As medical technology develops new therapies to replace malfunctioning organs in our bodies as we age or injure ourselves, there will be questions as to performance, longevity, and reliability of those replacements. Will engineers look at the data in precisely the correct way to give them that extra insight? When engineers design these organs, will they make the same mistakes that NASA made, getting all the big pieces of data correct but missing the most basic consideration of knowing what the numbers mean? This unit will guide students into a way of approaching data and getting a feel for what numbers say so that little considerations like the meaning of the numbers get their due.

(Developed for Calculus AP/AB and AP/BC, grades 10-12, and Algebra I Support, grades 9-10; recommended for Algebra I, Geometry, Algebra II, Trigonometry, Calculus, Physics, Chemistry, and Biology, High School grades 9-12 [also appropriate for Middle School])