Dimensional analysis, conversion factors and ratios. Discussion about the division line, its direct translation to “for every” and “per”. Illustration by the concept of “per cent”, literally “for every 100”.

Introduction to the direct and indirect (or inverse) math functions and their corresponding graphs. Discussion about the proportionality symbol or the “related to” symbol. Adding the concept of observed movement, same direction or opposite direction, and the corresponding mathematical expressions. Creation of individual relationship graphs from students’ own experiences.

(LAB) Demonstration of 2 fundamental gas laws (Pressure/Volume relationship and Temperature/Volume relationship). (THOUGHT LAB) Discussion of Moles/Volume relationship.

Tying it all together. Discussion of how to manipulate individual relationships and how to put them together. Involves manipulation of individual relationships to get them to line up. Creation of the ideal gas law from observed and thought generated data. Re-introducing the units back into the derived equation along with discussion about the numbers and where they come from (ie. 278 Kelvin instead of Celsius or Fahrenheit, because the latter 2 scales have inconvenient zeroes in them.) Derivation of the ideal gas constant (k). Introduces the concept of a constant that makes the relationship mathematical, which is used to make testable predictions.

Creation of individualized student relationships related to “happiness”, re-introduction of the process of generating a complex relationship. Demonstrating how manipulation of the 3 variables impacts the outcome. Introduction of the use of variables in place of words.