II. Probable Algebra Units

While algebraic ideas will undoubtedly be developed and applied in many of the CMP units, from data analysis to geometry, it seems likely that separate units should be developed to focus on the following major concepts and methods of the subject:

A_1: Variables and Patterns — Introduction to the concept of variable and relations among quantitative variables, representation of those relationships using graphs, tables, words, and causal loop diagrams. No use of symbolic expressions at this time; informal use of the phrases "depends on" and "is a function of", but no formal use of function definition or notation. Through questions, focus on key features of a relationship such as rate of change, max/min, zeroes, etc. Use both applied situations and number pattern examples.

A_2: Relating Variables by Symbolic Expressions — Introduction to the use of symbolic rules as concise summarizers of relations among variables. Connection to tables and graphs for the same relations through technology introduction (possible graphing calculator). Order of operations and distributive property.

This section will emphasize relations of the form $y = f(x)$, but it will also include some like $x + y = c$ or $xy = c$ where it is easy to solve for one variable as a function of the other using "inverse operation" or "undoing" logic.

A_3: Patterns Relating Variables — Exploration of table, graph, symbolic, and verbal representations that characterize linear, exponential, quadratic, and inverse relations between variables. This will be an informal, technology-based study aiming at getting students adept at recognizing the type of relationship to expect when given information in any one of the forms. The broad goal is that students should become sensitive to the fact that different relations have different but predictable symbolic, graphic, and tabular forms.

This unit will not aim at fine-tuning student ability to predict changes in tables or graphs from parameter changes in rules or to construct rules from given tables or graphs.

A_4: Linear Relationships Among Variables — This unit will look closely at recognition, representation, and strategies for answering questions about linear relations. This will include particular attention to the connection between $y = mx + b$, slope and intercepts of graphs, rates of change in y, and typical applications that lead to such relations and questions.

A_5: Quadratic Relations — A unit similar in goal and structure to A_4.