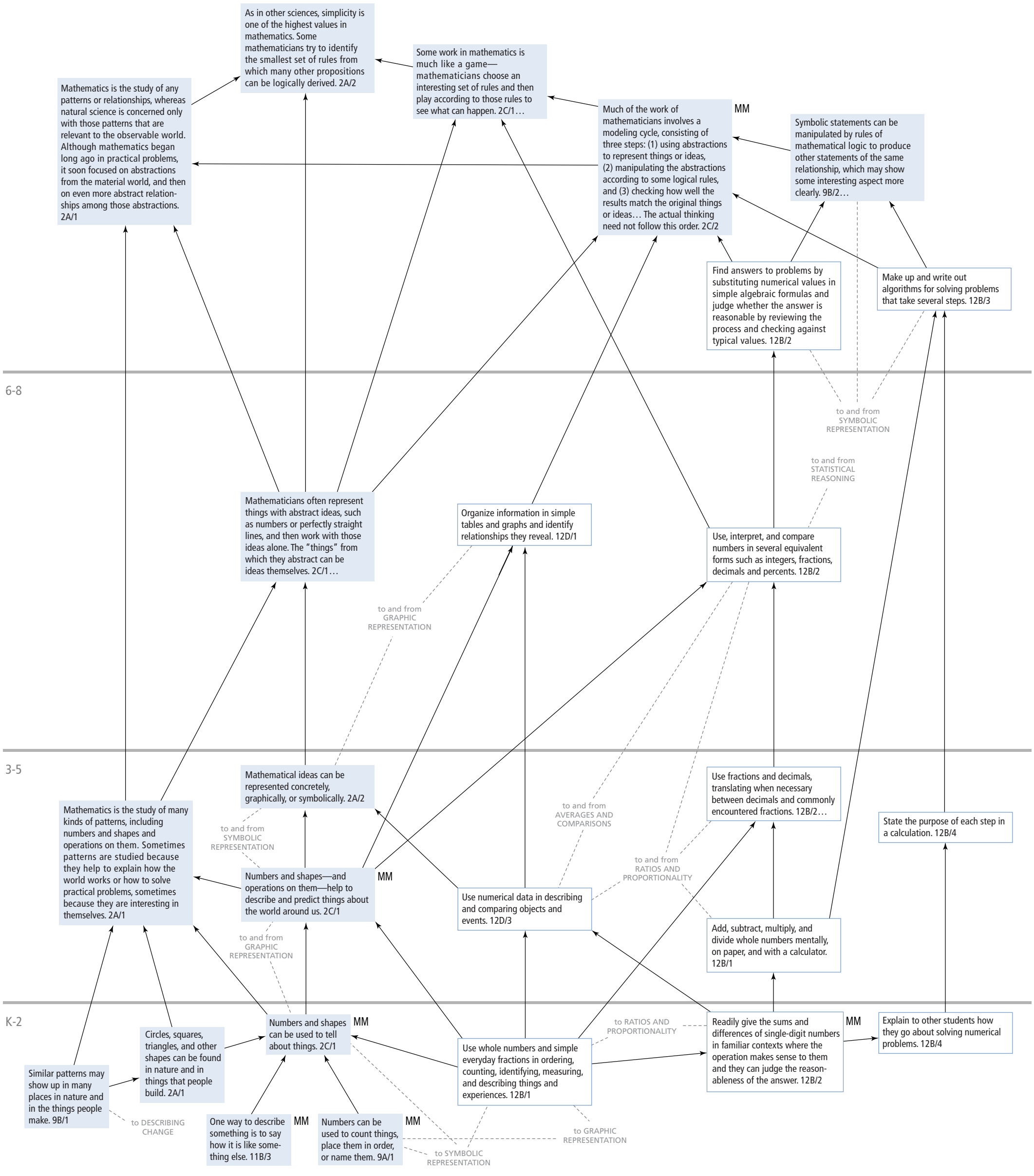
9-12
6-8
3-5
K-2
Mathematics is the study of any patterns or relationships, whereas natural science is concerned only with those patterns that are relevant to the observable world. Although mathematics began long ago in practical problems, it soon focused on abstractions from the material world, and then on even more abstract relationships among those abstractions. 2A/1
As in other sciences, simplicity is one of the highest values in mathematics. Some mathematicians try to identify the smallest set of rules from which many other propositions can be logically derived. 2A/2
Some work in mathematics is much like a game—mathematicians choose an interesting set of rules and then play according to those rules to see what can happen. 2C/1…
Much of the work of mathematicians involves a modeling cycle, consisting of three steps: (1) using abstractions to represent things or ideas, (2) manipulating the abstractions according to some logical rules, and (3) checking how well the results match the original things or ideas… The actual thinking need not follow this order. 2C/2
MM
Symbolic statements can be manipulated by rules of mathematical logic to produce other statements of the same relationship, which may show some interesting aspect more clearly. 9B/2…
Find answers to problems by substituting numerical values in simple algebraic formulas and judge whether the answer is reasonable by reviewing the process and checking against typical values. 12B/2
Make up and write out algorithms for solving problems that take several steps. 12B/3
to and from SYMBOLIC REPRESENTATION
to and from STATISTICAL REASONING
Mathematicians often represent things with abstract ideas, such as numbers or perfectly straight lines, and then work with those ideas alone. The "things" from which they abstract can be ideas themselves. 2C/1…
Organize information in simple tables and graphs and identify relationships they reveal. 12D/1
Use, interpret, and compare numbers in several equivalent forms such as integers, fractions, decimals and percents. 12B/2
to and from GRAPHIC REPRESENTATION
Mathematical ideas can be represented concretely, graphically, or symbolically. 2A/2
Use fractions and decimals, translating when necessary between decimals and commonly encountered fractions. 12B/2…
State the purpose of each step in a calculation. 12B/4
to and from AVERAGES AND COMPARISONS
Mathematics is the study of many kinds of patterns, including numbers and shapes and operations on them. Sometimes patterns are studied because they help to explain how the world works or how to solve practical problems, sometimes because they are interesting in themselves. 2A/1
to and from SYMBOLIC REPRESENTATION
Numbers and shapes—and operations on them—help to describe and predict things about the world around us. 2C/1
MM
to and from RATIOS AND PROPORTIONALITY
Use numerical data in describing and comparing objects and events. 12D/3
Add, subtract, multiply, and divide whole numbers mentally, on paper, and with a calculator. 12B/1
to and from GRAPHIC REPRESENTATION
Numbers and shapes can be used to tell about things. 2C/1
MM
to RATIOS AND PROPORTIONALITY
Readily give the sums and differences of single-digit numbers in familiar contexts where the operation makes sense to them and they can judge the reasonableness of the answer. 12B/2
MM
Explain to other students how they go about solving numerical problems. 12B/4
Circles, squares, triangles, and other shapes can be found in nature and in things that people build. 2A/1
Use whole numbers and simple everyday fractions in ordering, counting, identifying, measuring, and describing things and experiences. 12B/1
Similar patterns may show up in many places in nature and in the things people make. 9B/1
to DESCRIBING CHANGE
One way to describe something is to say how it is like something else. 11B/3
MM
Numbers can be used to count things, place them in order, or name them. 9A/1
MM
to SYMBOLIC REPRESENTATION
to GRAPHIC REPRESENTATION
studying patterns
representation and abstraction
computation and operations