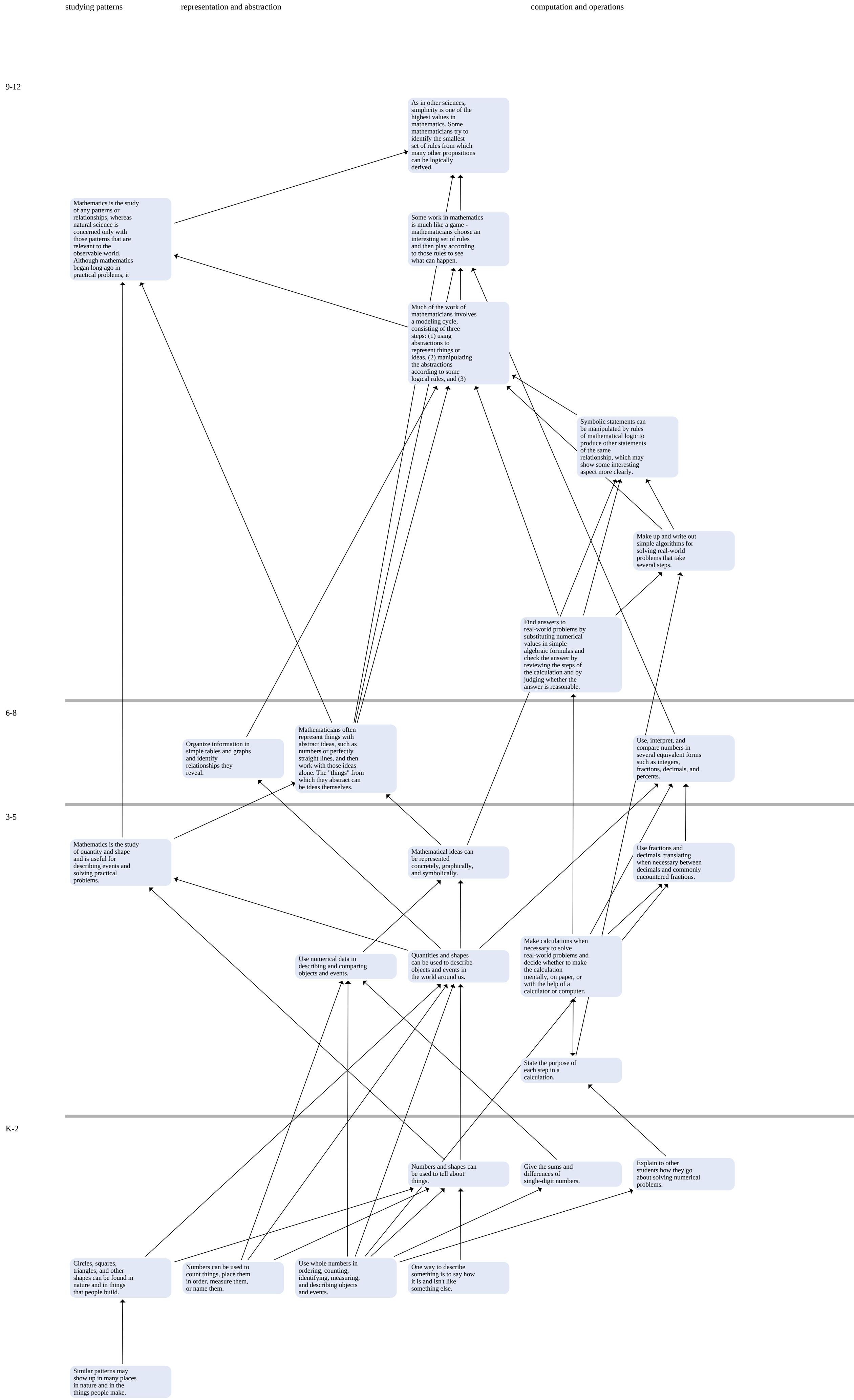
studying patterns
representation and abstraction
computation and operations
9-12
As in other sciences, simplicity is one of the highest values in mathematics. Some mathematicians try to identify the smallest set of rules from which many other propositions can be logically derived.
Mathematics is the 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
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.
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)
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.
Make up and write out simple algorithms for solving real-world problems that take several steps.
Find answers to real-world problems by substituting numerical values in simple algebraic formulas and check the answer by reviewing the steps of the calculation and by judging whether the answer is reasonable.
6-8
Organize information in simple tables and graphs and identify relationships they reveal.
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.
Use, interpret, and compare numbers in several equivalent forms such as integers, fractions, decimals, and percents.
3-5
Mathematics is the study of quantity and shape and is useful for describing events and solving practical problems.
Mathematical ideas can be represented concretely, graphically, and symbolically.
Use fractions and decimals, translating when necessary between decimals and commonly encountered fractions.
Use numerical data in describing and comparing objects and events.
Quantities and shapes can be used to describe objects and events in the world around us.
Make calculations when necessary to solve real-world problems and decide whether to make the calculation mentally, on paper, or with the help of a calculator or computer.
State the purpose of each step in a calculation.
K-2
Numbers and shapes can be used to tell about things.
Give the sums and differences of single-digit numbers.
Explain to other students how they go about solving numerical problems.
Circles, squares, triangles, and other shapes can be found in nature and in things that people build.
Numbers can be used to count things, place them in order, measure them, or name them.
Use whole numbers in ordering, counting, identifying, measuring, and describing objects and events.
One way to describe something is to say how it is and isn't like something else.
Similar patterns may show up in many places in nature and in the things people make.