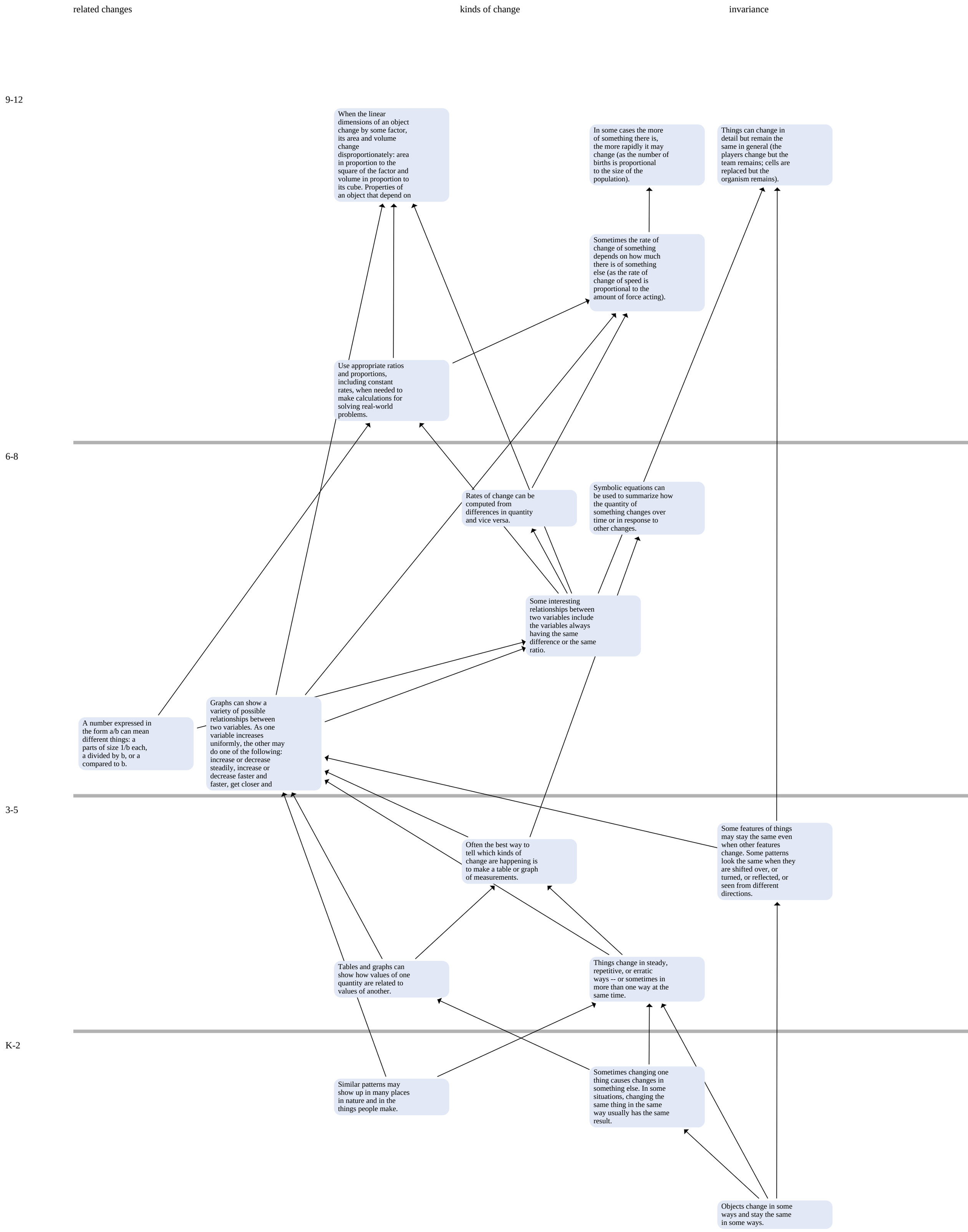
related changes
kinds of change
invariance
9-12
When the linear dimensions of an object change by some factor, its area and volume change disproportionately: area in proportion to the square of the factor and volume in proportion to its cube. Properties of an object that depend on
In some cases the more of something there is, the more rapidly it may change (as the number of births is proportional to the size of the population).
Things can change in detail but remain the same in general (the players change but the team remains; cells are replaced but the organism remains).
Sometimes the rate of change of something depends on how much there is of something else (as the rate of change of speed is proportional to the amount of force acting).
Use appropriate ratios and proportions, including constant rates, when needed to make calculations for solving real-world problems.
6-8
Rates of change can be computed from differences in quantity and vice versa.
Symbolic equations can be used to summarize how the quantity of something changes over time or in response to other changes.
Some interesting relationships between two variables include the variables always having the same difference or the same ratio.
A number expressed in the form a/b can mean different things: a parts of size 1/b each, a divided by b, or a compared to b.
Graphs can show a variety of possible relationships between two variables. As one variable increases uniformly, the other may do one of the following: increase or decrease steadily, increase or decrease faster and faster, get closer and
3-5
Often the best way to tell which kinds of change are happening is to make a table or graph of measurements.
Some features of things may stay the same even when other features change. Some patterns look the same when they are shifted over, or turned, or reflected, or seen from different directions.
Tables and graphs can show how values of one quantity are related to values of another.
Things change in steady, repetitive, or erratic ways -- or sometimes in more than one way at the same time.
K-2
Similar patterns may show up in many places in nature and in the things people make.
Sometimes changing one thing causes changes in something else. In some situations, changing the same thing in the same way usually has the same result.
Objects change in some ways and stay the same in some ways.