effect of size on properties

variety of magnitudes in nature

describing extremes

9-12

Both shape and scale can have important consequences for the performance of systems.

When describing and comparing very small and very large quantities, express them using powers-of-ten notation.

Because different properties are not affected to the same degree by changes in size, large changes in size typically change the way that things work in physical, biological, or social systems.

Representing very large or very small numbers in terms of powers of ten makes it easier to perform calculations using those numbers.

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

6-8

Some properties of an object depend on its length, some depend on its area, and some depend on its volume.

Express numbers like 100, 1,000, and 1,000,000 as powers of ten.

A substance has characteristic properties such as density, a boiling point, and solubility, all of which are independent of the amount of the substance and can be used to identify it.

Natural phenomena often involve sizes, durations, and speeds that are extremely small or extremely large. These phenomena may be difficult to appreciate because they involve magnitudes far outside human experience.

3-5

All materials have certain physical properties, such as strength, hardness, flexibility, durability, resistance to water and fire, and ease of conducting heat.

Finding out what the largest and the smallest values of something are is often as informative as knowing what the usual value is.

K-2

Things in nature and things people make have very different sizes, weights, ages, and speeds.

Use whole numbers in ordering, counting, identifying, measuring, and describing objects and events.