MAP KEY

Maps organize all of the elements from standards on a particular topic (e.g., Models, Patterns, or Definitions of Energy) on a single page. The elements from grades K–2 are at the bottom of the page and elements from grades 9–12 are at the top. Arrows connect elements to indicate how competency in one element can be useful in learning another. Thus, the map is a useful tool to help educators think about what each element means and how elements build on one another over time in order to plan curriculum, instruction, and assessment. This Map Key provides further details about all of the features on the maps.

Title: The name of the map (topic) is featured at the top of the page.

Element Box: A rectangle on a map that contains the text of one of the bulleted statements (called “elements”) from the foundation boxes and the NGSS appendices.

The color of a box indicates what type of element it is.

Green = Crosscutting Concepts
Orange = Core Ideas
Purple = Connections to the Nature of Science
Teal = Connections to Engineering
Gray = Performance Expectations

Arrow: A connection between two element boxes indicates that competency in one element is useful in learning to achieve the other element. Arrows always point at least somewhat upward.

Also On... Connection: This phrase followed by one or more map codes indicates that the connected element boxes also appear on those other maps.

Off-Map Element: An element code in a very small box on the map. It represents an element that can be found on other maps that is somewhat relevant to the topic of the map, but not so much so that the element needs to be on the map. Due to design constraints, an off-map element may appear more than once on a map and some connections to it may not be shown. The full text of it can be found on the page facing the map.

Element Code*: A unique identifier for an element. The first part of the code (before the dash) is a letter and a number. The letter indicates the element’s grade band: P for primary (grades K–2), E for elementary (grades 3–5), M for middle school (grades 6–8), and H for high school (grades 9–12). The number that appears after the letter indicates the bullet position of the element in that particular grade band (1st, 2nd, 3rd, etc.). The code for an element appears in every box after the text for that element.

* Note for Chapter 9: This chapter contains maps of performance expectations (PEs). The boxes in these maps contain PEs instead of elements and use the PE code instead of an element code. In addition, these maps do not have a topic code.

Map Code: A unique identifier that appears in the top right-hand corner of the map. The number before the period identifies which chapter the map comes from, and the number after the period identifies which map it is in that chapter.

Grade Bands: The map is broken up into four grade bands. Grades K–2 (primary) is at the bottom of the map, with grades 3–5 (elementary), grades 6–8 (middle school), and grades 9–12 (high school) stacked up in order. How high or low an element appears within a grade band is not an indicator of what grade it belongs in or whether learning it should precede or follow learning other ideas in that grade band.

Strand: A chain of connected elements that run up the map and share a theme or involve the development of the same idea. The simplest strands are aligned in a vertical column connected by arrows, but sometimes a strand may fork and/or converge if it doesn’t make sense to stack the elements in one straight line.

Plants or algae form the lowest level of the food web. At each link upward in a food web, only a small fraction of the matter consumed at the lower level is transferred upward, to produce growth and release energy in cellular respiration at the higher level. Given this inefficiency, there are generally fewer organisms at higher levels of a food web. Some matter reacts to release energy for life functions, some matter is stored in newly made structures, and much is discarded. The chemical elements that make up the molecules of organisms pass through food webs and into and out of the atmosphere and soil, and they are combined and recombinated in different ways. At each link in an ecosystem, matter and energy are conserved. LS2.B.H2

Food webs are models that demonstrate how matter and energy are transferred between producers, consumers, and decomposers as the three groups interact within an ecosystem. Transfers of matter into and out of the physical environment occur at every level. Decomposers recycle nutrients from dead plant or animal matter back to the soil in terrestrial environments or to the water in aquatic environments. The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem. LS2.B.M1

As matter and energy flow through different organizational levels of living systems, chemical elements are recombinated in different ways to form different products. LS1.C.H3

Within individual organisms, food moves through a series of chemical reactions in which it is broken down and rearranged to form new molecules, to support growth, or to release energy. LS1.C.M2

The sugar molecules thus formed contain carbon, hydrogen, and oxygen; their hydrocarbon backbones are used to make amino acids and other carbon-based molecules that can be assembled into larger molecules (such as proteins or DNA), used for example to form new cells. LS1.C.H2

Cellular respiration in plants and animals involves chemical reactions with oxygen that release stored energy. In these processes, complex molecules containing carbon react with oxygen to produce carbon dioxide and other materials. PS3.D.M2

The main way that solar energy is captured and stored on Earth is through the complex chemical process known as photosynthesis. PS3.D.H2

Photosynthesis and cellular respiration are important components of the carbon cycle, in which carbon is exchanged among the biosphere, atmosphere, oceans, and geosphere through chemical, physical, geologic, and biological processes. LS2.B.H3

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The NSTA Atlas of the THREE DIMENSIONS

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