## HS. Structure a nd Properties of Matter

Students who demonstrate understanding can:

HS-PS1-1. Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms. [Clarification Statement: Examples of properties that could be predicted from patterns could include reactivity of metals, types of bonds formed, numbers of bonds formed, and reactions with oxygen.] [Assessment Boundary: Assessment is limited to main group elements. Assessment does not include quantitative understanding of Td [Cnsd [CwQ q 2[CdiT88(o)-9 Td [(o)-8.1( )27(e)-6.997(n318.994(e)-6.99rg



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HS. Energy

Students who demonstrate understanding can:

HS-PS3-1. Create a computational model to calculate the change in the energy of one component in a system when the change in



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Constructing explanations and designing solutions in 9 12 builds on K 8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.

- Design, evaluate, and/or refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations. (HS-PS3 3)

1),(HS-PS3 3),(HS-PS3 4)

- (NYSED) Electrical power and energy can be determined for electric circuits. (HS-PS3 6)

PS3.C: Relationship Between Energy and Forces

- When two objects interacting through a field change relative position, the energy stored in the field is changed. (HS-PS3 5)

*Connections to Engineering, Technology, and Applications of Science*

Influence of Science, Engineering, and Technology on Society and the Natural World

- Modern civilization depends on major technological systems. Engineers continuously modify these technological systems by applying scientific knowledge and engineering design practices to increase benefits while decreasing costs and risks. (HS-

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*Connections to Nature of Science*

Scientific Knowledge Assumes an Order and Consistency in Nat ur 0 g520.7



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HS. Waves and Electromagnetic Radiation

Students who demonstrate understanding can:

HS-PS4-1. Use mathematical representations to support a claim regarding relationships among the period,



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| *Connection to Nature of Science* | (HS-PS4-4)<br>ƒ Photoelectric materials emit electrons when they absorb light of a high-enough frequency. (HS-PS4-5)<br>PS4.C: Information Technologies and Instrumentation<br>ƒ Multiple technologies based on the understanding of waves and their interactions with matter are part of everyday experiences in the modern world (e.g., medical imaging, communications, scanners) and in scientific research. They are essential tools for producing, transmitting, and capturing signals and for storing and interpreting the information contained in them. (HS-PS4-5) | Influence of Engineering, Technology, and Science on Society and the Natural World<br>ƒ Modern civilization depends on major technological systems. (HS-PS4-2),(HS- PS4-5)<br>ƒ Engineers continuously modify these technological systems by applying scientific knowledge and engineering design practices to increase benefits while decreasing costs and risks. (HS-PS4-2) |
|---|---|---|
| Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena<br>cientific theory is a substantiated explanation of some aspect of the natural world, based on a body of facts that have been repeatedly confirmed through observation and experiment and the science community validates each theory before it is accepted. If new evidence is discovered that the theory does not accommodate, the theory is generally modified in light of this new evidence. (HS-PS4-3) | | |

*Connections to other DCIs in this grade-band:* HS.PS1.C (HS-PS4-4); HS.PS3.A (HS-PS4-4),(HS-PS4-5); HS.PS3.D (HS-PS4-3),(HS-PS4-4); HS.LS1.C (HS-PS4-4); HS.ESS1.A (HS-PS4-3); HS.ESS2.A (HS-PS4-1); HS.ESS2.D (HS-PS4-3)

*Articulation of DCIs across grade-bands:* MS.PS3.D (HS-PS4-4); MS.PS4.A (HS-PS4-1),(HS-PS4-2),(HS-PS4-5); MS.PS4.B (HS-PS4-1),(HS-PS4-2),(HS-PS4-3),(HS-PS4-4),(HS-PS4-5); MS.PS4.C (HS-PS4-2),(HS-PS4-5); MS.LS1.C (HS-PS4-4); MS.ESS2.D (HS-PS4-4)

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HS. Structure and Function

Students who demonstrate understanding can:

HS-LS1-1.



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HS. Matter and Energy in Organisms and Ecosystems

Students who demonstrate understanding can:

HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.



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| | | ƒ (NYSED)Photosynthesis and cellular respiration are important components of the carbon cycle, in which carbon is exchanged among the biosphere, atmosphere, hydrosphere, and geosphere through chemical, physical, geological, and biological processes. (HS-LS2-5)<br>PS3.D: Energy in Chemical Processes<br>ƒ The main way that solar energy is captured and stored on Earth is through the complex chemical process known as photosynthesis. (secondary to HS-LS2-5) |



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HS. Interdependent Relationships in Ecosystems

Students who demonstrate understanding can:

HS-LS2-1. Use mathematical



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## HS. Inheritance and Variation of Traits

Students who demonstrate understanding can:

HS-LS1-4. Use a model to illustrate cellular division (mitosis) and differentiation. [Clarification Statement: Emphasis should be on the outcomes of mitotic division and cell differentiation on



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| | LS3-2)<br>ƒ (NYSED) Advances in biotechnology have allowed organisms to be modified genetically. (HS-LS3-2)<br>ƒ Environmental factors also affect expression of traits, and hence affect the probability of occurrences of traits in a population. Thus the variation and distribution of traits observed depends on both genetic and environmental factors. (HS-LS3-2),(HS-LS3-3) | |

*Connections to other DCIs in this grade-band:* HS.LS2.A (HS-LS3-3); HS.LS2.C (HS-LS3-3); HS.LS4.B (HS-LS3-3); HS.LS4.C (HS-LS3-3)



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## HS. Natural Selection and Evolution

Students who demonstrate understanding can:

HS-LS4-1. Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence. [Clarification Statement: Emphasis is on a conceptual understanding of the role each line of evidence has relating to common ancestry and biological evolution. Examples of evidence could include similarities in DNA sequences, anatomical structures, and order of appearance of structures in embryological development.]

HS-LS4-2. Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals

*Connections to Nature of Science*

Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena

- A scientific theory is a substantiated explanation of some aspect of the natural world, based on a body of facts that have been repeatedly confirmed through observation and experiment and the science community validates each theory before it is accepted. If new evidence is discovered that the theory does not accommodate, the theory is generally modified in light of this new evidence. (HS-LS4-



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HS. Earth's Systems



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| | address a question or solve a problem. (HS-ESS3-5),(HS-ESS2-8) |
| 11-12.SL.5 | Make strategic use of digital media and/or visual displays in presentations to enhance understanding of findings, reasoning, and evidence, and to add elements of interest to engage the audience. (HS-ESS2-4) |

*Mathematics*

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| MP.2 | Reason abstractly and quantitatively. (HS-ESS2-4),(HS-ESS3-5),(HS-ESS2-8) |
| MP.4 | Model with Mathematics. (HS-ESS2-4) |
| AI-N.Q.1 | Select quantities and use units as a way to: i) interpret and guide the solution of multi -step problems; ii) choose and interpret units consistently in formulas; and iii) choose and interpret the scale and the origin in graphs and data displays. (HS-ESS2-4),(HS-ESS3-5) |
| AI-N.Q.3 | Choose a level of accuracy appropriate to limitations on measure(r)-18(a)8(c0)8(TQ q 3(a)8(c0)8(TQ5(m)-21(i)5(t)-10(a)8(t)6o(o)-8(n)6(2ebh 1 0 0 1 108.98 6 |



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## HS. Human Sustainability

Students who demonstrate understanding can:

HS-ESS3-1. Construct an explanation based on evidence for how the availability of na tural resources, occurrence of natural hazards, and changes in climate have influenced human activity . [Clarification Statement: Examples of key natural resources include access to freshwater (such as rivers, lakes, and groundwater), regions of fertile soils such as river deltas, and high concentrations of minerals and fossil fuels.



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| and sufficient evidence and scientific reasoning to defend and critique claims and explanations about natural and designed world(s). Arguments may also come from current scientific or historical ep isodes in science.<br>ƒ Evaluate competing design solutions to a real-world problem based on scientific ideas and principles, empirical evidence, and logical arguments regarding relevant factors (e.g. economic, societal, environmental, ethical considerations). (HS-ESS32) | account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, |



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