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Elevate Science

Life, Earth, & Physical

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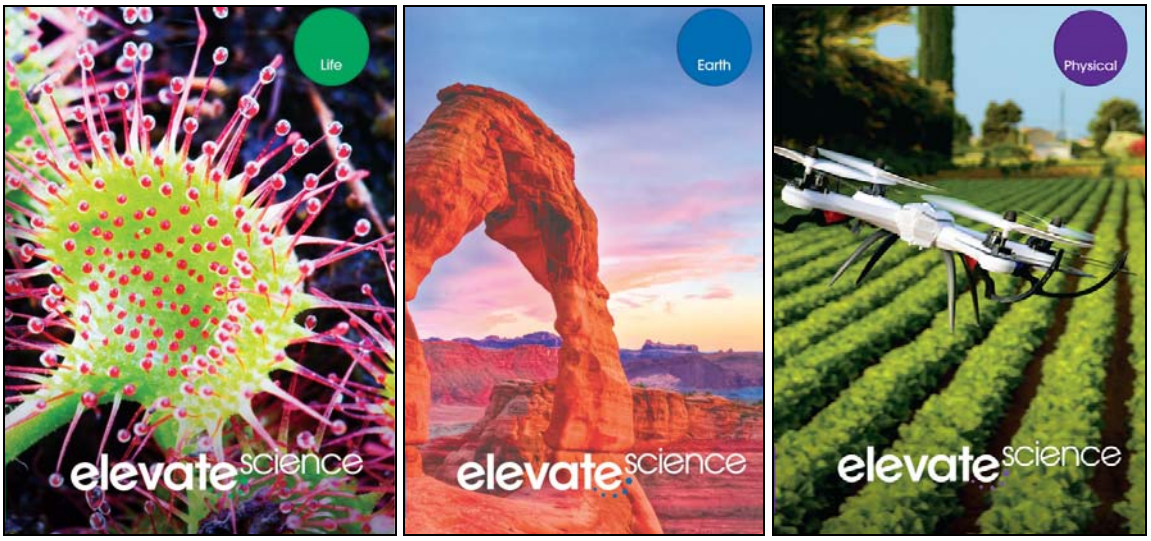

To the

Utah Science and Engineering Education Standards (SEEd)

Grade 8

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A Correlation of Elevate Science ©2019: Life, Earth, and Physical
To the
Utah SEEd Standards for Grade 8

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8.1 Matter and Energy Interact in the Physical World The physical world is made of atoms and molecules. Even large objects can be viewed as a combination of small particles. Energy causes particles to move and interact physically or chemically. Those interactions create a variety of substances. As molecules undergo a chemical or physical change, the number of atoms in that system remains constant. Humans use energy to refine natural resources into synthetic materials.	
8.1.1 Develop a model to describe the scale and proportion of atoms and molecules. Emphasize developing atomic models of elements and their numbers of protons, neutrons, and electrons, as well as models of simple molecules. Topics like valence electrons, bond energy, ionic complexes, ions, and isotopes will be introduced at the high school level.	**SE/TE:** **Elevate Science Physical:** Model It!: Molecules and Atoms, 9 Interactivity, 10 Model It!: Models of an Atom, 339 uEngineer It!: When Particles Collide, 367 Topic Review and Assess, 386-387 **Realize™ Digital Resources:** **Elevate Science Physical:** **Topic 1: Introduction to Matter** >Lesson 1: Describing and Classifying Matter >uInvestigate Lab: Modeling Atoms and Molecules; >Interactivity: Molecules and Extended Structures **Topic 8: Atoms and the Periodic Table** >Topic Launch, Atoms and the Periodic Table>uConnect Lab: Modeling Matter >Lesson 1: Atomic Theory>Enrichment: Introduction to Atoms

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8.1.2 Obtain information about various properties of matter, evaluate how different materials' properties allow them to be used for particular functions in society, and communicate your findings. Emphasize general properties of matter. Examples could include color, density, flammability, hardness, malleability, odor, ability to rust, solubility, state, or the ability to react with water.	**SE/TE:** **Elevate Science Physical:** Matter, 5-7 Physical and Chemical Properties, 6-7 Reading Check: Infer, 7 uEngineer It!: Gathering Speed with Superconductors, 33 Uses of Lanthanum, 352 Physical Properties of Metals, 363 **Realize™ Digital Resources:** **Elevate Science Physical:** **Topic 1: Introduction to Matter** >Topic Launch> Quest Kickoff: Lights! Camera! Action! >Lesson 1: Describing and Classifying Matter>Video: Describing and Classifying Matter; > Career Video: Museum Conservator **Topic 8: Atoms and the Periodic Table** >Lesson 2: Quest Check-In Interactivity: Examining Physical Properties of the Powders
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8.1.4 Obtain and evaluate information to describe how synthetic materials come from natural resources, what their functions are, and how society uses these new materials. Examples of synthetic materials could include medicine, foods, building materials, plastics, and alternative fuels.	**SE/TE:** **Elevate Science Physical:** Connect It!, 428 Synthetic Materials, 429-432 Accidental Synthetics, 431 Impact of Synthetic Materials, 433-434 Literacy Connection: Evaluate Information, 433 Reading Check: Evaluate Information, 434 Lesson 4 Check, 435 Quest Check-In, 435 Topic Review and Assess, 438-439 **Realize™ Digital Resources:** **Elevate Science Physical:** **Topic 9: Chemical Reactions** >Lesson 4: Producing Useful Materials>Video: Producing Useful Materials; >Interactivity: The Impact of Synthetics; >Enrichment: How Sweet It Is; > Quest Check-In Lab: Heat It Up or Ice It Down

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8.1.5 Develop a model that uses computational thinking to illustrate cause and effect relationships in particle motion, temperature, density, and state of a pure substance when heat energy is added or removed. Emphasize molecular-level models of solids, liquids, and gases to show how adding or removing heat energy can result in phase changes, and focus on calculating the density of a substance's state.	**SE/TE:** **Elevate Science Physical:** Math Toolbox: Temperature and Density of Water, 19 Quest Kickoff: How can you use solids, liquids, and gases to lift a car?, 44-45 Model It!: Crystalline and Amorphous Solids, 50 Lesson 1 Check, 54 Quest Check-In, 54 Model It!: Dry Ice, 63 Model It!: Developing Models, 71 Evidence-Based Assessment, 80-81 uDemonstrate Lab: Melting Ice, 82-85 **Realize™ Digital Resources:** **Elevate Science Physical:** **Topic 2: Solids, Liquids, and Gases** >Lesson 1: States of Matter> uInvestigate Lab: Properties of Matter > Lesson 2: Changes of State> Interactivity: Particle Motion and States of Matter; > Worksheet: States of Matter; > uInvestigate Lab: Mirror, Mirror; > Interactivity: Thermal Energy and Changes of State >Lesson 3: Gas Behavior> Interactivity: Hot Air Balloon Ride
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8.1.7 Design, construct, and test a device that can affect the rate of a phase change. Compare and identify the best characteristics of competing devices and modify them based on data analysis to improve the device to better meet the criteria for success.	**SE/TE:** **Elevate Science Physical:** Quest Kickoff: How can you use solids, liquids, and gases to lift a car?, 44-45 Quest Check-In, 64 Quest Kickoff: How can you keep hot water from cooling down?, 138-139 uEngineer It!: Shockwave to the Future, 155 **Realize™ Digital Resources:** **Elevate Science Physical:** **Topic 2: Solids Liquids, and Gases** >Lesson 1: States of Matter> Quest Check-In Interactivity: Design Your Lift >Lesson 2: Changes of State> Quest Check-In Interactivity: Lift Your Car
8.2 Energy is Stored and Transferred in Physical Systems Objects can store and transfer energy within systems. Energy can be transferred between objects, which involves changes in the object's energy. There is a direct relationship between an object's energy, mass, and velocity. Energy can travel in waves and may be harnessed to transmit information.	
8.2.1 Use computational thinking to analyze data about the relationship between the mass and speed of objects and the relative amount of kinetic energy of the objects. Emphasis should be on the quantity of mass and relative speed to the observable effects of the kinetic energy. Examples could include a full cart vs. an empty cart or rolling spheres with different masses down a ramp to measure the effects on stationary masses. Calculations of kinetic and potential energy will be learned at the high school level.	**SE/TE:** **Elevate Science Physical:** Hands-On Lab: uInvestigate, 102 Math Toolbox: Mass, Speed, and Kinetic Energy, 102 Lesson 2 Check, 106 **Realize™ Digital Resources:** **Elevate Science Physical:** **Topic 3: Energy** >Lesson 2: Kinetic Energy and Potential Energy; >Interactivity: Interpret Kinetic Energy Graphs; >Virtual Lab: Skate or Fly!; >Video: Kinetic Energy and Potential Energy>Interactivity: Racing for Kinetic Energy

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8.2.2 Ask questions about how the amount of potential energy varies as distance within the system changes. Plan and conduct an investigation to answer a question about potential energy. Emphasize comparing relative amounts of energy. Examples could include a full cart vs. an empty cart or rolling spheres with different masses down a ramp to measure the effects on stationary masses. Calculations of kinetic and potential energy will be learned at the high school level.	**SE/TE:** **Elevate Science Physical:** Potential Energy, 103-105 Gravitational Potential Energy, 104 Lesson 2 Check, 106 Kinetic and Potential Energy, 120 Energy Transformation and Transfer, 121 Model It!: Transformation and Transfer in Demolition, 121 Lesson 4 Check, 125 Topic Review and Assess, 128-129 Evidence-Based Assessment, 130-131 uDemonstrate Lab: 3, 2, 1…Liftoff!, 132-135 **Realize™ Digital Resources:** **Elevate Science Physical:** **Topic 3: Energy** >Lesson 2: Kinetic Energy and Potential Energy>uInvestigate Lab: Energy, Magnetism, and Electricity; >Enrichment: Kinetic or Potential Energy?
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8.2.4 Use computational thinking to describe a simple model for waves that shows the pattern of wave amplitude being related to wave energy. Emphasize describing waves with both quantitative and qualitative thinking. Examples could include using graphs, charts, computer simulations, or physical models to demonstrate amplitude and energy correlation.	**SE/TE:** **Elevate Science Physical:** Math Toolbox: Wave Properties, 184 Lesson 1 Check, 184 Types of Interference, 192-193 Lesson 2 Check, 196 Math Toolbox: Decibel Levels, 204 Math Toolbox: Applying Ohm's Law, 294 Case Study: Super Ultra High Definition!, 310-311 **Realize™ Digital Resources:** **Elevate Science Physical:** **Topic 5: Waves and Electromagnetic Radiation** >Lesson 1: Wave Properties>Interactivity: Making Waves; >Interactivity: Describe Properties of Waves >Lesson 2: Wave Interactions> Interactivity: Model Wave Interactions >Lesson 3: Sound Waves>Inquiry Warm-Up Lab: Amplitude and Loudness
8.2.5 Develop and use a model to describe the structure of waves and how they are reflected, absorbed, or transmitted through various materials. Emphasize both light and mechanical waves. Examples could include drawings, simulations, and written descriptions of light waves through a prism; mechanical waves through gas vs. liquids vs. solids; or sound waves through different mediums.	**SE/TE:** **Elevate Science Physical:** Quest Kick-Off, 176-177 Plan It!: Develop Models, 190 Model It!: Develop Models, 201 Hands-On Lab: uInvestigate, 201 Lesson 3 Check, 207 Model It!: Polarizing Glasses, 211 Model It!: Fun with Mirrors, 224 Topic Review and Assess, 228-229 Evidence-Based Assessment, 230-231 **Realize™ Digital Resources:** **Elevate Science Physical:** **Topic 5: Waves and Electromagnetic Radiation** >Lesson 2: Wave Interactions> Interactivity: Use Models to Describe Wave Behavior >Lesson 5: Light>Interactivity: Describe the Behavior of Light; >uInvestigate Lab: Light Interacting with Matter

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8.2.6 Obtain and evaluate information to communicate the claim that the structure of digital signals are a more reliable way to store or transmit information than analog signals. Emphasize the basic understanding that waves can be used for communication purposes. Examples could include using vinyl record vs. digital song files, film cameras vs. digital cameras, or alcohol thermometers vs. digital thermometers.	**SE/TE:** **Elevate Science Physical:** Signals and Information, 301-303 Hands-On Lab, 301 Analog and Digital Signals, 304-306 Interactivity, 305, 319 Hands-On Lab: uInvestigate, 306 Lesson 2 Check, 309 Quest Check-In, 309 Case Study: Super Ultra High Definition!, 310-311 Roger That!: Connect to Technology, 316-317 Advantages of Digital Signals, 318-319 Lesson 3 Check, 320 Extraordinary Science: Beam Me Up!, 321 Topic Review and Assess, 322-323 Evidence-Based Assessment, 324-325 uDemonstrate Lab: Over and Out, 326-329 **Realize™ Digital Resources:** **Elevate Science Physical:** **Topic 7: Information Technologies** >Lesson 2: Signals>Class Discussion: Clocks > Interactivity: Film Cameras and Digital Cameras; > Interactivity: Technology and Communication; > Interactivity: Signal Reliability; >Virtual Lab: Super Spy!; >Video: Communication and Technology

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8.3 Life Systems Store and Transfer Matter and Energy Living things use energy from their environment to rearrange matter to sustain life. Photosynthetic organisms are able to transfer light energy to chemical energy. Consumers can break down complex food molecules to utilize the stored energy and use the particles to form new, life-sustaining molecules. Ecosystems are examples of how energy can flow while matter cycles through the living and nonliving components of systems.	
8.3.1 Plan and conduct an investigation and use the evidence to construct an explanation of how photosynthetic organisms use energy to transform matter. Emphasize molecular and energy transformations during photosynthesis.	**SE/TE:** **Elevate Science Life:** Interactivity, 102 Hands-On Lab: uInvestigate, 102 uEngineer It!: An Artificial Leaf, 107 **Realize™ Digital Resources:** **Elevate Science Life:** **Topic 2: The Cell System** >Lesson 5: Photosynthesis>Interactivity: Flower Food; >Interactivity: Making Food for Cells; >uInvestigate Lab: Energy from the Sun; >Enrichment: Limits to Photosynthesis
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8.3.3 Ask questions to obtain, evaluate, and communicate information about how changes to an ecosystem affect the stability of cycling matter and the flow of energy among living and nonliving parts of an ecosystem. Emphasize describing the cycling of matter and flow of energy through the carbon cycle.	**SE/TE:** **Elevate Science Life:** Connect It!, 272 Literacy Connection: Determine Central Ideas, 276 Lesson 3 Check, 280 Interactions Between Cycles of an Ecosystem, 330 **Elevate Science Earth:** Case Study: The Carbon Cycle, 468-469 Evidence-Based Assessment, 482-483 uDemonstrate Lab: An Ocean of a Problem, 484-485 **Realize™ Digital Resources:** **Elevate Science Life:** **Topic 5: Ecosystems** >Lesson 3: Cycles of Matter>Video: Cycles of Matter; >Interactivity: Earth's Recyclables; >Quest Check-In Interactivity: Matter and Energy in a Pond; >Enrichment: Carbon and the Ocean

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8.4 Interactions with Natural Systems and Resources Interactions of matter and energy through geologic processes have led to the uneven distribution of natural resources. Many of these resources are nonrenewable, and per-capita use can cause positive or negative consequences. Global temperatures change due to various factors, and can cause a change in regional climates. As energy flows through the physical world, natural disasters can occur that affect human life. Humans can study patterns in natural systems to anticipate and forecast some future disasters and work to mitigate the outcomes.	
8.4.1 Construct a scientific explanation based on evidence that shows that the uneven distribution of Earth's mineral, energy, and groundwater resources is caused by geological processes. Examples of uneven distribution of resources could include Utah's unique geologic history that led to the formation and irregular distribution of natural resources like copper, gold, natural gas, oil shale, silver, and uranium.	**SE/TE:** **Elevate Science Earth:** Coal Formation and Distribution, 267 Interactivity, 268 Petroleum Formation and Distribution, 269 Distribution of Uranium, 271 Case Study: Phosphorous Fiasco, 290-291 Water on Earth, 293-295 Lesson 4 Check, 298 Quest Check-In, 298 Topic Review and Assess, 300-301 **Realize™ Digital Resources:** **Elevate Science Earth:** **Topic 6: Distribution of Natural Resources** >Lesson 1: Nonrenewable Energy Resources > Interactivity: Distribution of Fossil Fuels; >Quest Check-In Interactivity: Surviving on Fossil Fuels; >Enrichment: Fossil Fuels >Lesson 4: Water Resources>Interactivity: Distribution of Water Resources >Topic Close>Quest Findings: Reflect on Boomtowns

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8.4.2 Engage in argument supported by evidence about the effect of per capita consumption of natural resources on Earth's systems. Emphasize that these resources are limited and may be non-renewable. Examples of evidence include rates of consumption of food and natural resources such as freshwater, minerals, and energy sources.	**SE/TE:** **Elevate Science Physical:** Case Study: U.S. Energy Consumption, 126-127 **Elevate Science Earth:** Lesson 3 Check, 289 Quest Check-In, 289 Case Study: Phosphorous Fiasco, 290-291 Reading Check: Identify, 297 Topic Review and Assess, 300-301, 354-355 Connect It!, 312 Reading Check: Develop an Argument, 318 Lesson 1 Check, 319 Literacy Connection: Cite Textual Evidence, 337 Literacy Connection: Draw Evidence, 347 Lesson 4 Check, 352 Evidence-Based Assessment, 356-357 uDemonstrate Lab: Washing Away, 358-361 **Realize™ Digital Resources:** **Elevate Science Earth:** **Topic 6: Distribution of Natural Resources** >Lesson 4: Water Resources> Poll: Drinkable Water; >Interactivity: Distribution of Water Resources; Interactivity: Water Worth; Enrichment: Keeping Water Clean **Topic 7: Human Impacts on the Environment** >Lesson 1: Population Growth and Resource Consumption>Inquiry Warm-Up Lab: Growth Spurt; Worksheet: Human Population Growth; >uInvestigate Lab: Doubling Time >Topic Close> Quest Findings: Reflect on Trash Backlash

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8.4.3 Design a solution to monitor or mitigate the potential effects of the use of natural resources. Evaluate competing design solutions using a systematic process to determine how well each solution meets the criteria and constraints of the problem. Examples of uses of the natural environment could include agriculture, conservation efforts, recreation, solar energy, and water management.	**SE/TE:** **Elevate Science Earth:** Reading Check: Integrate with Visuals, 325 Interactivity, 327 Plan It!: Community Considerations, 333 uEngineer It!: Changing Climate Change, 479 Reading Check: Write Explanatory Texts, 351 Plan It!: Reducing Waste in Factories, 351 uEngineer It!: From Wastewater to Tap Water, 353 **Elevate Science Life:** Design It!: Ecological Restoration, 333 Lesson 4 Check, 334 **Realize™ Digital Resources:** **Elevate Science Earth:** **Topic 7: Human Impacts on the Environment** >Topic Launch>uConnect Lab: Finding a Solution for Your Pollution >Lesson 2: Air Pollution>Quest Check-In Lab: Trash versus Water >Lesson 4: Water Pollution>Quest Check-In Lab: Reducing Waste >Topic Close>Quest Findings: Reflect on Trash Backlash

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8.4.4 Analyze and interpret data on the factors that change global temperatures and their effects on regional climates. Examples of factors could include agricultural activity, changes in solar radiation, fossil fuel use, and volcanic activity. Examples of data could include graphs of the atmospheric levels of gases, seawater levels, ice cap coverage, human activities, and maps of global and regional temperatures.	**SE/TE:** **Elevate Science Earth:** Model It!: Sea Ice and Climate, 8 Global to Local: When the Ice Melts, 11 Pollution, 272 Connect It!, 320 Hands-On Lab: uInvestigate, 322 Reading Check: Cite Textual Evidence, 323 Global to Local: A New Mass Extinction?, 393 Volcanic Eruptions, 461 Math Toolbox: Ice Age Cooling Cycles, 462 Recent Climate Change, 463-466 Humans and Global Warming, 464-465 Lesson 2 Check, 467 Impact of Rising Temperatures, 471-474 Cascading Effects of Climate Change, 475 Topic Review and Assess, 480-481 **Realize™ Digital Resources:** **Elevate Science Earth:** **Topic 10: Climate** >Lesson 1: Climate Factors> uInvestigate Lab: Classifying Climates >Lesson 2: Climate Change> Interactivity: In the Greenhouse; > Interactivity: Human Impact on Climate Change; >Interactivity: Climate Change Q & A; >Write: Regional Climate Change; >Worksheet: Human Impact on Climate Change; >Video: Climate Change >Lesson 3: Effects of a Changing Climate> Video: Effects of a Changing Climate; >uInvestigate Lab: Thermal Expansion of Water

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8.4.5 Analyze and interpret patterns of the occurrence of natural hazards to forecast future catastrophic events, and investigate how data are used to develop technologies to mitigate their effects. Emphasize how some natural hazards, such as volcanic eruptions and severe weather, are preceded by phenomena that allow prediction, but others, such as earthquakes, may occur without warning.	**SE/TE:** **Elevate Science Earth:** How to Predict Weather, 75-77 Learning from Weather Maps, 78-79 Quest Check-In, 91 Case Study: The Case of the Runaway Hurricane, 92-93 uEngineer It!: Designing to Prevent Destruction, 189 Quest Kickoff: How can I design and build an artificial island?, 210-211 Quest Check-In, 220 uEngineer It!: Ground Shifting Advances, 221 Case Study: Buyer Beware, 240-241 uDemonstrate Lab: Materials on a Slope, 256-259 **Realize™ Digital Resources:** **Elevate Science Earth:** **Topic 2: Weather in the Atmosphere** >Lesson 4: Predicting Weather Changes>Class Discussion: Weather Prediction Woes; >Interactivity: Using Air Masses to Predict Weather; >uInvestigate Lab: Tracking Weather; >Interactivity: Weather Predicting >Lesson 5: Severe Weather and Floods>Virtual Lab: Hurricane Season; >uInvestigate Lab: Predicting Hurricanes; >Interactivity: Tinkering with Technology; >Enrichment: Chasing That Storm