# South Carolina Academic Standards and Performance Indicators for Science Correlation to *PhD Science*™

Green indicates that *PhD Science*™ fully addresses the standard within the grade level.

Blue indicates that *PhD Science* covers the standard but in a different grade level.

Yellow indicates that *PhD Science* partially covers the standard within the grade level.

Red indicates that *PhD Science* does not cover the standard.

**Key:** Module (M), Lesson (L)

## *PhD Science* Level 3

The Grade 3 South Carolina Academic Standards and Performance Indicators for Science are partially covered in the *PhD Science* curriculum. A detailed analysis of alignment appears in the table below.

| **Grade 3 Standards** | | | **Aligned *PhD Science* Lessons** |
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| **Properties and Changes in Matter** | | | |
| **3.P.2**: The student will demonstrate an understanding of the properties used to classify matter and how heat energy can change matter from one state to another. | | | |
| **3.P.2A:** Matter exists in several different states and is classified based on observable and measurable properties. Matter can be changed from one state to another when heat (thermal energy) is added or removed. | | | |
| 3.P.2A.1 | Analyze and interpret data from observations and measurements to describe and compare the physical properties of matter (including length, mass, temperature, and volume of liquids). | | Level 5 M1 L1–L4<br>Level 5 M1 L11–L17<br>Level 5 M1 L23–L26 |
| 3.P.2A.2 | Construct explanations using observations and measurements to describe how matter can be classified as a solid, liquid, or gas. | | Level 5 M1 L1–L4<br>Level 5 M1 L11–L17<br>Level 5 M1 L23–L26 |
| 3.P.2A.3 | Plan and conduct scientific investigations to determine how changes in heat (increase or decrease) change matter from one state to another (including melting, freezing, condensing, boiling, and evaporating). | | Level 5 M1 L9–L17<br>Level 5 M1 L23–L26 |
| 3.P.2A.4 | Obtain and communicate information to compare how different processes (including burning, friction, and electricity) serve as sources of heat energy. | | Level 5 M1 L11<br>Level 5 M1 L15–L16 |
| 3.P.2A.5 | Define problems related to heat transfer and design devices or solutions that facilitate (conductor) or inhibit (insulator) the transfer of heat. | | Level 5 M1 L9–L17<br>Level 5 M1 L23–L26 |

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| **Energy Transfer—Electricity and Magnetism** | | | |
| **3.P.3**: The student will demonstrate an understanding of how electricity transfers energy and how magnetism can result from electricity. | | | |
| **3.P.3A:** Energy can be transferred from plate to place by electric currents. Electric currents flowing through a simple circuit can be used to produce motion, sound, heat, or light. Some materials allow electricity to flow through a circuit and some do not. | | | |
| 3.P.3A.1 | Obtain and communicate information to develop models showing how electrical energy can be transformed into other forms of energy (including motion, sound, heat, or light). | | Level 4 M2 L1–L3<br>Level 4 M2 L10–L26 |
| 3.P.3A.2 | Develop and use models to describe the path of an electric current in a complete simple circuit as it accomplishes a task (such as lighting a bulb or making a sound). | | |
| 3.P.3A.3 | Analyze and interpret data from observations and investigations to classify different materials as either an insulator or conductor of electricity. | | Level 4 M2 L12 |
| **3.P.3B.** Magnets can exert forces on other magnets or magnetizable materials causing energy transfer between them, even when the objects are not touching. An electromagnet is produced when an electric current passes through a coil of wire wrapped around an iron core. Magnets and electromagnets have unique properties. | | | |
| 3.P.3B.1 | Develop and use models to describe and compare the properties of magnets and electromagnets (including polarity, attraction, repulsion, and strength). | | Level 3 M4 L19–L28 |
| 3.P.3B.2 | Plan and conduct scientific investigations to determine the factors that affect the strength of an electromagnet. | | Level 3 M4 L22 |
| **Earth's Materials and Processes** | | | |
| **3.E.4**: The student will demonstrate an understanding of the composition of Earth and the processes that shape features of Earth's surface. | | | |
| **3.E.4A:** Earth is made of materials (including rocks, minerals, soil, and water) that have distinct properties. These materials provide resources for human activities. | | | |
| 3.E.4A.1 | Analyze and interpret data from observations and measurements to describe and compare different Earth materials (including rocks, minerals, and soil) and classify each type of material based on its distinct physical properties. | | |
| 3.E.4A.2 | Develop and use models to describe and classify the pattern distribution of land and water features on Earth. | | Level 4 M1 L18–L20<br>Level 4 M1 L25–L27 |
| 3.E.4A.3 | Obtain and communicate information to exemplify how humans obtain, use, and protect renewable and nonrenewable Earth resources. | | Level 4 M1 L21–L27<br>Level 5 M3 L14–L27 |
| **3.E.4B**: Earth's surface has changed over time by natural processes and by human activities. Humans can take steps to reduce the impact of these changes. | | | |
| 3.E.4B.1 | Develop and use models to describe the characteristics of Earth's continental landforms and classify landforms as volcanoes, mountains, valleys, canyons, plains, and islands. | | Level 4 M1 L1–L5<br>Level 4 M1 L18–L20<br>Level 4 M1 L25–L27 |
| 3.E.4B.2 | Plan and conduct scientific investigations to determine how natural processes (including weathering, erosion, and gravity) shape Earth's surface. | | Level 4 M1 L6–L11<br>Level 4 M1 L25–L27 |
| 3.E.4B.3 | Obtain and communicate information to explain how natural events (such as fires, landslides, earthquakes, volcanic eruptions, or floods) and human activities (such as farming, mining, or building) impact the environment. | | Level 4 M1 L21–L27 |

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| 3.E.4B.4 | Define problems caused by a natural event or human activity and design devices or solutions to reduce the impact on the environment. | | Level 4 M1 L12–L17<br>Level 4 M1 L25–L27 |
| **Environments and Habitats** | | | |
| **3.L.5**: The student will demonstrate an understanding of how the characteristics and changes in environments and habitats affect the diversity of organisms. | | | |
| **3.L.5A**: The characteristics of an environment (including physical characteristics, temperature, availability of resources, or the kinds and numbers of organisms present) influence the diversity of organisms that live there. Organisms can survive only in environments where their basic needs are met. All organisms need energy to live and grow. This energy is obtained from food. The role an organism serves in an ecosystem can be describe by the way in which it gets its energy. | | | |
| 3.L.5A.1 | Analyze and interpret data about the characteristics of environments (including salt and fresh water, deserts, grasslands, forests, rain forests, and polar lands) to describe how the environment supports a variety of organisms. | | Level 4 M3 L1–L6<br>Level 4 M3 L20<br>Level 4 M3 L26–L31<br>Level 5 M3 L4–L5<br>Level 5 M3 L19–L27 |
| 3.L.5A.2 | Develop and use a food chain model to classify organisms as producers, consumers, and decomposers and to describe how organisms obtain energy. | | Level 5 M2 L8–L14<br>Level 5 M2 L20<br>Level 5 M2 L24–L26 |
| **3.L.5B**: When the environment or habitat changes, some plants and animals survive and reproduce, some move to new locations, and some die. Fossils can be used to infer characteristics of environments from long ago. | | | |
| 3.L.5B.1 | Obtain and communicate information to explain how changes in habitats (such as those that occur naturally or those caused by organisms) can be beneficial or harmful to the organisms that live there. | | Level 3 M2 L1–L2<br>Level 3 M2 L9–L12<br>Level 3 M2 L16–L19<br>Level 3 M2 L22–L28 |
| 3.L.5B.2 | Develop and use models to explain how changes in a habitat cause plants and animals to respond in different ways (such as hibernating, migrating, responding to light, death, or extinction). | | Level 3 M2 L1–L2<br>Level 3 M2 L9–L12<br>Level 3 M2 L16–L19<br>Level 3 M2 L22–L28 |
| 3.L.5B.3 | Construct scientific arguments using evidence from fossils of plants and animals that lived long ago to infer the characteristics of early environments. | | Level 3 M2 L1–L8<br>Level 3 M2 L26–L28 |

| Science and Engineering Practices | | | |
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| **3.S.1**: The student will use the science and engineering practices, including the processes and skills of scientific inquiry, to develop understandings of science content. | | | |
| **3.S.1A**: The practices of science and engineering support the development of science concepts, develop the habits of mind that are necessary for scientific thinking, and allow students to engage in science in ways that are similar to those used by scientists and engineers. | | | |
| 3.S.1A.1 | Ask questions that can be (1) answered using scientific investigations or (2) used to refine models, explanations, or designs. | | Level 3 M1 L1–L3<br>Level 3 M1 L21–L26<br>Level 3 M2 L1–L2<br>Level 3 M3 L1–L3<br>Level 3 M3 L12–L13<br>Level 3 M4 L1–L3<br>Level 3 M4 L7–L9<br>Level 3 M4 L15–L16<br>Level 3 M4 L19–L30 |
| 3.S.1A.2 | Develop, use, and refine models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others. | | Level 3 M1 L1–L3<br>Level 3 M1 L19–L20<br>Level 3 M2 L1–L3<br>Level 3 M2 L6–L12<br>Level 3 M2 L22–L25<br>Level 3 M3 L7–L11<br>Level 3 M3 L21–L25<br>Level 3 M4 L1–L3<br>Level 3 M4 L17–L18<br>Level 3 M4 L23–L27 |
| 3.S.1A.3 | Plan and conduct scientific investigations to answer questions, test predictions, and develop explanations: (1) formulate scientific questions and predict possible outcomes, (2) identify materials, procedures, and variables, (3) select and use appropriate tools or instruments to collect qualitative and quantitative data, and (4) record and represent data in an appropriate form. Use appropriate safety procedures. | | Level 3 M2 L4–L5<br>Level 3 M3 L12–L13<br>Level 3 M4 L7–L18<br>Level 3 M4 L23–L30 |
| 3.S.1A.4 | Analyze and interpret data from observations, measurements, or investigations to understand patterns and meanings. | | Level 3 M1 L4–L15<br>Level 3 M1 L19–L20<br>Level 3 M1 L27–L29<br>Level 3 M2 L3–L8<br>Level 3 M2 L16–L19<br>Level 3 M3 L4–L8<br>Level 3 M3 L14–L20<br>Level 3 M4 L4–L9 |
| 3.S.1A.5 | Use mathematical and computational thinking to (1) express quantitative observations using appropriate English or metric units, (2) collect and analyze data, or (3) understand patterns, trends, and relationships. | | Level 4 M2 L8–L9<br>Level 4 M4 L14–L17<br>Level 4 M1 L3–L7<br>Level 4 M1 L12–L18<br>Level 4 M1 L21–L22<br>Level 4 M1 L25–L27<br>Level 4 M2 L4–L5<br>Level 4 M2 L15–L26<br>Level 4 M3 L4–L5 |

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| | | | Level 4 M3 L24–L25<br>Level 4 M3 L29–L31<br>Level 4 M4 L14–L27 |
| 3.S.1A.6 | Construct explanations of phenomena using (1) scientific evidence and models, (2) conclusions from scientific investigations, (3) predictions based on observations and measurements, or (4) data communicated in graphs, tables, or diagrams. | | Level 3 M1 L13–L15<br>Level 3 M1 L18<br>Level 3 M1 L21–L29<br>Level 3 M2 L6–L8<br>Level 3 M2 L22–L28<br>Level 3 M3 L9–L11<br>Level 3 M3 L14–L15<br>Level 3 M3 L21–L28<br>Level 3 M4 L10–L14<br>Level 3 M4 L19–L21<br>Level 3 M4 L28–L30 |
| 3.S.1A.7 | Construct scientific arguments to support claims, explanations, or designs using evidence from observations, data, or informational texts. | | Level 3 M1 L21–L26<br>Level 3 M2 L9–L15<br>Level 3 M2 L20–L21<br>Level 3 M3 L16–L20<br>Level 3 M4 L12–L14 |
| 3.S.1A.8 | Obtain and evaluate informational texts, observations, data collected, or discussions to (1) generate and answer questions, (2) understand phenomena, (3) develop models, or (4) support explanations, claims, or designs. Communicate observations and explanations using the conventions and expectations of oral and written language. | | Level 3 M1 L11–L17<br>Level 3 M2 L13–L15<br>Level 3 M2 L20–L21<br>Level 3 M4 L22 |
| **3.S.1B**: Technology is any modification to the natural world created to fulfill the wants and needs of humans. The engineering design process involves a series of iterative steps used to solve a problem and often leads to the development of a new or improved technology. | | | |
| 3.S.1B.1 | Construct devices or design solutions to solve specific problems or needs: (1) ask questions to identify problems or needs, (2) ask questions about the criteria and constraints of the devices or solutions, (3) generate and communicate ideas for possible devices or solutions, (4) build and test devices or solutions, (5) determine if the devices or solutions solved the problem and refine the design if needed, and (6) communicate the results. | | Level 3 M1 L13–L15<br>Level 3 M1 L18<br>Level 3 M1 L21–L29<br>Level 3 M2 L6–L8<br>Level 3 M2 L22–L28<br>Level 3 M3 L9–L11<br>Level 3 M3 L14–L15<br>Level 3 M3 L21–L28<br>Level 3 M4 L10–L14<br>Level 3 M4 L19–L21<br>Level 3 M4 L28–L30 |

| **Crosscutting Concepts** | | | **Aligned *PhD Science* Lessons** |
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| 1 | Patterns<br>• Similarities and differences in patterns can be used to sort, classify, communicate, and analyze simple rates of change for natural phenomena and designed products.<br>• Patterns of change can be used to make predictions.<br>• Patterns can be used as evidence to support an explanation. | | Level 3 M1 L11–L15<br>Level 3 M1 L19–L20<br>Level 3 M1 L27–L29<br>Level 3 M2 L3–L8<br>Level 3 M2 L13–L15<br>Level 3 M3 L1–L8 |

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| | | | Level 3 M3 L14–L18<br>Level 3 M3 L26–L28<br>Level 3 M4 L1–L9<br>Level 3 M4 L28–L30 |
| 2 | Cause and Effect<br>• Cause and effect relationships are routinely identified, tested, and used to explain change.<br>• Events that occur together with regularity might or might not be a cause and effect relationship. | | Level 3 M1 L1–L3<br>Level 3 M1 L16–L18<br>Level 3 M1 L21–L29<br>Level 3 M2 L9–L12<br>Level 3 M2 L16–L28<br>Level 3 M3 L9–L13<br>Level 3 M3 L19–L25<br>Level 3 M4 L1–L3<br>Level 3 M4 L10–L30 |
| 3 | Scale, Proportion, and Quantity<br>• Natural objects and/or observable phenomena exist from the very small to the immensely large or from very short to very long time periods.<br>• Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume. | | Level 3 M1 L4–L10<br>Level 3 M2 L1–L2<br>Level 3 M3 L1–L3<br>Level 3 M3 L14–L15 |
| 4 | Systems and System Models<br>• A system is a group of related parts that make up a whole and can carry out functions its individual parts cannot.<br>• A system can be described in terms of its components and their interactions. | | Level 3 M1 L1–L3<br>Level 3 M1 L16–L20<br>Level 3 M2 L6–L15<br>Level 3 M2 L20–L28<br>Level 3 M3 L9–L11<br>Level 3 M4 L1–L30 |
| 5 | Energy and Matter: Flows, Cycles, and Conservation<br>• Matter is made of particles.<br>• Matter flows and cycles can be tracked in terms of the weight of the substances before and after a process occurs. The total weight of the substances does not change. This is what is meant by conservation of matter. Matter is transported into, out of, and within systems.<br>• Energy can be transferred in various ways and between objects. | | Level 5 M1 L5–L8<br>Level 5 M1 L13–L14<br>Level 5 M1 L23–L26<br>Level 5 M2 L6–L11<br>Level 5 M2 L14–L19<br>Level 5 M2 L24–L26<br>Level 5 M3 L10–L11<br>Level 5 M4 L3–L4 |
| 6 | Structure and Function<br>• Different materials have different substructures, which can sometimes be observed.<br>• Substructures have shapes and parts that serve functions. | | Level 3 M1 L21–L26<br>Level 3 M2 L1–L3<br>Level 3 M2 L9–L12<br>Level 3 M3 L4–L6<br>Level 3 M3 L21–L28 |
| 7 | Stability and Change<br>• Change is measured in terms of differences over time and may occur at different rates.<br>• Some systems appear stable, but over long periods of time will eventually change. | | Level 3 M1 L4–L15<br>Level 3 M1 L27–L29<br>Level 3 M2 L16–L19<br>Level 3 M3 L7–L8<br>Level 3 M3 L12–L13<br>Level 3 M3 L19–L20<br>Level 3 M3 L26–L28 |

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**Key:** Module (M), Lesson (L)

## *PhD Science* Level 4

The Grade 4 South Carolina Academic Standards and Performance Indicators for Science are partially covered in the *PhD Science* curriculum. A detailed analysis of alignment appears in the table below.

| **Grade 4 Standards** | | | **Aligned *PhD Science* Lessons** |
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| **Forms of Energy – Light and Sound** | | | |
| **Standard 4.P.4**: The student will demonstrate an understanding of the properties of light and sound as forms of energy. | | | |
| **4.P.1A**: Light, as a form of energy, has specific properties including color and brightness. Light travels in a straight line until it strikes an object. The way light reacts when it strikes an object depends on the object's properties. | | | |
| 4.P.4A.1 | Construct scientific arguments to support the claim that white light is made up of different colors. | | Level 4 M4 L9 |
| 4.P.4A.2 | Analyze and interpret data from observations and measurements to describe how the apparent brightness of light can vary as a result of the distance and intensity of the light source. | | Level 5 M4 L18–L19<br>Level 5 M4 L24–L26 |
| 4.P.4A.3 | Obtain and communicate information to explain how the visibility of an object is related to light. | | Level 4 M4 L1–L17<br>Level 4 M4 L25–L27 |
| 4.P.4A.4 | Develop and use models to describe how light travels and interacts when it strikes an object (including reflection, refraction, and absorption) using evidence from observations. | | Level 4 M4 L1–L17<br>Level 4 M4 L25–L27 |
| 4.P.4A.5 | Plan and conduct scientific investigations to explain how light behaves when it strikes transparent, translucent, and opaque materials. | | Level 5 M1 L9–L10<br>Level 5 M4 L3 |
| **4.P.4B**: Sound, as a form of energy, is produced by vibrating objects and has specific properties including pitch and volume. Sound travels through air and other materials and is used to communicate information in various forms of technology. | | | |
| 4.P.4B.1 | Plan and conduct scientific investigations to test how different variables affect the properties of sound (including pitch and volume). | | Level 4 M2 L10 |
| 4.P.4B.2 | Analyze and interpret data from observations and measurements to describe how changes in vibration affect the pitch and volume of sound. | | Level 4 M2 L10 |

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| 4.P.4B.3 | Define problems related to the communication of information over a distance and design devices or solutions that use sound to solve the problem. | | Level 4 M4 L18–L27 |
| **Weather and Climate** | | | |
| **Standard 4.E.2**: The student will demonstrate an understanding of the water cycle and weather and climate patterns. | | | |
| **4.E.2A:** Earth's atmosphere is a mixture of gases, including water vapor and oxygen. The movement of water, which is found almost everywhere on Earth including the atmosphere, changes form and cycles between Earth's surface and the air and back again. This cycling of water is driven by energy from the Sun. The movement of water in the water cycle is a major pattern that influences weather conditions. Clouds form during this cycle and various types of precipitation result. | | | |
| 4.E.2A.1 | Obtain and communicate information about some of the gases in the atmosphere (including oxygen, nitrogen, and water vapor) to develop models that exemplify the composition of Earth's atmosphere where weather takes place. | | Level 5 M2 L6–L7<br>Level 5 M2 L9<br>Level 5 M2 L11<br>Level 5 M2 L14<br>Level 5 M2 L19–L20<br>Level 5 M3 L18 |
| 4.E.2A.2 | Develop and use models to explain how water changes as it moves between the atmosphere and Earth's surface during each phase of the water cycle (including evaporation, condensation, precipitation, and runoff). | | Level 5 M3 L8 |
| **4.E.2B**: Scientists record patterns in weather conditions across time and place to make predictions about what kind of weather might occur next. Climate describes the range of an area's typical weather conditions and the extent to which those conditions vary over long periods of time. Some weather conditions lead to severe weather phenomena that have different effects and safety concerns. | | | |
| 4.E.2B.1 | Analyze and interpret data from observations, measurements, and weather maps to describe patterns in local weather conditions (including temperature, precipitation, wind speed/direction, relative humidity, and cloud types) and predict changes in weather over time. | | Level 3 M1 L1–L15<br>Level 3 M1 L19–L20<br>Level 3 M1 L27–L29 |
| 4.E.2B.2 | Obtain and communicate information about severe weather phenomena (including thunderstorms, hurricanes, and tornadoes) to explain steps humans can take to reduce the impact of severe weather phenomena. | | Level 3 M1 L1–L3<br>Level 3 M1 L16–L29 |
| 4.E.2B.3 | Construct explanations about regional climate differences using data from the long term weather conditions of the region. | | Level 3 M1 L11–L15<br>Level 3 M1 L27–L29 |
| **Stars and the Solar System** | | | |
| **Standard 4.E.3**: The student will demonstrate an understanding of the locations, movements, and patterns of stars and objects in the solar system. | | | |
| **4.E.3A**: Astronomy is the study of objects in our solar system and beyond. A solar system includes a sun (star) and all other objects that orbit that sun. Planets in our night sky change positions and are not always visible from Earth as they orbit our Sun. Stars that are beyond the solar system can be seen in the night sky in patterns called constellations. Constellations can be used for navigation and appear to move together across the sky because of Earth's rotation. | | | |
| 4.E.3A.1 | Develop and use models of Earth's solar system to exemplify the location and order of the planets as they orbit the Sun and the main composition (rock or gas) of the planets. | | Level 5 M3 L1–L13<br>Level 5 M3 L24–L27<br>Level 5 M4 L7<br>Level 5 M4 L18<br>Level 5 M4 L23<br>Level 5 M4 L25 |

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| 4.E.3A.2 | Obtain and communicate information to describe how constellations (including Ursa Major, Ursa Minor, and Orion) appear to move from Earth's perspective throughout the seasons. | | |
| 4.E.3A.3 | Construct scientific arguments to support claims about the importance of astronomy in navigation and exploration (including the use of telescopes, astrolabes, compasses, and sextants). | | Level 5 M4 L1–L2<br>Level 5 M4 L17<br>Level 5 M4 L21 |
| **4.E.3B**: Earth orbits around the Sun and the Moon orbits around Earth. These movements together with the rotation of Earth on a tilted axis result in patterns that can be observed and predicted. | | | |
| 4.E.3B.1 | Analyze and interpret data from observations to describe patterns in the (1) location, (2) movement, and (3) appearance of the Moon throughout the year. | | Level 5 M4 L1–L2<br>Level 5 M4 L5–L17<br>Level 5 M4 L20–L26 |
| 4.E.3B.2 | Construct explanations of how day and night result from Earth's rotation on its axis. | | Level 5 M4 L1–L2<br>Level 5 M4 L5–L17<br>Level 5 M4 L20–L26 |
| 4.E.3B.3 | Construct explanations of how the Sun appears to move throughout the day using observations of shadows. | | Level 5 M4 L1–L2<br>Level 5 M4 L5–L17<br>Level 5 M4 L20–L26 |
| 4.E.3B.4 | Develop and use models to describe the factors (including tilt, revolution, and angle of sunlight) that result in Earth's seasonal changes. | | Level 3 M1 L1–L15<br>Level 3 M1 L19–L20<br>Level 3 M1 L27–L29 |
| **Characteristics and Growth of Organisms** | | | |
| **Standard 4.L.5**: The student will demonstrate an understanding of how the structural characteristics and traits of plants and animals allow them to survive, grow, and reproduce. | | | |
| **4.L.5A**: Scientists have identified and classified many types of plants and animals. Each plant or animal has a unique pattern of growth and development called a life cycle. Some characteristics (traits) that organisms have are inherited and some result from interactions with the environment. | | | |
| 4.L.5A.1 | Obtain and communicate information about the characteristics of plants and animals to develop models which classify plants as flowering or nonflowering and animals as vertebrate or invertebrate. | | Level 3 M2 L1–L3<br>Level 3 M2 L6–L8<br>Level 3 M2 L10–L11<br>Level 3 M2 L14<br>Level 3 M2 L24–L26 |
| 4.L.5A.2 | Analyze and interpret data from observations and measurements to compare the stages of development of different seed plants. | | Level 3 M2 L10<br>Level 3 M2 L19<br>Level 3 M3 L4–L6 |
| 4.L.5A.3 | Develop and use models to compare the stages of growth and development in various animals. | | Level 4 M3 L1–L6<br>Level 4 M3 L20<br>Level 4 M3 L26–L31 |
| 4.L.5A.4 | Construct scientific arguments to support claims that some characteristics of organisms are inherited from parents and some are influenced by the environment. | | Level 3 M3 L9–L13<br>Level 3 M3 L19–L20<br>Level 3 M3 L26–L28 |
| **4.L.5B**: Plants and animals have physical characteristics that allow them to receive information from the environment. Structural adaptations within groups of plants and animals allow them to better survive and reproduce. | | | |
| 4.L.5B.1 | Develop and use models to compare how humans and other animals use their senses and sensory organs to detect and respond to signals from the environment. | | Level 4 M3 L1–L6<br>Level 4 M3 L15–L25<br>Level 4 M3 L29–L31 |
| 4.L.5B.2 | Construct explanations for how structural adaptations (such as the types of roots, stems, or leaves; color of flowers; or seed dispersal) allow plants to survive and reproduce. | | Level 4 M3 L26–L31 |

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| 4.L.5B.3 | Construct explanations for how structural adaptations (such as methods for defense, locomotion, obtaining resources, or camouflage) allow animals to survive in the environment. | | Level 4 M3 L1–L6<br>Level 4 M3 L20<br>Level 4 M3 L26–L31 |
| **Science and Engineering Practices** | | | |
| **Standard 4.S.1**: The student will use the science and engineering practices, including the processes and skills of scientific inquiry, to develop understandings of science content. | | | |
| **4.S.1A.** The practices of science and engineering support the development of science concepts, develop the habits of mind that are necessary for scientific thinking, and allow students to engage in science in ways that are similar to those used by scientists and engineers. | | | |
| 4.S.1A.1 | Ask questions that can be (1) answered using scientific investigations or (2) used to refine models, explanations, or designs. | | Level 4 M1 L1–L2<br>Level 4 M2 L1–L3<br>Level 4 M2 L8–L9<br>Level 4 M3 L1–L3<br>Level 4 M3 L6<br>Level 4 M3 L15–L19<br>Level 4 M4 L1–L2 |
| 4.S.1A.2 | Develop, use, and refine models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others. | | Level 4 M1 L12–L17<br>Level 4 M1 L21–L27<br>Level 4 M2 L1–L3<br>Level 4 M2 L7–L23<br>Level 4 M3 L12–L14<br>Level 4 M3 L29–L31<br>Level 4 M3 L3–L21<br>Level 4 M4 L3–L13<br>Level 4 M4 L18–L24 |
| 4.S.1A.3 | Plan and conduct scientific investigations to answer questions, test predictions, and develop explanations: (1) formulate scientific questions and predict possible outcomes, (2) identify materials, procedures, and variables, (3) select and use appropriate tools or instruments to collect qualitative and quantitative data, and (4) record and represent data in an appropriate form. Use appropriate safety procedures. | | Level 4 M1 L6–L11<br>Level 4 M1 L21–L22<br>Level 4 M2 L6–L7<br>Level 4 M2 L10–L14<br>Level 4 M3 L15–L19<br>Level 4 M4 L7–L9<br>Level 4 M4 L14–L21 |
| 4.S.1A.4 | Analyze and interpret data from informational texts, observations, measurements, or investigations using a range of methods (such as tabulation or graphing) to (1) reveal patterns and construct meaning or (2) support explanations, claims, or designs. | | Level 4 M1 L12–L20<br>Level 4 M1 L23–L24<br>Level 4 M4 L10–L17 |
| 4.S.1A.5 | Use mathematical and computational thinking to (1) express quantitative observations using appropriate English or metric units, (2) collect and analyze data, or (3) understand patterns, trends, and relationships between variables. | | Level 4 M2 L8–L9<br>Level 4 M4 L14–L17 |
| 4.S.1A.6 | Construct explanations of phenomena using (1) scientific evidence and models, (2) conclusions from scientific investigations, (3) predictions based on observations and measurements, or (4) data communicated in graphs, tables, or diagrams. | | Level 4 M1 L3–L7<br>Level 4 M1 L12–L18<br>Level 4 M1 L21–L22<br>Level 4 M1 L25–L27<br>Level 4 M2 L4–L5<br>Level 4 M2 L15–L26<br>Level 4 M3 L4–L5<br>Level 4 M3 L24–L25<br>Level 4 M3 L29–L31<br>Level 4 M4 L14–L27 |

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| 4.S.1A.7 | Construct scientific arguments to support claims, explanations, or designs using evidence from observations, data, or informational texts. | | Level 4 M3 L21–L23<br>Level 4 M3 L26–L28<br>Level 4 M4 L7–L8 |
| 4.S.1A.8 | Obtain and evaluate informational texts, observations, data collected, or discussions to (1) generate and answer questions, (2) understand phenomena, (3) develop models, or (4) support explanations, claims, or designs. Communicate observations and explanations using the conventions and expectations of oral and written language. | | Level 4 M1 L3–L5<br>Level 4 M1 L23–L24<br>Level 4 M3 L4–L6<br>Level 4 M3 L10–L11<br>Level 4 M3 L20–L23<br>Level 4 M3 L26–L28<br>Level 4 M4 L22–L24 |
| **4.S.1B**: Technology is any modification to the natural world created to fulfill the wants and needs of humans. The engineering design process involves a series of iterative steps used to solve a problem and often leads to the development of a new or improved technology. | | | |
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| 4.S.1B.1 | Construct devices or design solutions to solve specific problems or needs: (1) ask questions to identify problems or needs, (2) ask questions about the criteria and constraints of the devices or solutions, (3) generate and communicate ideas for possible devices or solutions, (4) build and test devices or solutions, (5) determine if the devices or solutions solved the problem and refine the design if needed, and (6) communicate the results. | | Level 4 M1 L3–L7<br>Level 4 M1 L12–L18<br>Level 4 M1 L21–L22<br>Level 4 M1 L25–L27<br>Level 4 M2 L4–L5<br>Level 4 M2 L15–L26<br>Level 4 M3 L4–L5<br>Level 4 M3 L24–L25<br>Level 4 M3 L29–L31<br>Level 4 M4 L14– L27 |

| **Crosscutting Concepts** | | | **Aligned *PhD Science* Lessons** |
|---|---|---|---|
| 1 | Patterns<br>• Similarities and differences in patterns can be used to sort, classify, communicate, and analyze simple rates of change for natural phenomena and designed products.<br>• Patterns of change can be used to make predictions.<br>• Patterns can be used as evidence to support an explanation. | | Level 4 M1 L1–L5<br>Level 4 M1 L18–L22<br>Level 4 M2 L4–L5<br>Level 4 M2 L8–L11<br>Level 4 M2 L24–L26<br>Level 4 M3 L1–L3<br>Level 4 M3 L7–L11<br>Level 4 M3 L20<br>Level 4 M3 L24–L28<br>Level 4 M4 L1–L4<br>Level 4 M4 L7–L8<br>Level 4 M4 L17–L23 |
| 2 | Cause and Effect<br>• Cause and effect relationships are routinely identified, tested, and used to explain change.<br>• Events that occur together with regularity might or might not be a cause and effect relationship. | | Level 4 M1 L6–L17<br>Level 4 M1 L19–L20<br>Level 4 M1 L23–L27<br>Level 4 M2 L1–L7<br>Level 4 M2 L10–L14<br>Level 4 M2 L24–L26<br>Level 4 M3 L6–L11<br>Level 4 M3 L15–L23<br>Level 4 M4 L3–L16<br>Level 4 M4 L24–L26 |

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| 3 | Scale, Proportion, and Quantity<br>• Natural objects and/or observable phenomena exist from the very small to the immensely large or from very short to very long time periods.<br>• Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume. | | Level 4 M1 L3–L5 |
| 4 | Systems and System Models<br>• A system is a group of related parts that make up a whole and can carry out functions its individual parts cannot.<br>• A system can be described in terms of its components and their interactions. | | Level 4 M1 L1–L2<br>Level 4 M1 L12–L17<br>Level 4 M1 L21–L24<br>Level 4 M2 L1–L11<br>Level 4 M2 L15–L26<br>Level 4 M3 L4–L5<br>Level 4 M3 L7–L9<br>Level 4 M3 L15–L19<br>Level 4 M3 L21–L23<br>Level 4 M3 L26–L31<br>Level 4 M4 L1–L8<br>Level 4 M4 L10–L23 |
| 5 | Energy and Matter<br>• Matter is made of particles.<br>• Matter flows and cycles can be tracked in terms of the weight of the substances before and after a process occurs. The total weight of the substance does not change. This is what is meant by conservation of matter. Matter is transported into, out of, and within systems.<br>• Energy can be transferred in various ways and between objects. | | Level 4 M2 L1–L3<br>Level 4 M2 L8–L26<br>Level 4 M3 L1–L3<br>Level 4 M3 L10–L19 |
| 6 | Structure and Function<br>• Different materials have different substructures, which can sometimes be observed.<br>• Substructures have shapes and parts that serve functions. | | Level 4 M3 L4–L6<br>Level 4 M3 L20<br>Level 4 M3 L24–L25<br>Level 4 M3 L29–L31<br>Level 4 M4 L9<br>Level 4 M4 L24–L26 |
| 7 | Stability and Change<br>• Change is measured in terms of differences over time and may occur at different rates.<br>• Some systems appear stable, but over long periods of time will eventually change. | | Level 4 M1 L3–L11<br>Level 4 M1 L18–L20<br>Level 4 M1 L25–L27 |

# South Carolina Academic Standards and Performance Indicators for Science Correlation to *PhD Science*™

Green indicates that *PhD Science*™ fully addresses the standard within the grade level.

Blue indicates that *PhD Science* covers the standard but in a different grade level.

Yellow indicates that *PhD Science* partially covers the standard within the grade level.

Red indicates that *PhD Science* does not cover the standard.

**Key:** Module (M), Lesson (L)

## *PhD Science* Level 5

The Grade 5 South Carolina Academic Standards and Performance Indicators for Science are partially covered in the *PhD Science* curriculum. A detailed analysis of alignment appears in the table below.

| **Grade 5 Standards** | | | **Aligned *PhD Science* Lessons** |
|---|---|---|---|
| **Matter and Mixtures** | | | |
| **Standard 5.P.2**: The student will demonstrate an understanding of the physical properties of matter and mixtures. | | | |
| **5.P.2A**: Matter is made up of particles that are too small to be seen. Even though the particles are very small, the movement and spacing of these particles determines the basic properties of matter. | | | |
| 5.P.2A.1 | Analyze and interpret data from observations and measurements of the physical properties of matter (including volume, shape, movement, and spacing of particles) to explain why matter can be classified as a solid, liquid, or gas. | | Level 5 M1 L1–L4<br>Level 5 M1 L11–L17<br>Level 5 M1 L23–L26 |
| **5.P.2B**: A mixture is formed when two or more kinds of matter are put together. Sometimes when two or more different substances are mixed together, a new substance with different properties may be formed but the total amount (mass) of the substances is conserved. Solutions are a special type of mixture in which one substance is dissolved evenly into another substance. When the physical properties of the components in a mixture are not changed, they can be separated in different physical ways. | | | |
| 5.P.2B.1 | Obtain and communicate information to describe what happens to the properties of substances when two or more substances are mixed together. | | Level 5 M1 L1–L2<br>Level 5 M1 L15–L26 |
| 5.P.2B.2 | Analyze and interpret data to support claims that when two substances are mixed the total amount (mass) of the substances does not change. | | Level 5 M1 L9–L17<br>Level 5 M1 L23–L26 |
| 5.P.2B.3 | Develop models using observations to describe mixtures, including solutions, based on their characteristics. | | Level 5 M1 L13–L17<br>Level 5 M1 L23–L26 |
| 5.P.2B.4 | Construct explanations for how the amount of solute and the solvent determine the concentration of a solution. | | |
| 5.P.2B.5 | Conduct controlled scientific investigations to test how different variables (including temperature change, particle size, and stirring) affect the rate of dissolving. | | Level 5 M1 L14 |

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| 5.P.2B.6 | Design and test the appropriate method(s) (such as filtration, sifting, attraction to magnets, evaporation, chromatography, or floatation) for separating various mixtures. | | Level 5 M1 L13–L26 |
| **Forces and Motion** | | | |
| **Standard 5.P.5**: The student will demonstrate an understanding of the factors that affect the motion of an object. | | | |
| **5.P.5A**: The motion of an object can be described in terms of its position, direction, and speed. The rate and motion of an object is determined by multiple factors. | | | |
| 5.P.5A.1 | Use mathematical and computational thinking to describe and predict the motion of an object (including position, direction, and speed). | | Level 3 M4 L1–L9<br>Level 3 M4 L28–L30 |
| 5.P.5A.2 | Develop and use models to explain how the amount or type of force (contact and noncontact) affects the motion of an object. | | Level 4 M2 L8–L9<br>Level 4 M2 L24–L26 |
| 5.P.5A.3 | Plan and conduct controlled scientific investigations to test the effects of balanced and unbalanced forces on the rate and direction of motion of objects. | | Level 3 M4 L10–L18<br>Level 3 M4 L28–L30 |
| 5.P.5A.4 | Analyze and interpret data to describe how a change of force, a change in mass, or friction affects the motion of an object. | | Level 3 M4 L10–L18<br>Level 3 M4 L28–L30 |
| 5.P.5A.5 | Design and test possible devices or solutions that reduce the effects of friction on the motion of an object. | | Level 3 M4 L15–L18 |
| **Changes in Landforms and Oceans** | | | |
| **Standard 5.E.3**: The student will demonstrate an understanding of how natural processes and human activities affect the features of Earth's landforms and oceans. | | | |
| **5.E.3A:** Some of the land on Earth is located above water and some is located below the oceans. The downhill movement of water as it flows to the ocean shapes the appearance of the land. There are patterns in the location and structure of landforms found on the continents and those found on the ocean floor. | | | |
| 5.E.3A.1 | Construct explanations of how different landforms and surface features result from the location and movement of water on Earth's surface through watersheds (drainage basins) and rivers. | | Level 5 M3 L1–L13<br>Level 5 M3 L24–L27 |
| 5.E.3A.2 | Develop and use models to describe and compare the characteristics and locations of the landforms on continents with those on the ocean floor (including the continental shelf and slope, the mid-ocean ridge, the rift zone, the trench, and the abyssal plain). | | Level 5 M3 L1–L13<br>Level 5 M3 L24–L27 |
| **5.E.3B**: Earth's oceans and landforms can be affected by natural processes in various ways. Humans cannot eliminate natural hazards caused by these processes but can take steps to reduce their impacts. Human activities can affect the land and oceans in positive and negative ways. | | | |
| 5.E.3B.1 | Analyze and interpret data to describe and predict how natural processes (such as weathering, erosion, deposition, earthquakes, tsunamis, hurricanes, or storms) affect Earth's surface. | | Level 4 M1 L6–L11<br>Level 4 M1 L18–L20<br>Level 4 M1 L25–L27 |
| 5.E.3B.2 | Develop and use models to explain the effect of the movement of ocean water (including waves, currents, and tides) on the ocean shore zone (including beaches, barrier islands, estuaries, and inlets). | | Level 5 M3 L9–L13 |
| 5.E.3B.3 | Construct scientific arguments to support claims that human activities (such as conservation efforts or pollution) affect the land and oceans of Earth. | | Level 5 M3 L14–L27 |
| 5.E.3B.4 | Define problems caused by natural processes or human activities and test possible solutions to reduce the impact on landforms and the ocean shore zone. | | Level 4 M1 L12–L17<br>Level 4 M1 L25–L27 |

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| **Life Science: Interdependent Relationships in Ecosystems** | | | |
| **Standard 5.L.4**: The student will demonstrate an understanding of relationships among biotic and abiotic factors within terrestrial and aquatic ecosystems. | | | |
| **5.L.4A**: Ecosystems are complex, interactive systems that include both the living components (biotic factors) and physical components (abiotic factors) of the environment. Ecosystems can be classified as either terrestrial (such as forests, wetlands, and grasslands) or aquatic (such as oceans, estuaries, lakes, and ponds). | | | |
| 5.L.4A.1 | Analyze and interpret data to summarize the abiotic factors (including quantity of light and water, range of temperature, salinity, and soil composition) of different terrestrial ecosystems and aquatic ecosystems. | | Level 5 M3 L4–L5<br>Level 5 M3 L19–L27<br>Level 5 M2 L8–L14<br>Level 5 M2 L20<br>Level 5 M2 L24–L26 |
| 5.L.4A.2 | Obtain and communicate information to describe and compare the biotic factors (including individual organisms, populations, and communities) of different terrestrial and aquatic ecosystems. | | Level 5 M2 L1–L2<br>Level 5 M2 L6–L14<br>Level 5 M2 L24–L26 |
| **5.L.4B**: All organisms need energy to live and grow. Energy is obtained from food. The role an organism serves in an ecosystem can be described by the way in which it gets its energy. Energy is transferred within an ecosystem as organisms produce, consume, or decompose food. A healthy ecosystem is one in which a diversity of life forms are able to meet their needs in a relatively stable web of life. | | | |
| 5.L.4B.1 | Analyze and interpret data to explain how organisms obtain their energy and classify organisms as producers, consumers (including herbivore, carnivore, and omnivore), or decomposers (such as fungi and bacteria). | | Level 5 M4 L10–L26 |
| 5.L.4B.2 | Develop and use models of food chains and food webs to describe the flow of energy in an ecosystem. | | Level 5 M2 L1–L2<br>Level 5 M2 L8–L14<br>Level 5 M2 L20<br>Level 5 M2 L24–L26 |
| 5.L.4B.3 | Construct explanations for how organisms interact with each other in an ecosystem (including predators and prey, and parasites and hosts). | | Level 3 M2 L13–L15<br>Level 3 M2 L26–L28<br>Level 3 M3 L21–L25 |
| 5.L.4B.4 | Construct scientific arguments to explain how limiting factors (including food, water, space, and shelter) or a newly introduced organism can affect an ecosystem. | | Level 5 M2 L1–L2<br>Level 5 M2 L8–L14<br>Level 5 M2 L20<br>Level 5 M2 L24–L26 |
| **Science and Engineering Practices** | | | |
| **Standard 5.S.1**: The student will use the science and engineering practices, including the processes and skills of scientific inquiry, to develop understandings of science content. | | | |
| **5.S.1A**: The practices of science and engineering support the development of science concepts, develop the habits of mind that are necessary for scientific thinking, and allow students to engage in science in ways that are similar to those used by scientists and engineers. | | | |
| 5.S.1A.1 | Ask questions used to (1) generate hypotheses for scientific investigations or (2) refine models, explanations, or designs. | | Level 5 M1 L1–L2<br>Level 5 M2 L1–L2<br>Level 5 M2 L21–L23<br>Level 5 M3 L1–L3<br>Level 5 M3 L19–L23<br>Level 5 M4 L1–L2<br>Level 5 M4 L13 |
| 5.S.1A.2 | Develop, use, and refine models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others. | | Level 5 M1 L1–L2<br>Level 5 M1 L5–L10<br>Level 5 M1 L13–L14<br>Level 5 M1 L23–L26 |

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| | | | Level 5 M2 L1–L2<br>Level 5 M2 L6–L7<br>Level 5 M2 L14<br>Level 5 M2 L20<br>Level 5 M3 L1–L3<br>Level 5 M3 L6–L16<br>Level 5 M3 L19–L27<br>Level 5 M4 L1–L4<br>Level 5 M4 L7–L17<br>Level 5 M4 L20–L26 |
| 5.S.1A.3 | Plan and conduct controlled scientific investigations to answer questions, test predictions, and develop explanations: (1) formulate scientific questions and testable hypotheses, (2) identify materials, procedures, and variables, (3) select and use appropriate tools or instruments to collect qualitative and quantitative data, and (4) record and represent data in an appropriate form. Use appropriate safety procedures. | | Level 5 M1 L13–L14<br>Level 5 M1 L18–L22<br>Level 5 M2 L3–L5<br>Level 5 M3 L10–11<br>Level 5 M4 L5–L6<br>Level 5 M4 L18–L19 |
| 5.S.1A.4 | Analyze and interpret data from informational texts, observations, measurements, or investigations using a range of methods (such as tabulation or graphing) to (1) reveal patterns and construct meaning or (2) support hypotheses, explanations, claims, or designs. | | Level 5 M1 L15–L17<br>Level 5 M2 L3–L5<br>Level 5 M2 L8–L13<br>Level 5 M2 L15–L17<br>Level 5 M3 L4–L5<br>Level 5 M3 L14–L16<br>Level 5 M4 L14–L15 |
| 5.S.1A.5 | Use mathematical and computational thinking to (1) express quantitative observations using appropriate metric units, (2) collect and analyze data, or (3) understand patterns, trends, and relationships between variables. | | Level 5 M1 L3–L4<br>Level 5 M1 L15–L17<br>Level 5 M3 L10–L11<br>Level 5 M3 L24–L27<br>Level 5 M4 L5–L6<br>Level 5 M4 L14–L15 |
| 5.S.1A.6 | Construct explanations of phenomena using (1) scientific evidence and models, (2) conclusions from scientific investigations, (3) predictions based on observations and measurements, or (4) data communicated in graphs, tables, or diagrams. | | Level 5 M1 L5–L6<br>Level 5 M1 L11–L12<br>Level 5 M1 L18–L26<br>Level 5 M2 L12–L13<br>Level 5 M2 L15–L17<br>Level 5 M2 L21–L26<br>Level 5 M3 L17–L23<br>Level 5 M4 L3–L4<br>Level 5 M4 L9–L12<br>Level 5 M4 L20–L26 |
| 5.S.1A.7 | Construct scientific arguments to support claims, explanations, or designs using evidence from observations, data, or informational texts. | | Level 5 M1 L3–L4<br>Level 5 M2 L3–L5<br>Level 5 M2 L8–L11<br>Level 5 M2 L21–L23<br>Level 5 M3 L19–L23<br>Level 5 M4 L5–L6<br>Level 5 M4 L13–L17<br>Level 5 M4 L20–L21<br>Level 5 M4 L24–L26 |

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| 5.S.1A.8 | Obtain and evaluate informational texts, observations, data collected, or discussions to (1) generate and answer questions, (2) understand phenomena, (3) develop models, or (4) support hypotheses, explanations, claims, or designs. Communicate observations and explanations using the conventions and expectations of oral and written language. | | Level 5 M2 L6–L7<br>Level 5 M2 L10–L11<br>Level 5 M2 L18–L20<br>Level 5 M3 L9<br>Level 5 M3 L14–L16<br>Level 5 M3 L19–L27<br>Level 5 M4 L18–L19 |
| **5.S.1B**: Technology is any modification to the natural world created to fulfill the wants and needs of humans. The engineering design process involves a series of iterative steps used to solve a problem and often leads to the development of a new or improved technology. | | | |
| | | | |
| 5.S.1B.1 | Construct devices or design solutions to solve specific problems or needs: (1) ask questions to identify problems or needs, (2) ask questions about the criteria and constraints of the devices or solutions, (3) generate and communicate ideas for possible devices or solutions, (4) build and test devices or solutions, (5) determine if the devices or solutions solved the problem and refine the design if needed, and (6) communicate the results. | | Level 5 M2 L21–L23 |

| **Crosscutting Concepts** | | | **Aligned *PhD Science* Lessons** |
|---|---|---|---|
| 1 | Patterns<br>• Similarities and differences in patterns can be used to sort, classify, communicate, and analyze simple rates of change for natural phenomena and designed products.<br>• Patterns of change can be used to make predictions.<br>• Patterns can be used as evidence to support an explanation. | | Level 5 M1 L7–L8<br>Level 5 M2 L1–L5<br>Level 5 M2 L8–L9<br>Level 5 M2 L15–L17<br>Level 5 M3 L6–L9<br>Level 5 M4 L1–L17<br>Level 5 M4 L20–L26 |
| 2 | Cause and Effect<br>• Cause and effect relationships are routinely identified, tested, and used to explain change.<br>• Events that occur together with regularity might or might not be a cause and effect relationship. | | Level 5 M1 L1–L2<br>Level 5 M1 L5–L6<br>Level 5 M1 L9–L10<br>Level 5 M1 L18–L22<br>Level 5 M2 L3–L7<br>Level 5 M2 L12–L13<br>Level 5 M2 L18–L23<br>Level 5 M3 L6–L8<br>Level 5 M3 L12–L18<br>Level 5 M4 L5–L6<br>Level 5 M4 L24–L26 |
| 3 | Scale, Proportion, and Quantity<br>• Natural objects and/or observable phenomena exist from the very small to the immensely large or from very short to very long time periods.<br>• Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume. | | Level 5 M1 L3–L4<br>Level 5 M1 L13–L17<br>Level 5 M1 L23–L26<br>Level 5 M2 L10–L11<br>Level 5 M3 L1–L5<br>Level 5 M3 L10–L11<br>Level 5 M3 L24–L27 |

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| | | | Level 5 M4 L18–L19<br>Level 5 M4 L24–L26 |
| 4 | Systems and System Models<br>• A system is a group of related parts that make up a whole and can carry out functions its individual parts cannot.<br>• A system can be described in terms of its components and their interactions. | | Level 5 M1 L3–L4<br>Level 5 M1 L15–L17<br>Level 5 M2 L1–L2<br>Level 5 M2 L6–L11<br>Level 5 M2 L14<br>Level 5 M2 L18–L19<br>Level 5 M2 L24–L26<br>Level 5 M3 L1–L9<br>Level 5 M3 L12–L13<br>Level 5 M3 L19–L27<br>Level 5 M4 L1–L2<br>Level 5 M4 L7–L23 |
| 5 | Energy and Matter<br>• Matter is made of particles.<br>• Matter flows and cycles can be tracked in terms of the weight of the substances before and after a process occurs. The total weight of the substances does not change. This is what is meant by conservation of matter. Matter is transported into, out of, and within systems.<br>• Energy can be transferred in various ways and between objects. | | Level 5 M1 L5–L8<br>Level 5 M1 L13–L14<br>Level 5 M1 L23–L26<br>Level 5 M2 L6–L11<br>Level 5 M2 L14–L19<br>Level 5 M2 L24–L26<br>Level 5 M3 L10–L11<br>Level 5 M4 L3–L4 |
| 6 | Structure and Function<br>• Different materials have different substructures, which can sometimes be observed.<br>• Substructures have shapes and parts that serve functions. | | Level 3 M1 L21–L26<br>Level 3 M2 L1–L3<br>Level 3 M2 L9–L12<br>Level 3 M3 L4–L6<br>Level 3 M3 L21–L28<br>Level 4 M3 L4–L6<br>Level 4 M3 L20<br>Level 4 M3 L24–L25<br>Level 4 M3 L29–L31<br>Level 4 M4 L9<br>Level 4 M4 L24–L26 |
| 7 | Stability and Change<br>• Change is measured in terms of differences over time and may occur at different rates.<br>• Some systems appear stable, but over long periods of time will eventually change. | | Level 5 M1 L1–L2<br>Level 5 M1 L9–L12<br>Level 5 M1 L18–L26<br>Level 5 M2 L12–L13<br>Level 5 M2 L20<br>Level 5 M2 L24–L26<br>Level 5 M3 L14–L18<br>Level 5 M4 L5–L6<br>Level 5 M4 L9–L12 |