


Pennsylvania Standards of Excellence 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 Pennsylvania Standards of Excellence are partially covered in the *PhD Science* curriculum. A detailed analysis of alignment appears in the table below.

Grade 3 Standards		Aligned <i>PhD Science</i> Lessons
3.1 Biological Sciences		
3.1.A Organisms and Cells		
3.1.3.A1	Describe characteristics of living things that help to identify and classify them.	 Level 4 M1 L1–L5 Level 4 M1 L18–20 Level 4 M2 L4–L5 Level 4 M2 L8–L11 Level 4 M2 L24–L26 Level 4 M3 L1–L3 Level 4 M3 L7–L11 Level 4 M3 L20 Level 4 M3 L24–L31 Level 4 M4 L1–L4 Level 4 M4 L7–L8 Level 4 M4 L14–L17 Level 4 M4 L22–L27
3.1.3.A2	Describe the basic needs of living things and their dependence on light, food, air, water, and shelter.	 Level 5 M2 L8–L14 Level 5 M2 L20 Level 5 M2 L24–L26
3.1.3.A3	Illustrate how plants and animals go through predictable life cycles that include birth, growth, development, reproduction, and death.	 Level 3 M3 L7–L8 Level 3 M3 L23–L28
3.1.3.A5	Identify the structures in plants that are responsible for food production, support, water transport, reproduction, growth, and protection.	 Level 3 M3 L7–L8 Level 3 M3 L23–L28
3.1.3.A9	Distinguish between scientific fact and opinion.	 Level 3 M2 L21 Level 3 M3 L2 Level 3 M3 L6
	Ask questions about objects, organisms, and events.	 Level 3 M1 L1–L3 Level 3 M1 L21–L26 Level 3 M2 L1–L2

		Level 3 M3 L1–L3 Level 3 M3 L12–L13 Level 3 M4 L1–L3 Level 3 M4 L7–L9 Level 3 M4 L15–L16 Level 3 M4 L19–L30
	Understand that all scientific investigations involve asking and answering questions and comparing the answer with what is already known.	Level 3 M1 L1–L3 Level 3 M1 L21–L26 Level 3 M2 L1–L2 Level 3 M3 L1–L3 Level 3 M3 L12–L13 Level 3 M4 L1–L3 Level 3 M4 L7–L9 Level 3 M4 L15–L16 Level 3 M4 L19–L30
	Plan and conduct a simple investigation and understand that different questions require different kinds of investigations.	Level 3 M2 L4–L5 Level 3 M3 L12–L13 Level 3 M4 L7–L18 Level 3 M4 L23–L30
	Use simple equipment (tools and other technologies) to gather data and understand that this allows scientists to collect more information than relying only on their senses to gather information.	Level 3 M2 L4–L5 Level 3 M3 L12–L13 Level 3 M4 L7–L18 Level 3 M4 L23–L30
	Use data/evidence to construct explanations and understand that scientists develop explanations based on their evidence and compare them with their current scientific knowledge.	Level 3 M1 L21–L26 Level 3 M2 L9–L15 Level 3 M2 L20–L21 Level 3 M3 L16–L20 Level 3 M4 L12–L14
	Communicate procedures and explanations giving priority to evidence and understanding that scientists make their results public, describe their investigations so they can be reproduced, and review and ask questions about the work of other scientists.	Level 3 M1 L11–L17 Level 3 M2 L13–L15 Level 3 M2 L20–L21 Level 3 M4 L22
3.1.B Genetics		
3.1.3.B1	Understand that plants and animals closely resemble their parents.	Level 3 M3 L1–L6 Level 3 M3 L14–L18 Level 3 M3 L26–L28
3.1.3.B5	PATTERNS Identify characteristics that appear in both parents and offspring.	Level 3 M3 L14–L18 Level 3 M3 L26–L28
3.1.3.B6	Distinguish between scientific fact and opinion.	Level 3 M2 L21 Level 3 M3 L2 Level 3 M3 L6
	Ask questions about objects, organisms, and events.	Level 3 M1 L1–L3 Level 3 M1 L21–L26 Level 3 M2 L1–L2 Level 3 M3 L1–L3 Level 3 M3 L12–L13 Level 3 M4 L1–L3 Level 3 M4 L7–L9 Level 3 M4 L15–L16 Level 3 M4 L19–L30

	Understand that all scientific investigations involve asking and answering questions and comparing the answer with what is already known.	Level 3 M1 L1–L3 Level 3 M1 L21–L26 Level 3 M2 L1–L2 Level 3 M3 L1–L3 Level 3 M3 L12–L13 Level 3 M4 L1–L3 Level 3 M4 L7–L9 Level 3 M4 L15–L16 Level 3 M4 L19–L30
	Plan and conduct a simple investigation and understand that different questions require different kinds of investigations.	Level 3 M2 L4–L5 Level 3 M3 L12–L13 Level 3 M4 L7–L18 Level 3 M4 L23–L30
	Use simple equipment (tools and other technologies) to gather data and understand that this allows scientists to collect more information than relying only on their senses to gather information.	Level 3 M2 L4–L5 Level 3 M3 L12–L13 Level 3 M4 L7–L18 Level 3 M4 L23–L30
	Use data/evidence to construct explanations and understand that scientists develop explanations based on their evidence and compare them with their current scientific knowledge.	Level 3 M1 L21–L26 Level 3 M2 L9–L15 Level 3 M2 L20–L21 Level 3 M3 L16–L20 Level 3 M4 L12–L14
	Communicate procedures and explanations giving priority to evidence and understanding that scientists make their results public, describe their investigations so they can be reproduced, and review and ask questions about the work of other scientists.	Level 3 M1 L11–L17 Level 3 M2 L13–L15 Level 3 M2 L20–L21 Level 3 M4 L22
3.1.C Evolution		
3.1.3.C1	Recognize that plants survive through adaptations, such as stem growth towards light and root growth downward in response to gravity. Recognize that many plants and animals can survive harsh environments because of seasonal behaviors (e.g., hibernation, migration, trees shedding leaves).	Level 3 M2 L1–L2 Level 3 M2 L9–L12 Level 3 M2 L16–L28
3.1.3.C2	Describe animal characteristics that are necessary for survival.	Level 3 M2 L1–L28
3.1.3.C3	CONSTANCY AND CHANGE Recognize that fossils provide us with information about living things that inhabited the Earth long ago.	Level 3 M2 L1–L8 Level 3 M2 L26–L28
3.1.3.C4	Distinguish between scientific fact and opinion.	Level 3 M2 L21 Level 3 M3 L2 Level 3 M3 L6
	Ask questions about objects, organisms, and events.	Level 3 M1 L1–L3 Level 3 M1 L21–L26 Level 3 M2 L1–L2 Level 3 M3 L1–L3 Level 3 M3 L12–L13 Level 3 M4 L1–L3 Level 3 M4 L7–L9 Level 3 M4 L15–L16 Level 3 M4 L19–L30

	Understand that all scientific investigations involve asking and answering questions and comparing the answer with what is already known.		Level 3 M1 L1–L3 Level 3 M1 L21–L26 Level 3 M2 L1–L2 Level 3 M3 L1–L3 Level 3 M3 L12–L13 Level 3 M4 L1–L3 Level 3 M4 L7–L9 Level 3 M4 L15–L16 Level 3 M4 L19–L30
	Plan and conduct a simple investigation and understand that different questions require different kinds of investigations.		Level 3 M2 L4–L5 Level 3 M3 L12–L13 Level 3 M4 L7–L18 Level 3 M4 L23–L30
	Use simple equipment (tools and other technologies) to gather data and understand that this allows scientists to collect more information than relying only on their senses to gather information.		Level 3 M2 L4–L5 Level 3 M3 L12–L13 Level 3 M4 L7–L18 Level 3 M4 L23–L30
	Use data/evidence to construct explanations and understand that scientists develop explanations based on their evidence and compare them with their current scientific knowledge.		Level 3 M1 L21–L26 Level 3 M2 L9–L15 Level 3 M2 L20–L21 Level 3 M3 L16–L20 Level 3 M4 L12–L14
	Communicate procedures and explanations giving priority to evidence and understanding that scientists make their results public, describe their investigations so they can be reproduced, and review and ask questions about the work of other scientists.		Level 3 M1 L11–L17 Level 3 M2 L13–L15 Level 3 M2 L20–L21 Level 3 M4 L22
3.2 Physical Sciences: Chemistry and Physics			
3.2.A Chemistry			
3.2.3.A1	Differentiate between properties of objects such as size, shape, and weight and properties of materials that make up the objects such as color, texture, and hardness. Differentiate between the three states of matter, classifying a substance as a solid, liquid, or gas.		Level 5 M1 L3–L5 Level 5 M3 L6 Level 5 M3 L24–L27
3.2.3.A2	Recognize that all objects and materials in the world are made of matter.		Level 5 M1 L1–L26
3.2.3.A3	Demonstrate how heating and cooling may cause changes in the properties of materials including phase changes.		Level 5 M1 L11–L12 Level 5 M1 L23–L26
3.2.3.A4	Use basic reactions to demonstrate observable changes in properties of matter (e.g., burning, cooking).		Level 5 M1 L9–L17 Level 5 M1 L23–L26
3.2.3.A5	CONSTANCY AND CHANGE Recognize that everything is made of matter.		Level 5 M1 L1–L26
3.2.3.A6	Distinguish between scientific fact and opinion.		Level 3 M2 L21 Level 3 M3 L2 Level 3 M3 L6
	Ask questions about objects, organisms, and events.		Level 3 M1 L1–L3 Level 3 M1 L21–L26 Level 3 M2 L1–L2 Level 3 M3 L1–L3 Level 3 M3 L12–L13

		Level 3 M4 L1–L3 Level 3 M4 L7–L9 Level 3 M4 L15–L16 Level 3 M4 L19–L30
	Understand that all scientific investigations involve asking and answering questions and comparing the answer with what is already known.	Level 3 M1 L1–L3 Level 3 M1 L21–L26 Level 3 M2 L1–L2 Level 3 M3 L1–L3 Level 3 M3 L12–L13 Level 3 M4 L1–L3 Level 3 M4 L7–L9 Level 3 M4 L15–L16 Level 3 M4 L19–L30
	Plan and conduct a simple investigation and understand that different questions require different kinds of investigations.	Level 3 M2 L4–L5 Level 3 M3 L12–L13 Level 3 M4 L7–L18 Level 3 M4 L23–L30
	Use simple equipment (tools and other technologies) to gather data and understand that this allows scientists to collect more information than relying only on their senses to gather information.	Level 3 M2 L4–L5 Level 3 M3 L12–L13 Level 3 M4 L7–L18 Level 3 M4 L23–L30
	Use data/evidence to construct explanations and understand that scientists develop explanations based on their evidence and compare them with their current scientific knowledge.	Level 3 M1 L21–L26 Level 3 M2 L9–L15 Level 3 M2 L20–L21 Level 3 M3 L16–L20 Level 3 M4 L12–L14
	Communicate procedures and explanations giving priority to evidence and understanding that scientists make their results public, describe their investigations so they can be reproduced, and review and ask questions about the work of other scientists.	Level 3 M1 L11–L17 Level 3 M2 L13–L15 Level 3 M2 L20–L21 Level 3 M4 L22
3.2.B Physics		
3.2.3.B1	Explain how movement can be described in many ways.	Level 3 M4 L10–L18 Level 3 M4 L28–L30
3.2.3.B2	Explore energy’s ability to cause motion or create change. Explore how energy can be found in moving objects, light, sound, and heat.	Level 4 M2 L1–L5 Level 4 M2 L8–L9 Level 4 M2 L24–L26
3.2.3.B3	Explore temperature changes that result from the addition or removal of heat.	Level 5 M1 L9–L17 Level 5 M1 L23–L26
3.2.3.B4	Identify and classify objects and materials that are conductors or insulators of electricity. Identify and classify objects and materials as magnetic or non-magnetic.	Level 3 M4 L19–L21
3.2.3.B5	Recognize that light travels in a straight line until it strikes an object or travels from one material to another.	Level 4 M4 L3–L4 Level 4 M4 L7–L8
3.2.3.B6	ENERGY Recognize that light from the sun is an important source of energy for living and nonliving systems and some source of energy is needed for all organisms to stay alive and grow.	Level 5 M2 L6–L7 Level 5 M2 L15–L19 Level 5 M2 L24–L26


3.2.3.B7	Distinguish between scientific fact and opinion.	Level 3 M2 L21 Level 3 M3 L2 Level 3 M3 L6
	Ask questions about objects, organisms, and events.	Level 3 M1 L1–L3 Level 3 M1 L21–L26 Level 3 M2 L1–L2 Level 3 M3 L1–L3 Level 3 M3 L12–L13 Level 3 M4 L1–L3 Level 3 M4 L7–L9 Level 3 M4 L15–L16 Level 3 M4 L19–L30
	Understand that all scientific investigations involve asking and answering questions and comparing the answer with what is already known.	Level 3 M1 L1–L3 Level 3 M1 L21–L26 Level 3 M2 L1–L2 Level 3 M3 L1–L3 Level 3 M3 L12–L13 Level 3 M4 L1–L3 Level 3 M4 L7–L9 Level 3 M4 L15–L16 Level 3 M4 L19–L30
	Plan and conduct a simple investigation and understand that different questions require different kinds of investigations.	Level 3 M2 L4–L5 Level 3 M3 L12–L13 Level 3 M4 L7–L18 Level 3 M4 L23–L30
	Use simple equipment (tools and other technologies) to gather data and understand that this allows scientists to collect more information than relying only on their senses to gather information.	Level 3 M2 L4–L5 Level 3 M3 L12–L13 Level 3 M4 L7–L18 Level 3 M4 L23–L30
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	Communicate procedures and explanations giving priority to evidence and understanding that scientists make their results public, describe their investigations so they can be reproduced, and review and ask questions about the work of other scientists.	Level 3 M1 L11–L17 Level 3 M2 L13–L15 Level 3 M2 L20–L21 Level 3 M4 L22
	3.3 Earth and Space Sciences	
3.3.A Earth Structure, Processes, and Cycles		
3.3.3.A1	Explain and give examples of the ways in which soil is formed.	Level 5 M3 L10–L11
3.3.3.A2	Identify the physical properties of minerals and demonstrate how minerals can be tested for these different physical properties.	
3.3.3.A4	Connect various forms of precipitation to the weather in a particular place and time.	Level 3 M1 L1–L15 Level 3 M1 L19–L20 Level 3 M1 L27–L29
3.3.3.A5	Explain how air temperature, moisture, wind speed and direction, and precipitation make up the weather in a particular place and time.	Level 3 M1 L1–L26
3.3.3.A7	Distinguish between scientific fact and opinion.	Level 3 M2 L21 Level 3 M3 L2

		Level 3 M3 L6
	Ask questions about objects, organisms, and events.	Level 3 M1 L1–L3 Level 3 M1 L21–L26 Level 3 M2 L1–L2 Level 3 M3 L1–L3 Level 3 M3 L12–L13 Level 3 M4 L1–L3 Level 3 M4 L7–L9 Level 3 M4 L15–L16 Level 3 M4 L19–L30
	Understand that all scientific investigations involve asking and answering questions and comparing the answer with what is already known.	Level 3 M1 L1–L3 Level 3 M1 L21–L26 Level 3 M2 L1–L2 Level 3 M3 L1–L3 Level 3 M3 L12–L13 Level 3 M4 L1–L3 Level 3 M4 L7–L9 Level 3 M4 L15–L16 Level 3 M4 L19–L30
	Plan and conduct a simple investigation and understand that different questions require different kinds of investigations.	Level 3 M2 L4–L5 Level 3 M3 L12–L13 Level 3 M4 L7–L18 Level 3 M4 L23–L30
	Use simple equipment (tools and other technologies) to gather data and understand that this allows scientists to collect more information than relying only on their senses to gather information.	Level 3 M2 L4–L5 Level 3 M3 L12–L13 Level 3 M4 L7–L18 Level 3 M4 L23–L30
	Use data/evidence to construct explanations and understand that scientists develop explanations based on their evidence and compare them with their current scientific knowledge.	Level 3 M1 L21–L26 Level 3 M2 L9–L15 Level 3 M2 L20–L21 Level 3 M3 L16–L20 Level 3 M4 L12–L14
	Communicate procedures and explanations giving priority to evidence and understanding that scientists make their results public, describe their investigations so they can be reproduced, and review and ask questions about the work of other scientists.	Level 3 M1 L11–L17 Level 3 M2 L13–L15 Level 3 M2 L20–L21 Level 3 M4 L22
3.3.B Origin and Evolution of the Universe		
3.3.3.B1	Relate the rotation of the earth and day/night, to the apparent movement of the sun, moon, and stars across the sky. Describe the changes that occur in the observable shape of the moon over the course of a month.	Level 5 M4 L1–L2 Level 5 M4 L5–L17 Level 5 M4 L20–L26
3.3.3.B3	Distinguish between scientific fact and opinion.	Level 3 M2 L21 Level 3 M3 L2 Level 3 M3 L6
	Ask questions about objects, organisms, and events.	Level 3 M1 L1–L3 Level 3 M1 L21–L26 Level 3 M2 L1–L2 Level 3 M3 L1–L3 Level 3 M3 L12–L13

			Level 3 M4 L1–L3 Level 3 M4 L7–L9 Level 3 M4 L15–L16 Level 3 M4 L19–L30
	Understand that all scientific investigations involve asking and answering questions and comparing the answer with what is already known.		Level 3 M1 L1–L3 Level 3 M1 L21–L26 Level 3 M2 L1–L2 Level 3 M3 L1–L3 Level 3 M3 L12–L13 Level 3 M4 L1–L3 Level 3 M4 L7–L9 Level 3 M4 L15–L16 Level 3 M4 L19–L30
	Plan and conduct a simple investigation and understand that different questions require different kinds of investigations.		Level 3 M2 L4–L5 Level 3 M3 L12–L13 Level 3 M4 L7–L18 Level 3 M4 L23–L30
	Use simple equipment (tools and other technologies) to gather data and understand that this allows scientists to collect more information than relying only on their senses to gather information.		Level 3 M2 L4–L5 Level 3 M3 L12–L13 Level 3 M4 L7–L18 Level 3 M4 L23–L30
	Use data/evidence to construct explanations and understand that scientists develop explanations based on their evidence and compare them with their current scientific knowledge.		Level 3 M1 L21–L26 Level 3 M2 L9–L15 Level 3 M2 L20–L21 Level 3 M3 L16–L20 Level 3 M4 L12–L14
	Communicate procedures and explanations giving priority to evidence and understanding that scientists make their results public, describe their investigations so they can be reproduced, and review and ask questions about the work of other scientists.		Level 3 M1 L11–L17 Level 3 M2 L13–L15 Level 3 M2 L20–L21 Level 3 M4 L22
3.4 Technology and Engineering Education			
3.4.A The Scope of Technology			
3.4.3.A1	Identify how the natural made world and the human made world are different.		Level 3 M2 L22–L25 Level 3 M4 L22–L27
3.4.3.A2	Identify that some systems are found in nature and some systems are made by humans.		Level 3 M1 L1–L3 Level 3 M1 L16–L20 Level 3 M2 L6–L15 Level 3 M2 L20–L28 Level 3 M3 L9–L11 Level 3 M4 L1–L30
3.4.3.A3	Identify how the study of technology uses many of the same ideas and skills as many other subjects.		Level 3 M1 L21–L26 Level 3 M2 L22–L25 Level 3 M4 L22–L27
3.4.B Technology and Society			
3.4.3.B1	Describe how using technology can be good or bad.		Level 3 M1 L21–L26 Level 3 M2 L22–L25 Level 3 M4 L22–L27
3.4.3.B2	Explain how materials are re-used or recycled.		
3.4.3.B3	Identify and define products made to meet individual needs versus wants.		Level 4 M1 L12–L17 Level 4 M1 L23–L24

			Level 4 M2 L15–L23 Level 4 M4 L14–L17 Level 5 M2 L21–L23 Level 5 M3 L19–L23
3.4.3.B4	Illustrate how people have made tools to provide food, clothing, and shelter.		Level 5 M2 L8–L14 Level 5 M2 L20 Level 5 M2 L24–L26
3.4.C Technology and Engineering Design			
3.4.3.C1	Recognize design is a creative process and everyone can design solutions to problems.		Level 3 M4 L1–L3
3.4.3.C2	Explain why the design process requires creativity and consideration of all ideas.		Level 3 M4 L22–L30
3.4.3.C3	Recognize that all products and systems are subject to failure; many products and systems can be fixed.		Level 3 M4 L23–L27
3.4.D Abilities for a Technological World			
3.4.3.D1	Identify people’s needs and wants and define some problems that can be solved through the design process.		Level 3 M2 L22–L25 Level 3 M4 L22–L27
3.4.3.D2	Observe, analyze, and document how simple systems work.		Level 3 M1 L1–L3 Level 3 M1 L16–L20 Level 3 M2 L6–L15 Level 3 M2 L20–L28 Level 3 M3 L9–L11 Level 3 M4 L1–L30
3.4.3.D3	Collect information about everyday products and systems by asking questions.		Level 3 M1 L1–L3 Level 3 M4 L1–L30
3.4.E The Designed World			
3.4.3.E1	Identify the technologies that support and improve quality of life.		Level 3 M1 L21–L26 Level 3 M2 L22–L25 Level 3 M4 L22–L27
3.4.3.E2	Identify some processes used in agriculture that require different procedures, products, or systems.		Level 5 M3 L17–L23
3.4.3.E3	Recognize that tools, machines, products, and systems use energy in order to do work.		Level 4 M2 L1–L5 Level 4 M2 L10–L26
3.4.3.E4	Recognize that information and communication technology is the transfer of messages among people and/or machines over distances through the use of technology.		Level 4 M4 L18–L27
3.4.3.E5	Understand that transportation has many parts that work together to help people travel.		
3.4.3.E6	Explain how manufacturing systems design and produce products in quantity.		
3.4.3.E7	Recognize that people live, work, and go to school in buildings which are different types of structures.		

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


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Key: Module (M), Lesson (L)

PhD Science Level 4

The Grade 4 Pennsylvania Standards of Excellence are partially covered by the *PhD Science* curriculum. A detailed analysis of alignment appears in the table below.

Grade 4 Standards		Aligned <i>PhD Science</i> Lessons
3.1 Biological Sciences		
3.1.A Organisms and Cells		
3.1.4.A1	Classify plants and animals according to the physical characteristics that they share.	
3.1.4.A2	Describe the different resources that plants and animals need to live.	 Level 5 M2 L8–L14 Level 5 M2 L20 Level 5 M2 L24–L26
3.1.4.A3	Identify differences in the life cycles of plants and animals.	 Level 3 M2 L7 Level 3 M3 L7–L8 Level 3 M3 L23–L28
3.1.4.A5	Describe common functions living things share to help them function in a specific environment.	 Level 3 M3 L9–L13 Level 3 M3 L19–L20 Level 3 M3 L26–L28
3.1.4.A8	MODELS Construct and interpret models and diagrams of various animal and plant life cycles.	 Level 3 M3 L7–L8 Level 3 M3 L23–L28
3.1.4.A9	Distinguish between scientific fact and opinion.	 Level 4 M3 L27
	Ask questions about objects, organisms, and events.	 Level 4 M1 L1–L2 Level 4 M2 L1–L3 Level 4 M2 L8–L9 Level 4 M3 L1–L3 Level 4 M3 L6 Level 4 M3 L15–L19 Level 4 M4 L1–L2
	Understand that all scientific investigations involve asking and answering questions and comparing the answer with what is already known.	 Level 4 M1 L1–L2 Level 4 M2 L1–L3 Level 4 M2 L8–L9 Level 4 M3 L1–L3

		Level 4 M3 L6 Level 4 M3 L15–L19 Level 4 M4 L1–L2
	Plan and conduct a simple investigation and understand that different questions require different kinds of investigations.	Level 4 M1 L6–L11 Level 4 M1 L21–L22 Level 4 M2 L6–L7 Level 4 M2 L10–L14 Level 4 M3 L15–L19 Level 4 M4 L7–L9 Level 4 M4 L14–L21
	Use simple equipment (tools and other technologies) to gather data and understand that this allows scientists to collect more information than relying only on their senses to gather information.	Level 4 M1 L3–L7 Level 4 M1 L12–L18 Level 4 M1 L21–L22 Level 4 M1 L25–L27 Level 4 M2 L4–L5 Level 4 M2 L15–L26 Level 4 M3 L4–L5 Level 4 M3 L24–L25 Level 4 M3 L29–L31 Level 4 M4 L14–L27
	Use data/evidence to construct explanations and understand that scientists develop explanations based on their evidence and compare them with their current scientific knowledge.	Level 4 M1 L3–L7 Level 4 M1 L12–L18 Level 4 M1 L21–L22 Level 4 M1 L25–L27 Level 4 M2 L4–L5 Level 4 M2 L15–L26 Level 4 M3 L4–L5 Level 4 M3 L24–L25 Level 4 M3 L29–L31 Level 4 M4 L14–L27
	Communicate procedures and explanations giving priority to evidence and understanding that scientists make their results public, describe their investigations so they can be reproduced, and review and ask questions about the work of other scientists.	Level 4 M1 L3–L5 Level 4 M1 L23–L24 Level 4 M3 L4–L6 Level 4 M3 L10–L11 Level 4 M3 L20–L23 Level 4 M3 L26–L28 Level 4 M4 L22–L24
3.1.B Genetics		
3.1.4.B1	Describe features that are observable in both parents and their offspring.	Level 3 M3 L1–L6 Level 3 M3 L14–L18 Level 3 M3 L26–L28
3.1.4.B2	Recognize that reproduction is necessary for the continuation of life.	Level 4 M3 L1–L6 Level 4 M3 L20 Level 4 M3 L26–L31
3.1.4.B5	PATTERNS Identify observable patterns in the physical characteristics of plants or groups of animals.	Level 4 M1 L3–L5 Level 4 M3 L1–L3 Level 4 M3 L11 Level 4 M3 L20 Level 4 M3 L24–L31
3.1.4.B6	Distinguish between scientific fact and opinion.	Level 4 M3 L27

	Ask questions about objects, organisms, and events.	<p>Level 4 M1 L1–L2 Level 4 M2 L1–L3 Level 4 M2 L8–L9 Level 4 M3 L1–L3 Level 4 M3 L6 Level 4 M3 L15–L19 Level 4 M4 L1–L2</p>
	Understand that all scientific investigations involve asking and answering questions and comparing the answer with what is already known.	<p>Level 4 M1 L1–L2 Level 4 M2 L1–L3 Level 4 M2 L8–L9 Level 4 M3 L1–L3 Level 4 M3 L6 Level 4 M3 L15–L19 Level 4 M4 L1–L2</p>
	Plan and conduct a simple investigation and understand that different questions require different kinds of investigations.	<p>Level 4 M1 L6–L11 Level 4 M1 L21–L22 Level 4 M2 L6–L7 Level 4 M2 L10–L14 Level 4 M3 L15–L19 Level 4 M4 L7–L9 Level 4 M4 L14–L21</p>
	Use simple equipment (tools and other technologies) to gather data and understand that this allows scientists to collect more information than relying only on their senses to gather information.	<p>Level 4 M1 L3–L7 Level 4 M1 L12–L18 Level 4 M1 L21–L22 Level 4 M1 L25–L27 Level 4 M2 L4–L5 Level 4 M2 L15–L26 Level 4 M3 L4–L5 Level 4 M3 L24–L25 Level 4 M3 L29–L31 Level 4 M4 L14–L27</p>
	Use data/evidence to construct explanations and understand that scientists develop explanations based on their evidence and compare them with their current scientific knowledge.	<p>Level 4 M1 L3–L7 Level 4 M1 L12–L18 Level 4 M1 L21–L22 Level 4 M1 L25–L27 Level 4 M2 L4–L5 Level 4 M2 L15–L26 Level 4 M3 L4–L5 Level 4 M3 L24–L25 Level 4 M3 L29–L31 Level 4 M4 L14–L27</p>
	Communicate procedures and explanations giving priority to evidence and understanding that scientists make their results public, describe their investigations so they can be reproduced, and review and ask questions about the work of other scientists.	<p>Level 4 M1 L3–L5 Level 4 M1 L23–L24 Level 4 M3 L4–L6 Level 4 M3 L10–L11 Level 4 M3 L20–L23 Level 4 M3 L26–L28 Level 4 M4 L22–L24</p>

3.1.C Evolution		
3.1.4.C1	<p>Identify different characteristics of plants and animals that help some populations survive and reproduce in greater numbers.</p> <p>Describe how environmental changes can cause extinction in plants and animals.</p>	<p>Level 4 M3 L1–L6 Level 4 M3 L20 Level 4 M3 L26–L31</p>
3.1.4.C2	Describe plant and animal adaptations that are important to survival.	<p>Level 3 M2 L1–L2 Level 3 M2 L9–L12 Level 3 M2 L16–L19 Level 3 M2 L22–L28</p>
3.1.3.C3	<p>CONSTANCY AND CHANGE Compare fossils to one another and to currently living organisms according to their anatomical similarities and differences.</p>	<p>Level 3 M2 L1–L8 Level 3 M2 L26–L28</p>
3.1.4.C4	Distinguish between scientific fact and opinion.	Level 4 M3 L27
	Ask questions about objects, organisms, and events.	<p>Level 4 M1 L1–L2 Level 4 M2 L1–L3 Level 4 M2 L8–L9 Level 4 M3 L1–L3 Level 4 M3 L6 Level 4 M3 L15–L19 Level 4 M4 L1–L2</p>
	Understand that all scientific investigations involve asking and answering questions and comparing the answer with what is already known.	<p>Level 4 M1 L1–L2 Level 4 M2 L1–L3 Level 4 M2 L8–L9 Level 4 M3 L1–L3 Level 4 M3 L6 Level 4 M3 L15–L19 Level 4 M4 L1–L2</p>
	Plan and conduct a simple investigation and understand that different questions require different kinds of investigations.	<p>Level 4 M1 L6–L11 Level 4 M1 L21–L22 Level 4 M2 L6–L7 Level 4 M2 L10–L14 Level 4 M3 L15–L19 Level 4 M4 L7–L9 Level 4 M4 L14–L21</p>
	Use simple equipment (tools and other technologies) to gather data and understand that this allows scientists to collect more information than relying only on their senses to gather information.	<p>Level 4 M1 L3–L7 Level 4 M1 L12–L18 Level 4 M1 L21–L22 Level 4 M1 L25–L27 Level 4 M2 L4–L5 Level 4 M2 L15–L26 Level 4 M3 L4–L5 Level 4 M3 L24–L25 Level 4 M3 L29–L31 Level 4 M4 L14–L27</p>
	Use data/evidence to construct explanations and understand that scientists develop explanations based on their evidence and compare them with their current scientific knowledge.	<p>Level 4 M1 L3–L7 Level 4 M1 L12–L18 Level 4 M1 L21–L22 Level 4 M1 L25–L27 Level 4 M2 L4–L5</p>

		<p>Level 4 M2 L15–L26 Level 4 M3 L4–L5 Level 4 M3 L24–L25 Level 4 M3 L29–L31 Level 4 M4 L14–L27</p>
	<p>Communicate procedures and explanations giving priority to evidence and understanding that scientists make their results public, describe their investigations so they can be reproduced, and review and ask questions about the work of other scientists.</p>	<p>Level 4 M1 L3–L5 Level 4 M1 L23–L24 Level 4 M3 L4–L6 Level 4 M3 L10–L11 Level 4 M3 L20–L23 Level 4 M3 L26–L28 Level 4 M4 L22–L24</p>
<p>3.2 Physical Sciences: Chemistry and Physics</p>		
<p>3.2.A Chemistry</p>		
3.2.4.A1	<p>Identify and classify objects based on their observable and measurable physical properties.</p> <p>Compare and contrast solids, liquids, and gases based on their properties.</p>	<p>Level 5 M1 L5–L10 Level 5 M1 L23–L26</p>
3.2.4.A2	<p>Demonstrate that materials are composed of parts that are too small to be seen without magnification.</p>	<p>Level 5 M1 L5–L10 Level 5 M1 L23–L26</p>
3.2.4.A3	<p>Demonstrate the conservation of mass during physical changes such as melting or freezing.</p>	<p>Level 5 M1 L9–L17 Level 5 M1 L23–L26</p>
3.2.4.A4	<p>Recognize that combining two or more substances may make new materials with different properties.</p>	<p>Level 5 M1 L1–L2 Level 5 M1 L13–L26</p>
3.2.4.A5	<p>MODELS Use models to demonstrate the physical change as water goes from liquid to ice and from liquid to vapor.</p>	<p>Level 5 M3 L24–L27</p>
3.2.4.A6	<p>Distinguish between scientific fact and opinion.</p>	<p>Level 4 M3 L27</p>
	<p>Ask questions about objects, organisms, and events.</p>	<p>Level 4 M1 L1–L2 Level 4 M2 L1–L3 Level 4 M2 L8–L9 Level 4 M3 L1–L3 Level 4 M3 L6 Level 4 M3 L15–L19 Level 4 M4 L1–L2</p>
	<p>Understand that all scientific investigations involve asking and answering questions and comparing the answer with what is already known.</p>	<p>Level 4 M1 L1–L2 Level 4 M2 L1–L3 Level 4 M2 L8–L9 Level 4 M3 L1–L3 Level 4 M3 L6 Level 4 M3 L15–L19 Level 4 M4 L1–L2</p>
	<p>Plan and conduct a simple investigation and understand that different questions require different kinds of investigations.</p>	<p>Level 4 M1 L6–L11 Level 4 M1 L21–L22 Level 4 M2 L6–L7 Level 4 M2 L10–L14 Level 4 M3 L15–L19</p>

		Level 4 M4 L7–L9 Level 4 M4 L14–L21
	Use simple equipment (tools and other technologies) to gather data and understand that this allows scientists to collect more information than relying only on their senses to gather information.	Level 4 M1 L3–L7 Level 4 M1 L12–L18 Level 4 M1 L21–L22 Level 4 M1 L25–L27 Level 4 M2 L4–L5 Level 4 M2 L15–L26 Level 4 M3 L4–L5 Level 4 M3 L24–L25 Level 4 M3 L29–L31 Level 4 M4 L14–L27
	Use data/evidence to construct explanations and understand that scientists develop explanations based on their evidence and compare them with their current scientific knowledge.	Level 4 M1 L3–L7 Level 4 M1 L12–L18 Level 4 M1 L21–L22 Level 4 M1 L25–L27 Level 4 M2 L4–L5 Level 4 M2 L15–L26 Level 4 M3 L4–L5 Level 4 M3 L24–L25 Level 4 M3 L29–L31 Level 4 M4 L14–L27
	Communicate procedures and explanations giving priority to evidence and understanding that scientists make their results public, describe their investigations so they can be reproduced, and review and ask questions about the work of other scientists.	Level 4 M1 L3–L5 Level 4 M1 L23–L24 Level 4 M3 L4–L6 Level 4 M3 L10–L11 Level 4 M3 L20–L23 Level 4 M3 L26–L28 Level 4 M4 L22–L24
3.2.B Physics		
3.2.4.B1	Explain how an object’s change in motion can be observed and measured.	Level 3 M4 L1–L9 Level 3 M4 L28–L30
3.2.4.B2	Identify types of energy and their ability to be stored and changed from one form to another.	Level 4 M2 L1–L26
3.2.4.B3	Understand that objects that emit light often emit heat.	Level 4 M2 L4–L5 Level 4 M2 L10–L11 Level 4 M2 L24–L26
3.2.4.B4	Apply knowledge of basic electrical circuits to the design and construction of simple direct current circuits. Compare and contrast series and parallel circuits. Demonstrate that magnets have poles that repel and attract each other.	

3.2.4.B5	<p>Demonstrate how vibrating objects make sound and sound can make things vibrate.</p> <p>Demonstrate how light can be reflected, refracted, or absorbed by an object.</p>	<p>Level 4 M2 L10 Level 4 M4 L3–L8 Level 4 M4 L26</p>
3.2.4.B6	<p>ENERGY Give examples of how energy can be transformed from one form to another.</p>	<p>Level 4 M2 L1–L5 Level 4 M2 L10–L11 Level 4 M2 L24–L26</p>
3.2.4.B7	<p>Distinguish between scientific fact and opinion.</p>	<p>Level 4 M3 L27</p>
	<p>Ask questions about objects, organisms, and events.</p>	<p>Level 4 M1 L1–L2 Level 4 M2 L1–L3 Level 4 M2 L8–L9 Level 4 M3 L1–L3 Level 4 M3 L6 Level 4 M3 L15–L19 Level 4 M4 L1–L2</p>
	<p>Understand that all scientific investigations involve asking and answering questions and comparing the answer with what is already known.</p>	<p>Level 4 M1 L1–L2 Level 4 M2 L1–L3 Level 4 M2 L8–L9 Level 4 M3 L1–L3 Level 4 M3 L6 Level 4 M3 L15–L19 Level 4 M4 L1–L2</p>
	<p>Plan and conduct a simple investigation and understand that different questions require different kinds of investigations.</p>	<p>Level 4 M1 L6–L11 Level 4 M1 L21–L22 Level 4 M2 L6–L7 Level 4 M2 L10–L14 Level 4 M3 L15–L19 Level 4 M4 L7–L9 Level 4 M4 L14–L21</p>
	<p>Use simple equipment (tools and other technologies) to gather data and understand that this allows scientists to collect more information than relying only on their senses to gather information.</p>	<p>Level 4 M1 L3–L7 Level 4 M1 L12–L18 Level 4 M1 L21–L22 Level 4 M1 L25–L27 Level 4 M2 L4–L5 Level 4 M2 L15–L26 Level 4 M3 L4–L5 Level 4 M3 L24–L25 Level 4 M3 L29–L31 Level 4 M4 L14–L27</p>
	<p>Use data/evidence to construct explanations and understand that scientists develop explanations based on their evidence and compare them with their current scientific knowledge.</p>	<p>Level 4 M1 L3–L7 Level 4 M1 L12–L18 Level 4 M1 L21–L22 Level 4 M1 L25–L27 Level 4 M2 L4–L5 Level 4 M2 L15–L26 Level 4 M3 L4–L5 Level 4 M3 L24–L25 Level 4 M3 L29–L31 Level 4 M4 L14–L27</p>

	Communicate procedures and explanations giving priority to evidence and understanding that scientists make their results public, describe their investigations so they can be reproduced, and review and ask questions about the work of other scientists.	<p>Level 4 M1 L3–L5 Level 4 M1 L23–L24 Level 4 M3 L4–L6 Level 4 M3 L10–L11 Level 4 M3 L20–L23 Level 4 M3 L26–L28 Level 4 M4 L22–L24</p>
3.3 Earth and Space Sciences		
3.3.A Earth Structure, Processes, and Cycles		
3.3.4.A1	Describe basic landforms. Identify the layers of the earth. Recognize that the surface of the earth changes due to slow processes and rapid processes.	<p>Level 4 M1 L1–L5 Level 4 M1 L19 –L20 Level 4 M1 L25–L27</p>
3.3.4.A2	Identify basic properties and uses of Earth’s materials including rocks, soils, water, and gases of the atmosphere.	<p>Level 5 M3 L1–L13 Level 5 M3 L24–L27</p>
3.3.4.A3	Recognize that fossils provide evidence about the plants and animals that lived long ago and the nature of the environment at that time.	<p>Level 3 M2 L1–L8 Level 3 M2 L26–L28</p>
3.3.4.A4	Recognize Earth’s different water resources, including both fresh and saltwater. Describe phase changes in the forms of water on Earth.	<p>Level 5 M3 L4–L5 Level 5 M3 L19–L27</p>
3.3.4.A5	Describe basic weather elements. Identify weather patterns over time.	<p>Level 3 M1 L1–L15 Level 3 M1 L19–L20 Level 3 M1 L27–L29</p>
3.3.4.A6	MODELS/SCALE Identify basic landforms using models and simple maps.	<p>Level 4 M1 L18–L20 Level 4 M1 L25–L27</p>
	CONSTANCY/ CHANGE Identify simple changes in the earth system as air, water, soil, and rock interact.	<p>Level 5 M3 L1–L13 Level 5 M3 L24–L27</p>
	SCALE Explain how basic weather elements are measured.	<p>Level 3 M1 L1–L15 Level 3 M1 L19–L20 Level 3 M1 L27–L29</p>
3.3.4.A7	Distinguish between scientific fact and opinion.	Level 4 M3 L27
	Ask questions about objects, organisms, and events.	<p>Level 4 M1 L1–L2 Level 4 M2 L1–L3 Level 4 M2 L8–L9 Level 4 M3 L1–L3 Level 4 M3 L6 Level 4 M3 L15–L19 Level 4 M4 L1–L2</p>
	Understand that all scientific investigations involve asking and answering questions and comparing the answer with what is already known.	<p>Level 4 M1 L1–L2 Level 4 M2 L1–L3 Level 4 M2 L8–L9 Level 4 M3 L1–L3 Level 4 M3 L6</p>


		Level 4 M3 L15–L19 Level 4 M4 L1–L2
	Plan and conduct a simple investigation and understand that different questions require different kinds of investigations.	Level 4 M1 L6–L11 Level 4 M1 L21–L22 Level 4 M2 L6–L7 Level 4 M2 L10–L14 Level 4 M3 L15–L19 Level 4 M4 L7–L9 Level 4 M4 L14–L21
	Use simple equipment (tools and other technologies) to gather data and understand that this allows scientists to collect more information than relying only on their senses to gather information.	Level 4 M1 L3–L7 Level 4 M1 L12–L18 Level 4 M1 L21–L22 Level 4 M1 L25–L27 Level 4 M2 L4–L5 Level 4 M2 L15–L26 Level 4 M3 L4–L5 Level 4 M3 L24–L25 Level 4 M3 L29–L31 Level 4 M4 L14–L27
	Use data/evidence to construct explanations and understand that scientists develop explanations based on their evidence and compare them with their current scientific knowledge.	Level 4 M1 L3–L7 Level 4 M1 L12–L18 Level 4 M1 L21–L22 Level 4 M1 L25–L27 Level 4 M2 L4–L5 Level 4 M2 L15–L26 Level 4 M3 L4–L5 Level 4 M3 L24–L25 Level 4 M3 L29–L31 Level 4 M4 L14–L27
	Communicate procedures and explanations giving priority to evidence and understanding that scientists make their results public, describe their investigations so they can be reproduced, and review and ask questions about the work of other scientists.	Level 4 M1 L3–L5 Level 4 M1 L23–L24 Level 4 M3 L4–L6 Level 4 M3 L10–L11 Level 4 M3 L20–L23 Level 4 M3 L26–L28 Level 4 M4 L22–L24
3.3.B Origin and Evolution of the Universe		
3.3.4.B1	Identify planets in our solar system and their basic characteristics. Describe the earth’s place in the solar system that includes the sun (a star), planets, and many moons. Recognize that the universe contains many billions of galaxies and that each galaxy contains many billions of stars.	Level 5 M4 L18–L19 Level 5 M4 L24–L26
3.3.4.B2	SCALES Know the basic characteristics and uses of telescopes.	Level 5 M4 L7 Level 5 M4 L19
	PATTERNS/PHASES Identify major lunar phases.	Level 5 M4 L13–L17

	<p>PATTERNS Explain time (days, seasons) using solar system motions.</p>	<p>Level 5 M4 L1–L2 Level 5 M4 L5–L17 Level 5 M4 L20–L26</p>
3.3.4.B3	Distinguish between scientific fact and opinion.	Level 4 M3 L27
	Ask questions about objects, organisms, and events.	<p>Level 4 M1 L1–L2 Level 4 M2 L1–L3 Level 4 M2 L8–L9 Level 4 M3 L1–L3 Level 4 M3 L6 Level 4 M3 L15–L19 Level 4 M4 L1–L2</p>
	Understand that all scientific investigations involve asking and answering questions and comparing the answer with what is already known.	<p>Level 4 M1 L1–L2 Level 4 M2 L1–L3 Level 4 M2 L8–L9 Level 4 M3 L1–L3 Level 4 M3 L6 Level 4 M3 L15–L19 Level 4 M4 L1–L2</p>
	Plan and conduct a simple investigation and understand that different questions require different kinds of investigations.	<p>Level 4 M1 L6–L11 Level 4 M1 L21–L22 Level 4 M2 L6–L7 Level 4 M2 L10–L14 Level 4 M3 L15–L19 Level 4 M4 L7–L9 Level 4 M4 L14–L21</p>
	Use simple equipment (tools and other technologies) to gather data and understand that this allows scientists to collect more information than relying only on their senses to gather information.	<p>Level 4 M1 L3–L7 Level 4 M1 L12–L18 Level 4 M1 L21–L22 Level 4 M1 L25–L27 Level 4 M2 L4–L5 Level 4 M2 L15–L26 Level 4 M3 L4–L5 Level 4 M3 L24–L25 Level 4 M3 L29–L31 Level 4 M4 L14–L27</p>
	Use data/evidence to construct explanations and understand that scientists develop explanations based on their evidence and compare them with their current scientific knowledge.	<p>Level 4 M1 L3–L7 Level 4 M1 L12–L18 Level 4 M1 L21–L22 Level 4 M1 L25–L27 Level 4 M2 L4–L5 Level 4 M2 L15–L26 Level 4 M3 L4–L5 Level 4 M3 L24–L25 Level 4 M3 L29–L31 Level 4 M4 L14–L27</p>
	Communicate procedures and explanations giving priority to evidence and understanding that scientists make their results public, describe their investigations so they can be reproduced, and review and ask questions about the work of other scientists.	<p>Level 4 M1 L3–L5 Level 4 M1 L23–L24 Level 4 M3 L4–L6 Level 4 M3 L10–L11 Level 4 M3 L20–L23</p>

		Level 4 M3 L26–L28 Level 4 M4 L22–L24
3.4 Technology and Engineering Education		
3.4.A The Scope of Technology		
3.4.4.A1	Understand that tools, materials, and skills are used to make things and carry out tasks.	Level 5 M2 L8–L9 Level 5 M4 L5–L8 Level 5 M4 L14–L15
3.4.4.A2	Understand that systems have parts and components that work together.	Level 4 M1 L1–L2 Level 4 M1 L12–L17 Level 4 M1 L21–L24 Level 4 M2 L1–L11 Level 4 M2 L15–L26 Level 4 M3 L7–L9 Level 4 M3 L15–L19 Level 4 M3 L21–L23 Level 4 M3 L26–L28 Level 4 M4 L1–L6 Level 4 M4 L10–L27
3.4.4.A3	Describe how various relationships exist between technology and other fields.	Level 4 M1 L12–L17 Level 4 M1 L23–L24 Level 4 M2 L15–L23 Level 4 M4 L23–L27
3.4.B Technology and Society		
3.4.4.B1	Describe how technology affects humans in various ways.	Level 4 M1 L12–L17 Level 4 M1 L23–L24 Level 4 M2 L15–L23 Level 4 M4 L14–L17
3.4.4.B2	Explain how the use of technology affects the environment in good and bad ways.	Level 4 M1 L12–L17 Level 4 M1 L23–L24 Level 4 M2 L15–L23 Level 4 M4 L14–L17
3.4.4.B3	Explain why new technologies are developed and old ones are improved in terms of needs and wants.	Level 4 M1 L12–L17 Level 4 M1 L23–L24 Level 4 M2 L15–L23 Level 4 M4 L14–L17
3.4.4.B4	Describe how the history of civilization is linked closely to technological development.	Level 4 M1 L12–L17 Level 4 M1 L23–L24 Level 4 M2 L15–L23 Level 4 M4 L14–L17
3.4.C Technology and Engineering Design		
3.4.4.C1	Understand that there is no perfect design.	Level 4 M2 L17–L23
3.4.4.C2	Describe the engineering design process: Define a problem. Generate ideas. Select a solution and test it. Make the item. Evaluate the item. Communicate the solution with others. Present the results.	Level 4 M1 L12–L17 Level 4 M4 L22–L24
3.4.4.C3	Explain how asking questions and making observations help a person understand how things work and can be repaired.	Level 4 M1 L1–L2 Level 4 M2 L1–L3 Level 4 M2 L8–L9

			Level 4 M3 L1–L3 Level 4 M3 L6 Level 4 M3 L15–L19 Level 4 M4 L1–L2
3.4.D Abilities for a Technological World			
3.4.4.D1	Investigate how things are made and how they can be improved.		Level 4 M1 L12–L17 Level 4 M4 L22–L24
3.4.4.D2	Recognize and use everyday symbols (e.g., icons, simple electrical symbols measurement) to communicate key ideas. Identify and use simple hand tools (e.g., hammer, scale) correctly and safely.		Level 3 M2 L13 Level 3 M3 L12–L13 Level 4 M1 L15 Level 4 M2 L8 Level 5 M1 L3 Level 5 M1 L5 Level 5 M1 L13–L16 Level 5 M2 L3–L5 Level 5 M2 L10 Level 5 M2 L18 Level 5 M3 L11 Level 5 M3 L14–L15
3.4.4.D3	Investigate and assess the influence of a specific technology or system on the individual, family, community, and environment.		Level 4 M1 L12–L17 Level 4 M1 L23–L24 Level 4 M2 L15–L23 Level 4 M4 L14–L17
3.4.E The Designed World			
3.4.4.E1	Identify tools and devices that have been designed to provide information about a healthy lifestyle.		
3.4.4.E2	Identify the technologies in agriculture that make it possible for food to be available year round.		
3.4.4.E3	Identify types of energy and the importance of energy conservation.		Level 4 M2 L1–L26
3.4.4.E4	Explain how information and communication systems allow information to be transferred from human to human.		Level 4 M4 L18–L27
3.4.4.E5	Recognize that a transportation system has many parts that work together to help people travel and to move goods from place to place.		
3.4.4.E6	Identify key aspects of manufacturing processes (designing products, gathering resources, and using tools to separate, form, and combine materials in order to produce products).		
3.4.4.E7	Understand that structures rest on foundations and that some structures are temporary, while others are permanent.		

Pennsylvania Standards of Excellence 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 Pennsylvania Standards of Excellence are partially covered in the *PhD Science* curriculum. A detailed analysis of alignment appears in the table below.

Grade 5 Standards		Aligned <i>PhD Science</i> Lessons
3.1 Biological Sciences		
3.1.A Organisms and Cells		
3.1.5.A2	Describe how life on earth depends on energy from the sun.	 Level 5 M2 L6–L7 Level 5 M2 L15–L19 Level 5 M2 L24–L26
3.1.5.A3	Compare and contrast the similarities and differences in life cycles of different organisms.	 Level 3 M3 L7–L8 Level 3 M3 L23–L28
3.1.5.A5	Explain the concept of a cell as the basic unit of life. Compare and contrast plant and animal cells.	
3.1.5.A9	Understand how theories are developed.	
	Identify questions that can be answered through scientific investigations and evaluate the appropriateness of questions.	 Level 5 M1 L1–L2 Level 5 M2 L1–L2 Level 5 M2 L21–L23 Level 5 M3 L1–L3 Level 5 M3 L19–L23 Level 5 M4 L1–L2 Level 5 M4 L13
	Design and conduct a scientific investigation and understand that current scientific knowledge guides scientific investigations.	 Level 5 M1 L13–L14 Level 5 M1 L18–L22 Level 5 M2 L3–L5 Level 5 M3 L10–L11 Level 5 M4 L5–L6 Level 5 M4 L18–L19
3.1.5.A9	Describe relationships using inference and prediction.	 Level 5 M1 L1–L2 Level 5 M2 L1–L2 Level 5 M2 L21–L23 Level 5 M3 L1–L3

		Level 5 M3 L19–L23 Level 5 M4 L1–L2 Level 5 M4 L13
	Use appropriate tools and technologies to gather, analyze, and interpret data and understand that it enhances accuracy and allows scientists to analyze and quantify results of investigations.	Level 5 M2 L8–L9 Level 5 M4 L5–L8 Level 5 M4 L14–L15
	Develop descriptions, explanations, and models using evidence and understand that these emphasize evidence, have logically consistent arguments, and are based on scientific principles, models, and theories.	Level 5 M1 L3–L4 Level 5 M2 L3–L5 Level 5 M2 L8–L11 Level 5 M2 L21–L23 Level 5 M3 L19–L23 Level 5 M4 L5–L6 Level 5 M4 L13–L17 Level 5 M4 L20–L21 Level 5 M4 L24–L26
	Analyze alternative explanations and understanding that science advances through legitimate skepticism.	Level 5 M4 L14–L15
	Use mathematics in all aspects of scientific inquiry.	Level 5 M1 L3–L4 Level 5 M1 L15–L17 Level 5 M3 L10–L11 Level 5 M3 L24–L27 Level 5 M4 L5–L6 Level 5 M4 L14–L15
	Understand that scientific investigations may result in new ideas for study, new methods, or procedures for an investigation or new technologies to improve data collection.	Level 5 M2 L21–L23 Level 5 M3 L6–L8 Level 5 M3 L19–L23
3.1.B Genetics		
3.1.5.B1	Differentiate between inherited and acquired characteristics of plants and animals.	Level 3 M3 L1–L6 Level 3 M3 L14–L18 Level 3 M3 L21–L28
3.1.5.B6	Understand how theories are developed.	
	Identify questions that can be answered through scientific investigations and evaluate the appropriateness of questions.	Level 5 M1 L1–L2 Level 5 M2 L1–L2 Level 5 M2 L21–L23 Level 5 M3 L1–L3 Level 5 M3 L19–L23 Level 5 M4 L1–L2 Level 5 M4 L13
	Design and conduct a scientific investigation and understand that current scientific knowledge guides scientific investigations.	Level 5 M1 L13–L14 Level 5 M1 L18–L22 Level 5 M2 L3–L5 Level 5 M3 L10–L11 Level 5 M4 L5–L6 Level 5 M4 L18–L19
	Describe relationships using inference and prediction.	Level 5 M1 L1–L2 Level 5 M2 L1–L2 Level 5 M2 L21–L23 Level 5 M3 L1–L3 Level 5 M3 L19–L23 Level 5 M4 L1–L2

		Level 5 M4 L13
	Use appropriate tools and technologies to gather, analyze, and interpret data and understand that it enhances accuracy and allows scientists to analyze and quantify results of investigations.	Level 5 M2 L8–L9 Level 5 M4 L5–L8 Level 5 M4 L14–L15
	Develop descriptions, explanations, and models using evidence and understand that these emphasize evidence, have logically consistent arguments, and are based on scientific principles, models, and theories.	Level 5 M1 L3–L4 Level 5 M2 L3–L5 Level 5 M2 L8–L11 Level 5 M2 L21–L23 Level 5 M3 L19–L23 Level 5 M4 L5–L6 Level 5 M4 L13–L17 Level 5 M4 L20–L21 Level 5 M4 L24–L26
	Analyze alternative explanations and understanding that science advances through legitimate skepticism.	Level 5 M4 L14–L15
	Use mathematics in all aspects of scientific inquiry.	Level 5 M1 L3–L4 Level 5 M1 L15–L17 Level 5 M3 L10–L11 Level 5 M3 L24–L27 Level 5 M4 L5–L6 Level 5 M4 L14–L15
	Understand that scientific investigations may result in new ideas for study, new methods, or procedures for an investigation or new technologies to improve data collection.	Level 5 M2 L21–L23 Level 5 M3 L6–L8 Level 5 M3 L19–L23
3.1.C Evolution		
3.1.5.C1	Describe how organisms meet some of their needs in an environment by using behaviors (patterns of activities) in response to information (stimuli) received from the environment.	Level 3 M3 L9–L13 Level 3 M3 L19–L20 Level 3 M3 L26–L28
3.1.5.C2	Give examples of how inherited characteristics (e.g., shape of beak, length of neck, location of eyes, shape of teeth) may change over time as adaptations to changes in the environment that enable organisms to survive.	Level 3 M2 L1–L2 Level 3 M2 L9–L12 Level 3 M2 L16–L19 Level 3 M2 L22–L28
3.1.5.C4	Understand how theories are developed.	
	Identify questions that can be answered through scientific investigations and evaluate the appropriateness of questions.	Level 5 M1 L1–L2 Level 5 M2 L1–L2 Level 5 M2 L21–L23 Level 5 M3 L1–L3 Level 5 M3 L19–L23 Level 5 M4 L1–L2 Level 5 M4 L13
	Design and conduct a scientific investigation and understand that current scientific knowledge guides scientific investigations.	Level 5 M1 L13–L14 Level 5 M1 L18–L22 Level 5 M2 L3–L5 Level 5 M3 L10–L11 Level 5 M4 L5–L6 Level 5 M4 L18–L19
	Describe relationships using inference and prediction.	Level 5 M1 L1–L2 Level 5 M2 L1–L2 Level 5 M2 L21–L23 Level 5 M3 L1–L3

			Level 5 M3 L19–L23 Level 5 M4 L1–L2 Level 5 M4 L13
	Use appropriate tools and technologies to gather, analyze, and interpret data and understand that it enhances accuracy and allows scientists to analyze and quantify results of investigations.		Level 5 M2 L8–L9 Level 5 M4 L5–L8 Level 5 M4 L14–L15
	Develop descriptions, explanations, and models using evidence and understand that these emphasize evidence, have logically consistent arguments, and are based on scientific principles, models, and theories.		Level 5 M1 L3–L4 Level 5 M2 L3–L5 Level 5 M2 L8–L11 Level 5 M2 L21–L23 Level 5 M3 L19–L23 Level 5 M4 L5–L6 Level 5 M4 L13–L17 Level 5 M4 L20–L21 Level 5 M4 L24–L26
	Analyze alternative explanations and understanding that science advances through legitimate skepticism.		Level 5 M4 L14–L15
	Use mathematics in all aspects of scientific inquiry.		Level 5 M1 L3–L4 Level 5 M1 L15–L17 Level 5 M3 L10–L11 Level 5 M3 L24–L27 Level 5 M4 L5–L6 Level 5 M4 L14–L15
	Understand that scientific investigations may result in new ideas for study, new methods, or procedures for an investigation or new technologies to improve data collection.		Level 5 M2 L21–L23 Level 5 M3 L6–L8 Level 5 M3 L19–L23
3.2 Physical Sciences: Chemistry and Physics			
3.2.A Chemistry			
3.2.5.A1	Describe how water can be changed from one state to another by adding or taking away heat.		Level 5 M3 L24–L27
3.2.5.A6 3	Understand how theories are developed.		
	Identify questions that can be answered through scientific investigations and evaluate the appropriateness of questions.		Level 5 M1 L1–L2 Level 5 M2 L1–L2 Level 5 M2 L21–L23 Level 5 M3 L1–L3 Level 5 M3 L19–L23 Level 5 M4 L1–L2 Level 5 M4 L13
	Design and conduct a scientific investigation and understand that current scientific knowledge guides scientific investigations.		Level 5 M1 L13–L14 Level 5 M1 L18–L22 Level 5 M2 L3–L5 Level 5 M3 L10–L11 Level 5 M4 L5–L6 Level 5 M4 L18–L19
	Describe relationships using inference and prediction.		Level 5 M1 L1–L2 Level 5 M2 L1–L2 Level 5 M2 L21–L23 Level 5 M3 L1–L3 Level 5 M3 L19–L23 Level 5 M4 L1–L2

		Level 5 M4 L13
	Use appropriate tools and technologies to gather, analyze, and interpret data and understand that it enhances accuracy and allows scientists to analyze and quantify results of investigations.	Level 5 M2 L8–L9 Level 5 M4 L5–L8 Level 5 M4 L14–L15
	Develop descriptions, explanations, and models using evidence and understand that these emphasize evidence, have logically consistent arguments, and are based on scientific principles, models, and theories.	Level 5 M1 L3–L4 Level 5 M2 L3–L5 Level 5 M2 L8–L11 Level 5 M2 L21–L23 Level 5 M3 L19–L23 Level 5 M4 L5–L6 Level 5 M4 L13–L17 Level 5 M4 L20–L21 Level 5 M4 L24–L26
	Analyze alternative explanations and understanding that science advances through legitimate skepticism.	Level 5 M4 L14–L15
	Use mathematics in all aspects of scientific inquiry.	Level 5 M1 L3–L4 Level 5 M1 L15–L17 Level 5 M3 L10–L11 Level 5 M3 L24–L27 Level 5 M4 L5–L6 Level 5 M4 L14–L15
	Understand that scientific investigations may result in new ideas for study, new methods, or procedures for an investigation or new technologies to improve data collection.	Level 5 M2 L21–L23 Level 5 M3 L6–L8 Level 5 M3 L19–L23
3.2.B Physics		
3.2.5.B1	Explain how mass of an object resists change to motion.	Level 3 M4 L10–L18 Level 3 M4 L28–L30
3.2.5.B2	Examine how energy can be transferred from one form to another.	Level 5 M1 L5–L8 Level 5 M1 L13–L14 Level 5 M1 L23–L26 Level 5 M2 L6–L11 Level 5 M2 L14–L19 Level 5 M2 L24–L26 Level 5 M3 L10–L11 Level 5 M4 L3–L4
3.2.5.B3	Demonstrate how heat energy is usually a byproduct of an energy transformation.	Level 4 M2 L4–L5 Level 4 M2 L8–L11
3.2.5.B4	Demonstrate how electrical circuits provide a means of transferring electrical energy when heat, light, sound, and chemical changes are produced. Demonstrate how electromagnets can be made and used.	Level 4 M2 L2 Level 4 M2 L4–L6 Level 4 M2 L10–L11
3.2.5.B5	Compare the characteristics of sound as it is transmitted through different materials. Relate the rate of vibration to the pitch of the sound.	Level 4 M2 L10
3.2.5.B7	Understand how theories are developed. Identify questions that can be answered through scientific investigations and evaluate the appropriateness of questions.	Level 5 M1 L1–L2 Level 5 M2 L1–L2

		Level 5 M2 L21–L23 Level 5 M3 L1–L3 Level 5 M3 L19–L23 Level 5 M4 L1–L2 Level 5 M4 L13
	Design and conduct a scientific investigation and understand that current scientific knowledge guides scientific investigations.	Level 5 M1 L13–L14 Level 5 M1 L18–L22 Level 5 M2 L3–L5 Level 5 M3 L10–L11 Level 5 M4 L5–L6 Level 5 M4 L18–L19
	Describe relationships using inference and prediction.	Level 5 M1 L1–L2 Level 5 M2 L1–L2 Level 5 M2 L21–L23 Level 5 M3 L1–L3 Level 5 M3 L19–L23 Level 5 M4 L1–L2 Level 5 M4 L13
	Use appropriate tools and technologies to gather, analyze, and interpret data and understand that it enhances accuracy and allows scientists to analyze and quantify results of investigations.	Level 5 M2 L8–L9 Level 5 M4 L5–L8 Level 5 M4 L14–L15
	Develop descriptions, explanations, and models using evidence and understand that these emphasize evidence, have logically consistent arguments, and are based on scientific principles, models, and theories.	Level 5 M1 L3–L4 Level 5 M2 L3–L5 Level 5 M2 L8–L11 Level 5 M2 L21–L23 Level 5 M3 L19–L23 Level 5 M4 L5–L6 Level 5 M4 L13–L17 Level 5 M4 L20–L21 Level 5 M4 L24–L26
	Analyze alternative explanations and understanding that science advances through legitimate skepticism.	Level 5 M4 L14–L15
	Use mathematics in all aspects of scientific inquiry.	Level 5 M1 L3–L4 Level 5 M1 L15–L17 Level 5 M3 L10–L11 Level 5 M3 L24–L27 Level 5 M4 L5–L6 Level 5 M4 L14–L15
	Understand that scientific investigations may result in new ideas for study, new methods, or procedures for an investigation or new technologies to improve data collection.	Level 5 M2 L21–L23 Level 5 M3 L6–L8 Level 5 M3 L19–L23
3.3 Earth and Space Sciences		
3.3.A Earth Structure, Processes, and Cycles		
3.3.5.A1	Describe how landforms are the result of a combination of destructive forces such as erosion and constructive erosion, deposition of sediment, etc.	Level 4 M1 L6–L11 Level 4 M1 L25–L27
3.3.5.A2	Describe the usefulness of Earth’s physical resources as raw materials for the human made world.	

3.3.5.A3	Explain how geological processes observed today such as erosion, movement of lithospheric plates, and changes in the composition of the atmosphere are similar to those in the past.	Level 4 M1 L6–L11 Level 4 M1 L25–L27
3.3.5.A4	Explain the basic components of the water cycle.	Level 5 M3 L8
3.3.5.A5	Differentiate between weather and climate. Explain how the cycling of water, both in and out of the atmosphere, has an effect on climate.	Level 5 M3 L1–L13 Level 5 M3 L24–L27
3.3.5.A7	Understand how theories are developed.	
	Identify questions that can be answered through scientific investigations and evaluate the appropriateness of questions.	Level 5 M1 L1–L2 Level 5 M2 L1–L2 Level 5 M2 L21–L23 Level 5 M3 L1–L3 Level 5 M3 L19–L23 Level 5 M4 L1–L2 Level 5 M4 L13
	Design and conduct a scientific investigation and understand that current scientific knowledge guides scientific investigations.	Level 5 M1 L13–L14 Level 5 M1 L18–L22 Level 5 M2 L3–L5 Level 5 M3 L10–L11 Level 5 M4 L5–L6 Level 5 M4 L18–L19
	Describe relationships using inference and prediction.	Level 5 M1 L1–L2 Level 5 M2 L1–L2 Level 5 M2 L21–L23 Level 5 M3 L1–L3 Level 5 M3 L19–L23 Level 5 M4 L1–L2 Level 5 M4 L13
	Use appropriate tools and technologies to gather, analyze, and interpret data and understand that it enhances accuracy and allows scientists to analyze and quantify results of investigations.	Level 5 M2 L8–L9 Level 5 M4 L5–L8 Level 5 M4 L14–L15
	Develop descriptions, explanations, and models using evidence and understand that these emphasize evidence, have logically consistent arguments, and are based on scientific principles, models, and theories.	Level 5 M1 L3–L4 Level 5 M2 L3–L5 Level 5 M2 L8–L11 Level 5 M2 L21–L23 Level 5 M3 L19–L23 Level 5 M4 L5–L6 Level 5 M4 L13–L17 Level 5 M4 L20–L21 Level 5 M4 L24–L26
	Analyze alternative explanations and understanding that science advances through legitimate skepticism.	Level 5 M4 L14–L15
	Use mathematics in all aspects of scientific inquiry.	Level 5 M1 L3–L4 Level 5 M1 L15–L17 Level 5 M3 L10–L11 Level 5 M3 L24–L27 Level 5 M4 L5–L6 Level 5 M4 L14–L15

	Understand that scientific investigations may result in new ideas for study, new methods, or procedures for an investigation or new technologies to improve data collection.	Level 5 M2 L21–L23 Level 5 M3 L6–L8 Level 5 M3 L19–L23
3.3.B Origin and Evolution of the Universe		
3.3.5.B1	Provide evidence that the earth revolves around (orbits) the sun in a year’s time and that the earth rotates on its axis once approximately every 24 hours.	Level 5 M4 L1–L2 Level 5 M4 L5–L17 Level 5 M4 L20–L26
3.3.5.B3	Understand how theories are developed.	
	Identify questions that can be answered through scientific investigations and evaluate the appropriateness of questions.	Level 5 M1 L1–L2 Level 5 M2 L1–L2 Level 5 M2 L21–L23 Level 5 M3 L1–L3 Level 5 M3 L19–L23 Level 5 M4 L1–L2 Level 5 M4 L13
	Design and conduct a scientific investigation and understand that current scientific knowledge guides scientific investigations.	Level 5 M1 L13–L14 Level 5 M1 L18–L22 Level 5 M2 L3–L5 Level 5 M3 L10–L11 Level 5 M4 L5–L6 Level 5 M4 L18–L19
	Describe relationships using inference and prediction.	Level 5 M1 L1–L2 Level 5 M2 L1–L2 Level 5 M2 L21–L23 Level 5 M3 L1–L3 Level 5 M3 L19–L23 Level 5 M4 L1–L2 Level 5 M4 L13
	Use appropriate tools and technologies to gather, analyze, and interpret data and understand that it enhances accuracy and allows scientists to analyze and quantify results of investigations.	Level 5 M2 L8–L9 Level 5 M4 L5–L8 Level 5 M4 L14–L15
	Develop descriptions, explanations, and models using evidence and understand that these emphasize evidence, have logically consistent arguments, and are based on scientific principles, models, and theories.	Level 5 M1 L3–L4 Level 5 M2 L3–L5 Level 5 M2 L8–L11 Level 5 M2 L21–L23 Level 5 M3 L19–L23 Level 5 M4 L5–L6 Level 5 M4 L13–L17 Level 5 M4 L20–L21 Level 5 M4 L24–L26
	Analyze alternative explanations and understanding that science advances through legitimate skepticism.	Level 5 M4 L14–L15
	Use mathematics in all aspects of scientific inquiry.	Level 5 M1 L3–L4 Level 5 M1 L15–L17 Level 5 M3 L10–L11 Level 5 M3 L24–L27 Level 5 M4 L5–L6 Level 5 M4 L14–L15

	Understand that scientific investigations may result in new ideas for study, new methods, or procedures for an investigation or new technologies to improve data collection.		Level 5 M2 L21–L23 Level 5 M3 L6–L8 Level 5 M3 L19–L23
3.4 Technology and Engineering Education			
3.4.A The Scope of Technology			
3.4.5.A1	Explain how people use tools and techniques to help them do things.		Level 5 M2 L8–L9 Level 5 M4 L5–L6
3.4.5.A2	Understand that a subsystem is a system that operates as part of a larger system.		Level 5 M3 L24–L27
3.4.5.A3	Describe how technologies are often combined.		Level 4 M1 L12–L17 Level 4 M1 L23–L24 Level 4 M2 L15–L23 Level 4 M4 L14–L17
3.4.B Technology and Society			
3.4.5.B1	Explain how the use of technology can have unintended consequences.		
3.4.5.B2	Describe how waste may be appropriately recycled or disposed of to prevent unnecessary harm to the environment.		
3.4.5.B3	Describe how community concerns support or limit technological developments.		
3.4.5.B4	Identify how the way people live and work has changed history in terms of technology.		Level 4 M1 L12–L17 Level 4 M1 L23–L24 Level 4 M2 L15–L23 Level 4 M4 L14–L17
3.4.C Technology and Engineering Design			
3.4.5.C1	Explain how the design process is a purposeful method of planning practical solutions to problems.		Level 5 M3 L19–L23
3.4.5.C2	Describe how design, as a dynamic process of steps, can be performed in different sequences and repeated.		Level 5 M1 L1–L2 Level 5 M2 L1–L2 Level 5 M2 L21–L23 Level 5 M3 L1–L3 Level 5 M3 L19–L23 Level 5 M4 L1–L2 Level 5 M4 L13
3.4.5.C3	Identify how invention and innovation are creative ways to turn ideas into real things.		Level 5 M2 L21–L23 Level 5 M3 L19–L23 Level 5 M4 L1
3.4.D Abilities for a Technological World			
3.4.5.D1	Identify ways to improve a design solution.		Level 5 M1 L18–L22
3.4.5.D2	Use information provided in manuals, protocols, or by experienced people to see and understand how things work.		
3.4.5.D3	Determine if the human use of a product or system creates positive or negative results.		Level 5 M2 L21–L23 Level 5 M3 L19–L23 Level 5 M4 L7–L8
3.4.E The Designed World			
3.4.5.E1	Identify how technological advances have made it possible to create new devices and to repair or replace certain parts of the human body.		

3.4.5.E2	Understand that there are many different tools necessary to maintain an ecosystem, whether natural or man-made.		Level 5 M3 L14–L27
3.4.5.E3	Explain how tools, machines, products, and systems use energy in order to do work.		Level 4 M2 L1–L26
3.4.5.E4	Describe how the use of symbols, measurements, and drawings promotes clear communication by providing a common language to express ideas.		Level 5 M2 L6–L7 Level 5 M2 L10–L11 Level 5 M2 L18–L20 Level 5 M3 L9 Level 5 M3 L14–L16 Level 5 M3 L19–L27 Level 5 M4 L18–L19
3.4.5.E5	Examine reasons why a transportation system may lose efficiency or fail (e.g., one part is missing or malfunctioning or if a subsystem is not working).		
3.4.5.E6	Examine how manufacturing technologies have become an integral part of the engineered world.		
3.4.5.E7	Describe the importance of guidelines when planning a community.		Level 3 M1 L21–L22 Level 4 M2 L1–L3 Level 4 M2 L16–L26 Level 5 M1 L1 Level 5 M3 L23