Cross-Content Standards Addressed

Level K

Texas Essential Knowledge and Skills

English Language Development

PhD Science® Texas follows an integrated approach to science instruction. The science that students learn as they make sense of authentic phenomena becomes the content for meaningful application of English language arts and reading (ELAR) skills. Many of these ELAR skills are required to gather evidence, construct sound scientific arguments, and communicate scientific explanations effectively. Some of the most common applications of ELAR skills in the *PhD Science Texas* curriculum are highlighted in the following sections.

DEVELOPING AND SUSTAINING FOUNDATIONAL LANGUAGE SKILLS: *listening, speaking, discussion, and thinking—oral language*

Students apply and develop oral language skills as they engage in scientific discourse. During instructional routines such as Think–Pair–Share, Inside–Outside Circles, and Link Up, students develop social communication skills while they work collaboratively by actively listening and sharing scientific ideas. Students further apply these skills during key knowledge-distilling moments such as Socratic Seminars, the Share stage of the engineering design process, assessment debriefs, investigations, and anchor model updates.

COMPREHENSION SKILLS: *listening, speaking, reading, writing, and thinking using multiple texts*

Students apply and develop metacognitive skills to deepen comprehension as they make sense of scientific phenomena. *PhD Science Texas* uses authentic texts in lessons to highlight coherence and build knowledge while allowing students to experience meaningful connections across content areas. Early elementary PhD Science Texas modules also have Knowledge Deck™ posters and accompanying Knowledge Deck cards, which feature vibrant images and carefully crafted, engaging, and accessible informational text. Before students engage with texts (written texts, videos, audio recordings, and artwork), they may establish a purpose for reading, generate questions, and make predictions. Students also make connections, infer, and synthesize information to uncover and distill new science knowledge.

INQUIRY AND RESEARCH: *listening, speaking, reading, writing, and thinking using multiple texts*

Students apply and develop writing and research skills as they build and communicate scientific knowledge. As students observe and discuss various sources, they generate questions for inquiry and identify relevant sources of information to answer the questions. These questions are added to a driving question board or used to develop a Phenomenon Question that drives student learning. Students make their thinking visible through drawing or writing. Students draft and revise their ideas many times throughout the learning cycle. Evidence of students' thinking can be found on anchor charts, anchor models, and Science Logbook pages. Through structured conversations, such as the Share stage of the engineering design process, students use appropriate modes of delivery to present their scientific ideas.

Level K Modules and Spotlight Lessons

M1 **Weather** WITH SPOTLIGHT LESSONS ON **Magnets**

M2 **Life**

M3 **Light** WITH SPOTLIGHT LESSONS ON **the Sky**

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
K.1A	Listen actively and ask questions to understand information and answer questions using multi-word responses.	**M1** L2, L3, L4, L6, L8, L9, L10, L16, L17, L20, L23, L24, L26, L30 **M1 SL** L4 **M2** L2, L4, L5, L10, L17, L20, L22, L24, L25, L28, L31, L36 **M3** L3, L8, L12, L13, L15, L19, L24 **M3 SL** L2, L3, L11
K.1B	Restate and follow oral directions that involve a short, related sequence of actions.	**M1** L1, L6, L7, L8, L14, L20 **M1 SL** L1, L2, L6 **M2** L4, L17, L22, L24 **M3** L6, L13, L19 **M3 SL** L3, L7
K.1C	Share information and ideas by speaking audibly and clearly using the conventions of language.	**M1** L2, L3, L6, L7, L10, L11, L16, L17, L20, L21, L23, L24, L26, L28, L30 **M1 SL** L1, L2, L3, L4, L8 **M2** L2, L4, L5, L10, L11, L17, L20, L24, L25, L26, L28, L31, L34, L36 **M3** L3, L8, L12, L15, L19, L21, L22, L24 **M3 SL** L2, L3, L7, L11
K.1D	Work collaboratively with others by following agreed-upon rules for discussion, including taking turns.	**M1** L1, L2, L3, L6, L7, L8, L10, L13, L14, L16, L20, L22, L25, L26, L28, L30 **M1 SL** L3, L6, L8 **M2** L4, L10, L17, L20, L22, L28, L34, L36 **M3** L3, L6, L12, L13, L17, L19, L22, L24 **M3 SL** L2, L3, L7, L11
K.1E	Develop social communication such as introducing himself/herself, using common greetings, and expressing needs and wants.	**M1** L28 **M2** L24, L34 **M3** L22

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
K.2A	Demonstrate phonological awareness by: (i) identifying and producing rhyming words, (ii) recognizing spoken alliteration or groups of words that begin with the same spoken onset or initial sound, (iii) identifying the individual words in a spoken sentence, (iv) identifying syllables in spoken words, (v) blending syllables to form multisyllabic words, (vi) segmenting multisyllabic words into syllables, (vii) blending spoken onsets and rimes to form simple words, (viii) blending spoken phonemes to form one-syllable words, (ix) manipulating syllables within a multisyllabic word, and (x) segmenting spoken one-syllable words into individual phonemes.	N/A
K.2B	Demonstrate and apply phonetic knowledge by: (i) identifying and matching the common sounds that letters represent; (ii) using letter-sound relationships to decode, including VC, CVC, CCVC, and CVCC words; (iii) recognizing that new words are created when letters are changed, added, or deleted such as it - pit - tip - tap; and (iv) identifying and reading at least 25 high-frequency words from a research-based list.	N/A
K.2C	Demonstrate and apply spelling knowledge by: (i) spelling words with VC, CVC, and CCVC; (ii) spelling words using sound-spelling patterns; and (iii) spelling high-frequency words from a research-based list.	N/A
K.2D	Demonstrate print awareness by: (i) identifying the front cover, back cover, and title page of a book; (ii) holding a book right side up, turning pages correctly, and knowing that reading moves from top to bottom and left to right with return sweep; (iii) recognizing that sentences are comprised of words separated by spaces and recognizing word boundaries; (iv) recognizing the difference between a letter and a printed word; and (v) identifying all uppercase and lowercase letters.	N/A
K.2E	Develop handwriting by accurately forming all uppercase and lowercase letters using appropriate directionality.	N/A
K.3A	Use a resource such as a picture dictionary or digital resource to find words.	N/A
K.3B	Use illustrations and texts the student is able to read or hear to learn or clarify word meanings.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
K.3C	Identify and use words that name actions; directions; positions; sequences; categories such as colors, shapes, and textures; and locations.	**M1** L6, L13 **M2** L32 **M3** L2, L17 **M3 SL** L3
K.4	Self-select text and interact independently with text for increasing periods of time.	N/A
K.5A	Establish purpose for reading assigned and self-selected texts with adult assistance.	**M2** L25, L35 **M3 SL** L1
K.5B	Generate questions about text before, during, and after reading to deepen understanding and gain information with adult assistance.	**M1** L2, L29 **M3** L4, L23
K.5C	Make and confirm predictions using text features and structures with adult assistance.	**M2** L25 **M3** L4, L7
K.5D	Create mental images to deepen understanding with adult assistance.	**M1** L2, L5, L20 **M2** L4, L25, L29 **M3** L23
K.5E	Make connections to personal experiences, ideas in other texts, and society with adult assistance.	**M1** L1, L4, L5, L8, L16, L17, L18, L20, L22, L24, L30 **M1 SL** L1, L2, L4 **M2** L2, L3, L13, L19, L20, L27, L33, L36 **M3** L1, L10, L14, L23, L24 **M3 SL** L1, L2, L5, L11
K.5F	Make inferences and use evidence to support understanding with adult assistance.	**M1** L12, L17, L22, L23, L24, L29 **M2** L4, L5, L12, L21, L27 **M3** L7, L8, L16 **M3 SL** L2, L3, L5, L8
K.5G	Evaluate details to determine what is most important with adult assistance.	**M2** L5, L14, L21
K.5H	Synthesize information to create new understanding with adult assistance.	**M1** L2, L3, L4, L8, L9, L11, L16, L17, L20, L21, L23, L24, L25, L26, L27 **M1 SL** L3, L8 **M2** L3, L5, L10, L12, L14, L18, L19, L22, L25, L26, L27, L28, L31, L33 **M3** L2, L6, L7, L8, L9, L11, L12, L14, L17, L19, L20, L21 **M3 SL** L2, L3, L6, L7, L8

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
K.5I	Monitor comprehension and make adjustments such as re-reading, using background knowledge, checking for visual cues, and asking questions when understanding breaks down with adult assistance.	**M1** L29 **M3** L7
K.6A	Describe personal connections to a variety of sources.	N/A
K.6B	Provide an oral, pictorial, or written response to a text.	**M1** L27 **M2** L35 **M3** L4 **M3 SL** L1
K.6C	Use text evidence to support an appropriate response.	**M1** L2, L27, L29 **M2** L5, L15, L16, L25, L27, L30, L35 **M3** L4, L7, L23
K.6D	Retell texts in ways that maintain meaning.	**M3** L4 **M3 SL** L1
K.6E	Interact with sources in meaningful ways such as illustrating or writing.	**M1** L2, L10, L22, L26 **M2** L1, L2, L4, L15, L16, L17, L20, L30 **M3** L7 **M3 SL** L3, L8
K.6F	Respond using newly acquired vocabulary as appropriate.	**M1** L4, L10, L20, L28 **M1 SL** L1, L2 **M2** L5, L14, L32, L34 **M3** L22 **M3 SL** L3, L9
K.7A	Discuss topics and determine the basic theme using text evidence with adult assistance.	N/A
K.7B	Identify and describe the main character(s).	N/A
K.7C	Describe the elements of plot development, including the main events, the problem, and the resolution for texts read aloud with adult assistance.	N/A
K.7D	Describe the setting.	N/A
K.8A	Demonstrate knowledge of distinguishing characteristics of well-known children's literature such as folktales, fables, fairy tales, and nursery rhymes.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
K.8B	Discuss rhyme and rhythm in nursery rhymes and a variety of poems.	N/A
K.8C	Discuss main characters in drama.	N/A
K.8D	Recognize characteristics and structures of informational text, including: (i) the central idea and supporting evidence with adult assistance, (ii) titles and simple graphics to gain information, and (iii) the steps in a sequence with adult assistance.	**M2** L11
K.8E	Recognize characteristics of persuasive text with adult assistance and state what the author is trying to persuade the reader to think or do.	N/A
K.8F	Recognize characteristics of multimodal and digital texts.	N/A
K.9A	Discuss with adult assistance the author's purpose for writing text.	N/A
K.9B	Discuss with adult assistance how the use of text structure contributes to the author's purpose.	N/A
K.9C	Discuss with adult assistance the author's use of print and graphic features to achieve specific purposes.	N/A
K.9D	Discuss with adult assistance how the author uses words that help the reader visualize.	N/A
K.9E	Listen to and experience first- and third-person texts.	N/A
K.10A	Plan by generating ideas for writing through class discussions and drawings.	N/A
K.10B	Develop drafts in oral, pictorial, or written form by organizing ideas.	**M1** L2, L3, L12, L22 **M2** L2, L3, L6, L10, L20 **M3** L2, L3 **M3 SL** L2
K.10C	Revise drafts by adding details in pictures or words.	**M1** L4, L8, L9, L11, L17, L20, L21, L23, L24, L25, L26, L27 **M2** L10, L12, L18, L21, L22, L24, L25, L26, L28, L30, L31 **M3** L2, L6, L7, L9, L11, L12, L14, L17, L19, L20 **M3 SL** L3, L6, L7, L8

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
K.10D	Edit drafts with adult assistance using standard English conventions, including: (i) complete sentences; (ii) verbs; (iii) singular and plural nouns; (iv) adjectives, including articles; (v) prepositions; (vi) pronouns, including subjective, objective, and possessive cases; (vii) capitalization of the first letter in a sentence and name; (viii) punctuation marks at the end of declarative sentences; and (ix) correct spelling of words with grade-appropriate orthographic patterns and rules and high-frequency words.	N/A
K.10E	Share writing.	N/A
K.11A	Dictate or compose literary texts, including personal narratives.	N/A
K.11B	Dictate or compose informational texts.	**M1** L20, L26 **M2** L6
K.12A	Generate questions for formal and informal inquiry with adult assistance.	**M1** L2, L3, L5, L9, L17, L22, L25, L26 **M1 SL** L1, L3 **M2** L2, L3, L6, L20, L29 **M3** L3, L10, L13, L16, L20 **M3 SL** L1, L8
K.12B	Develop and follow a research plan with adult assistance.	**M1** L25
K.12C	Gather information from a variety of sources with adult assistance.	**M1** L6, L11, L17, L20, L21, L22, L25, L26, L29 **M2** L1, L2, L10, L11, L13, L15, L20, L21, L25, L26, L27, L29, L30 **M3** L8, L10, L11, L12, L13 **M3 SL** L1, L2, L3, L4, L6, L7, L8
K.12D	Demonstrate understanding of information gathered with adult assistance.	**M1** L11, L17, L23, L26, L27 **M1 SL** L8 **M2** L10, L12, L14, L15, L16, L17, L18, L19, L25, L26, L27, L29, L33 **M3** L7, L8, L9, L11, L12, L15, L20, L21 **M3 SL** L6, L8
K.12E	Use an appropriate mode of delivery, whether written, oral, or multimodal, to present results.	**M1** L16, L20, L23 **M1 SL** L8 **M2** L22 **M3** L19

Mathematics

Mathematics is a fundamental tool used in both science and engineering. Throughout the *PhD Science Texas* curriculum, students use mathematics to gather information, make quantitative predictions, conduct investigations, and test and evaluate designs. Many of the thinking processes involved in doing mathematics overlap with the science and engineering practices students use to understand scientific ideas. Some of the most common applications of mathematics in the *PhD Science Texas* curriculum are highlighted in the following sections.

MATHEMATICAL PROCESS STANDARDS

Students apply and develop mathematical processes as they think analytically and quantitatively about scientific phenomena. During scientific investigations students select and use mathematical tools to make observations and gather data to answer scientific questions. Students use mathematical language and representations to communicate evidence that supports scientific arguments.

GEOMETRY AND MEASUREMENT

Students use physical properties such as size and shape to compare objects, systems, and organisms. During scientific investigations, students apply the skills of measurement to identify cause and effect relationships and to analyze relationships.

DATA ANALYSIS

Throughout the *PhD Science Texas* curriculum students engage with authentic data sets. Analyzing data related to scientific phenomena helps students generate investigative questions. Students also conduct scientific investigations that produce data. Students collect and organize their data in a way that helps them understand their findings. Then students use mathematics and computational thinking to analyze data and determine whether the data support their claims.

Level K Modules and Spotlight Lessons

M1 **Weather** WITH SPOTLIGHT LESSONS ON **Magnets**

M2 **Life**

M3 **Light** WITH SPOTLIGHT LESSONS ON **the Sky**

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
K.1A	Apply mathematics to problems arising in everyday life, society, and the workplace.	**M3** L19
K.1B	Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
K.1C	Select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems.	**M1** L6, L9 **M2** L6 **M3** L17
K.1D	Communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate.	N/A
K.1E	Create and use representations to organize, record, and communicate mathematical ideas.	**M1** L5, L18, L19 **M3** L18
K.1F	Analyze mathematical relationships to connect and communicate mathematical ideas.	**M1** L18, L19 **M2** L8, L9 **M3** L17 **M3 SL** L5, L6, L7
K.1G	Display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.	N/A
K.2A	Count forward and backward to at least 20 with and without objects.	N/A
K.2B	Read, write, and represent whole numbers from 0 to at least 20 with and without objects or pictures.	N/A
K.2C	Count a set of objects up to at least 20 and demonstrate that the last number said tells the number of objects in the set regardless of their arrangement or order.	**M1** L18
K.2D	Recognize instantly the quantity of a small group of objects in organized and random arrangements.	N/A
K.2E	Generate a set using concrete and pictorial models that represents a number that is more than, less than, and equal to a given number up to 20.	N/A
K.2F	Generate a number that is one more than or one less than another number up to at least 20.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
K.2G	Compare sets of objects up to at least 20 in each set using comparative language.	N/A
K.2H	Use comparative language to describe two numbers up to 20 presented as written numerals.	**M3 SL** L5
K.2I	Compose and decompose numbers up to 10 with objects and pictures.	N/A
K.3A	Model the action of joining to represent addition and the action of separating to represent subtraction.	N/A
K.3B	Solve word problems using objects and drawings to find sums up to 10 and differences within 10.	N/A
K.3C	Explain the strategies used to solve problems involving adding and subtracting within 10 using spoken words, concrete and pictorial models, and number sentences.	N/A
K.4	Identify U.S. coins by name, including pennies, nickels, dimes, and quarters.	N/A
K.5	Recite numbers up to at least 100 by ones and tens beginning with any given number.	N/A
K.6A	Identify two-dimensional shapes, including circles, triangles, rectangles, and squares as special rectangles.	N/A
K.6B	Identify three-dimensional solids, including cylinders, cones, spheres, and cubes, in the real world.	N/A
K.6C	Identify two-dimensional components of three-dimensional objects.	N/A
K.6D	Identify attributes of two-dimensional shapes using informal and formal geometric language interchangeably.	N/A
K.6E	Classify and sort a variety of regular and irregular two- and three-dimensional figures regardless of orientation or size.	N/A
K.6F	Create two-dimensional shapes using a variety of materials and drawings.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
K.7A	Give an example of a measurable attribute of a given object, including length, capacity, and weight.	**M1** L6, L13 **M2** L6
K.7B	Compare two objects with a common measurable attribute to see which object has more of/less of the attribute and describe the difference.	**M1** L5 **M3** L17
K.8A	Collect, sort, and organize data into two or three categories.	**M1** L4, L10, L18, L19, L25 **M1 SL** L2, L5 **M2** L5, L10, L32
K.8B	Use data to create real-object and picture graphs.	**M1** L18, L19 **M1 SL** L5 **M3 SL** L5
K.8C	Draw conclusions from real-object and picture graphs.	**M1** L17, L18, L19, L21, L25, L27 **M2** L15, L16 **M3 SL** L5, L6, L7
K.9A	Identify ways to earn income.	N/A
K.9B	Differentiate between money received as income and money received as gifts.	N/A
K.9C	List simple skills required for jobs.	N/A
K.9D	Distinguish between wants and needs and identify income as a source to meet one's wants and needs.	N/A

Social Studies

PhD Science Texas approaches phenomenon-driven instruction by situating scientific phenomena in a cultural context. Students study curated trade texts, artworks, and primary sources that tell the historical and cultural stories surrounding phenomena. They come to see science and engineering as processes of understanding and improving the world in which they live. The following sections highlight some of the social studies content areas students study and the skills they apply while making sense of authentic scientific phenomena.

GEOGRAPHY

Throughout the *PhD Science Texas* curriculum, students apply social studies skills to interpret and analyze geographical information. Students use maps, globes, and other resources to identify and describe physical characteristics of locations where scientific phenomena occur. Students observe natural systems and processes to describe the effects they have on landforms and water bodies.

SCIENCE, TECHNOLOGY, AND SOCIETY

The *PhD Science Texas* curriculum aims to develop scientifically literate citizens. As students identify the contributions of scientists and engineers, they recognize the influence of science, engineering, and technology on society and the natural world. Students explore past and present examples of technology within the context of making sense of scientific phenomena and solving problems.

SOCIAL STUDIES SKILLS

Students apply and develop social studies skills as they build new scientific knowledge. Students gather information from a wide range of authentic resources. Students apply skills, such as sequencing and categorizing, to help interpret information they gather. Then students communicate their knowledge orally or by using written and visual material.

Level K Modules and Spotlight Lessons

M1 **Weather** WITH SPOTLIGHT LESSONS ON **Magnets**

M2 **Life**

M3 **Light** WITH SPOTLIGHT LESSONS ON **the Sky**

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
K.1A	Identify national patriotic holidays such as Constitution Day, Presidents' Day, Veterans Day, and Independence Day.	N/A
K.1B	Identify customs associated with national patriotic holidays such as parades and fireworks on Independence Day.	N/A
K.2	Identify contributions of historical figures, including Stephen F. Austin, George Washington, Christopher Columbus, and José Antonio Navarro, who helped to shape the state and nation.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
K.3A	Use spatial terms, including over, under, near, far, left, and right, to describe relative location.	**M1 SL** L2
K.3B	Locate places on the school campus and describe their relative locations.	N/A
K.3C	Identify and use geographic tools that aid in determining location, including maps and globes.	**M1** L25 **M2** L1 **M3 SL** L8
K.4A	Identify the physical characteristics of place such as landforms, bodies of water, Earth's resources, and weather.	**M1** L2, L4, L7, L25 **M2** L29, L30, L31, L32 **M3** L14
K.4B	Identify how geographic location influences human characteristics of place such as shelter, clothing, food, and activities.	**M1** L2, L10 **M2** L29
K.5A	Identify basic human needs of food, clothing, and shelter.	**M1** L1, L10, L11 **M2** L28, L29
K.5B	Explain the difference between needs and wants.	N/A
K.5C	Explain how basic human needs and wants can be met.	**M1** L12
K.6A	Identify jobs in the home, school, and community.	**M1** L12, L20 **M2** L1 **M3** L14
K.6B	Explain why people have jobs.	**M2** L20
K.7A	Identify purposes for having rules.	N/A
K.7B	Identify rules that provide order, security, and safety in the home and school.	**M1** L1
K.8A	Identify authority figures in the home, school, and community.	N/A
K.8B	Explain how authority figures enforce rules.	N/A
K.9A	Identify the United States flag and the Texas state flag.	N/A
K.9B	Recite the Pledge of Allegiance to the United States Flag and the Pledge to the Texas Flag.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
K.9C	Use voting as a method for group decision making.	N/A
K.10	Identify similarities and differences among individuals such as kinship and religion.	N/A
K.11A	Describe and explain the importance of family traditions.	N/A
K.11B	Compare traditions among families.	N/A
K.12A	Identify examples of technology used in the home and school.	N/A
K.12B	Describe how technology helps accomplish specific tasks and meet people's needs.	**M1** L5 **M2** L30, L31, L32 **M3** L15
K.12C	Describe how his or her life might be different without modern technology.	**M2** L29, L30
K.13A	Gather information about a topic using a variety of valid oral and visual sources such as interviews, music, pictures, symbols, and artifacts with adult assistance.	**M1** L2, L10, L17, L21, L22, L24, L26 **M2** L1, L2, L5, L11, L13, L15, L16, L20, L21, L25, L26, L29, L30, L31 **M3** L8, L11, L13 **M3 SL** L1, L2, L4
K.13B	Sequence and categorize information.	**M1** L3, L4, L10 **M1 SL** L2, L5 **M2** L5, L10, L13, L19, L22, L25, L28, L32 **M3** L2, L3, L11, L17 **M3 SL** L2
K.14A	Place events in chronological order.	N/A
K.14B	Use social studies terminology related to time and chronology correctly, including before, after, next, first, last, yesterday, today, and tomorrow.	**M1** L4, L7
K.14C	Express ideas orally based on knowledge and experiences.	**M1** L4, L16, L20, L23, L28 **M1 SL** L3 **M2** L10, L12, L14, L18, L21, L26, L27, L34 **M3** L19, L22

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
K.14D	Create and interpret visuals, including pictures and maps.	**M1** L2, L3, L4, L6, L10, L12, L14, L24, L26 **M1 SL** L3, L4, L8 **M2** L7, L17 **M3** L3, L13 **M3 SL** L4
K.15	Use problem-solving and decision-making processes to identify a problem, gather information, list and consider options, consider advantages and disadvantages, choose and implement a solution, and evaluate the effectiveness of the solution.	**M1** L6, L7, L12, L13, L14, L15, L16 **M1 SL** L4, L5, L6, L7, L8

Cross-Content Standards Addressed

Level 1

Texas Essential Knowledge and Skills

English Language Development

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Students apply and develop oral language skills as they engage in scientific discourse. During instructional routines such as Think–Pair–Share, Inside–Outside Circles, and Link Up, students develop social communication skills while they work collaboratively by actively listening and sharing scientific ideas. Students further apply these skills during key knowledge-distilling moments such as Socratic Seminars, the Share stage of the engineering design process, assessment debriefs, investigations, and anchor model updates.

COMPREHENSION SKILLS: *listening, speaking, reading, writing, and thinking using multiple texts*

Students apply and develop metacognitive skills to deepen comprehension as they make sense of scientific phenomena. *PhD Science Texas* uses authentic texts in lessons to highlight coherence and build knowledge while allowing students to experience meaningful connections across content areas. Early elementary PhD Science Texas modules also have Knowledge Deck™ posters and accompanying Knowledge Deck cards, which feature vibrant images and carefully crafted, engaging, and accessible informational text. Before students engage with texts (written texts, videos, audio recordings, and artwork) they may establish a purpose for reading, generate questions, and make predictions. Students also make connections, infer, and synthesize information to uncover and distill new science knowledge.

INQUIRY AND RESEARCH: *listening, speaking, reading, writing, and thinking using multiple texts*

Students apply and develop writing and research skills as they build and communicate scientific knowledge. As students observe and discuss various sources, they generate questions for inquiry and identify relevant sources of information to answer the questions. These questions are added to a driving question board or used to develop a Phenomenon Question that drives student learning. Students make their thinking visible through drawing or writing. Students draft and revise their ideas many times throughout the learning cycle. Evidence of students' thinking can be found on anchor charts, anchor models, and Science Logbook pages. Through structured conversations, such as the Share stage of the engineering design process, students use appropriate modes of delivery to present their scientific ideas.

Level 1 Modules and Spotlight Lessons

M1 **Pushes and Pulls** WITH SPOTLIGHT LESSONS ON **Weather Conditions**

M2 **Environments** WITH SPOTLIGHT LESSONS ON **Water**

M3 **Survival** WITH SPOTLIGHT LESSONS ON **Earth Materials**

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
1.1A	Listen actively, ask relevant questions to clarify information, and answer questions using multi-word responses.	**M1** L1, L4, L7, L12, L22, L24 **M1 SL** L4, L7 **M2** L1, L3, L5, L6, L7, L13, L14, L22, L24, L25, L28 **M2 SL** L1, L2, L3, L7, L8 **M3** L1, L2, L3, L6, L7, L13, L16, L18, L20, L22, L24, L27, L28, L31 **M3 SL** L1, L4, L7, L8
1.1B	Follow, restate, and give oral instructions that involve a short, related sequence of actions.	**M1** L7, L10, L13, L14, L15, L19, L20 **M2** L8, L13, L14, L22, L23, L24, L25 **M2 SL** L2, L7 **M3** L4, L8, L9, L13, L14, L17, L18
1.1C	Share information and ideas about the topic under discussion, speaking clearly at an appropriate pace and using the conventions of language.	**M1** L9, L10, L13, L14, L16, L19, L21, L22, L24 **M1 SL** L4, L7 **M2** L5, L6, L7, L8, L9, L14, L25, L26, L28 **M2 SL** L1, L3, L8, L11 **M3** L2, L4, L5, L6, L7, L8, L11, L16, L17, L18, L20, L21, L22, L24, L28, L29, L31 **M3 SL** L1, L3, L4, L6, L7, L8
1.1D	Work collaboratively with others by following agreed-upon rules for discussion, including listening to others, speaking when recognized, and making appropriate contributions.	**M1** L1, L12, L13, L19, L22, L24 **M1 SL** L4, L5, L7 **M2** L6, L7, L8, L14, L22, L23, L25, L26, L28 **M2 SL** L2, L3, L7, L11 **M3** L2, L3, L4, L6, L9, L13, L14, L15, L16, L17, L18, L24, L27, L29, L31 **M3 SL** L8
1.1E	Develop social communication such as introducing himself/herself and others, relating experiences to a classmate, and expressing needs and feelings.	**M1** L1, L22 **M2** L26 **M3** L29

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
1.2A	Demonstrate phonological awareness by: (i) producing a series of rhyming words; (ii) recognizing spoken alliteration or groups of words that begin with the same spoken onset or initial sound; (iii) distinguishing between long and short vowel sounds in one-syllable words; (iv) recognizing the change in spoken word when a specified phoneme is added, changed, or removed; (v) blending spoken phonemes to form one-syllable words, including initial and/or final consonant blends; (vi) manipulating phonemes within base words; and (vii) segmenting spoken one-syllable words of three to five phonemes into individual phonemes, including words with initial and/or final consonant blends.	N/A
1.2B	Demonstrate and apply phonetic knowledge by: (i) decoding words in isolation and in context by applying common letter–sound correspondences; (ii) decoding words with initial and final consonant blends, digraphs, and trigraphs; (iii) decoding words with closed syllables; open syllables; VCe syllables; vowel teams, including vowel digraphs and diphthongs; and r-controlled syllables; (iv) using knowledge of base words to decode common compound words and contractions; (v) decoding words with inflectional endings, including -ed, -s, and -es; and (vi) identifying and reading at least 100 high-frequency words from a research-based list.	N/A
1.2C	Demonstrate and apply spelling knowledge by: (i) spelling words with closed syllables, open syllables, VCe syllables, vowel teams, and r-controlled syllables; (ii) spelling words with initial and final consonant blends, digraphs, and trigraphs; (iii) spelling words using sound-spelling patterns; and (iv) spelling high-frequency words from a research-based list.	N/A
1.2D	Demonstrate print awareness by identifying the information that different parts of a book provide.	N/A
1.2E	Alphabetize a series of words to the first or second letter and use a dictionary to find words.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
1.2F	Develop handwriting by printing words, sentences, and answers legibly, leaving appropriate spaces between words.	**M1** L5, L13 **M2** L2, L7, L10, L11, L27 **M2 SL** L7 **M3** L5, L9, L10, L20 **M3 SL** L2
1.3A	Use a resource such as a picture dictionary or digital resource to find words.	N/A
1.3B	Use illustrations and texts the student is able to read or hear to learn or clarify word meanings.	**M1** L1 **M1 SL** L5 **M2** L2, L10
1.3C	Identify the meaning of words with the affixes -s, -ed, and -ing.	N/A
1.3D	Identify and use words that name actions, directions, positions, sequences, categories, and locations.	**M1** L4, L5, L10, L14, L18
1.4	Use appropriate fluency (rate, accuracy, and prosody) when reading grade-level text.	N/A
1.5	Self-select text and interact independently with text for increasing periods of time.	N/A
1.6A	Establish purpose for reading assigned and self-selected texts with adult assistance.	**M1** L1 **M1 SL** L5 **M2** L9 **M2 SL** L1 **M3** L1, L7, L18, L19, L26 **M3 SL** L1, L2, L4
1.6B	Generate questions about text before, during, and after reading to deepen understanding and gain information with adult assistance.	**M1** L1
1.6C	Make and correct or confirm predictions using text features, characteristics of genre, and structures with adult assistance.	**M2** L2, L9 **M2 SL** L1 **M3** L6 **M3 SL** L1
1.6D	Create mental images to deepen understanding with adult assistance.	**M2** L1 **M3** L12

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
1.6E	Make connections to personal experiences, ideas in other texts, and society with adult assistance.	**M1** L3, L4, L9, L14, L23, L24 **M1 SL** L2 **M2** L2, L3, L11, L18, L19, L28 **M2 SL** L1, L11 **M3** L1, L17, L31 **M3 SL** L2, L3, L5, L8
1.6F	Make inferences and use evidence to support understanding with adult assistance.	**M1** L4, L5, L7, L8, L21 **M1 SL** L1, L3, L4 **M2** L1, L6 **M2 SL** L3, L5 **M3** L5, L6, L8, L19, L23 **M3 SL** L2
1.6G	Evaluate details to determine what is most important with adult assistance.	N/A
1.6H	Synthesize information to create new understanding with adult assistance.	**M1** L5, L8, L12, L14, L15, L16, L17, L21 **M1 SL** L3 **M2** L6, L7, L8, L10, L14, L17, L18, L20, L25 **M2 SL** L4, L5, L6, L8 **M3** L2, L4, L5, L6, L7, L8, L9, L10, L11, L17, L18, L19, L21, L24, L25, L27, L28 **M3 SL** L3, L4, L6, L7
1.6I	Monitor comprehension and make adjustments such as re-reading, using background knowledge, checking for visual cues, and asking questions when understanding breaks down.	N/A
1.7A	Describe personal connections to a variety of sources.	**M2** L19
1.7B	Write brief comments on literary or informational texts.	**M3** L18
1.7C	Use text evidence to support an appropriate response.	**M1** L1 **M1 SL** L5 **M2** L2, L9, L12, L16, L19 **M2 SL** L1 **M3** L1, L6, L7, L17, L18, L19, L30 **M3 SL** L1, L3, L4, L6
1.7D	Retell texts in ways that maintain meaning.	**M3** L27

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
1.7E	Interact with sources in meaningful ways such as illustrating or writing.	**M1** L3, L5, L13 **M2** L1, L2, L15 **M3** L4, L6, L9, L13, L17, L27 **M3 SL** L1
1.7F	Respond using newly acquired vocabulary as appropriate.	**M1** L8, L17, L18, L22 **M1 SL** L6 **M2** L2, L8, L10, L26 **M2 SL** L5, L8, L9 **M3** L7, L11, L29 **M3 SL** L7
1.8A	Discuss topics and determine theme using text evidence with adult assistance.	N/A
1.8B	Describe the main character(s) and the reason(s) for their actions.	**M1 SL** L4
1.8C	Describe plot elements, including the main events, the problem, and the resolution, for texts read aloud and independently.	N/A
1.8D	Describe the setting.	**M1 SL** L4
1.9A	Demonstrate knowledge of distinguishing characteristics of well-known children's literature such as folktales, fables, fairy tales, and nursery rhymes.	N/A
1.9B	Discuss rhyme, rhythm, repetition, and alliteration in a variety of poems.	N/A
1.9C	Discuss elements of drama such as characters and setting.	N/A
1.9D	Recognize characteristics and structures of informational text, including: (i) the central idea and supporting evidence with adult assistance; (ii) features and simple graphics to locate or gain information; and (iii) organizational patterns such as chronological order and description with adult assistance.	N/A
1.9E	Recognize characteristics of persuasive text with adult assistance and state what the author is trying to persuade the reader to think or do.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
1.9F	Recognize characteristics of multimodal and digital texts.	**M2** L21 **M3** L26
1.10A	Discuss the author's purpose for writing text.	**M3** L1
1.10B	Discuss how the use of text structure contributes to the author's purpose.	N/A
1.10C	Discuss with adult assistance the author's use of print and graphic features to achieve specific purposes.	N/A
1.10D	Discuss how the author uses words that help the reader visualize.	N/A
1.10E	Listen to and experience first- and third-person texts.	N/A
1.11A	Plan a first draft by generating ideas for writing such as by drawing and brainstorming.	N/A
1.11B	Develop drafts in oral, pictorial, or written form by: (i) organizing with structure and (ii) developing an idea with specific and relevant details.	**M1** L2, L5 **M2** L3, L6, L23 **M2 SL** L1 **M3** L2, L3, L13 **M3 SL** L1
1.11C	Revise drafts by adding details in pictures or words.	**M1** L6, L8, L12, L14, L15 **M2** L6, L8, L10, L14, L17, L25 **M2 SL** L4, L6, L8 **M3** L4, L6, L7, L9, L15, L17, L18, L19, L21, L24, L25, L27 **M3 SL** L3, L4, L6
1.11D	Edit drafts using standard English conventions, including: (i) complete sentences with subject–verb agreement; (ii) past and present verb tense; (iii) singular, plural, common, and proper nouns; (iv) adjectives, including articles; (v) adverbs that convey time; (vi) prepositions; (vii) pronouns, including subjective, objective, and possessive cases; (viii) capitalization for the beginning of sentences and the pronoun "I"; (ix) punctuation marks at the end of declarative, exclamatory, and interrogative sentences; and (x) correct spelling of words with grade-appropriate orthographic patterns and rules and high-frequency words with adult assistance.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
1.11E	Publish and share writing.	N/A
1.12A	Dictate or compose literary texts, including personal narratives and poetry.	N/A
1.12B	Dictate or compose informational texts, including procedural texts.	**M2 SL** L8
1.12C	Dictate or compose correspondence such as thank you notes or letters.	N/A
1.13A	Generate questions for formal and informal inquiry with adult assistance.	**M1** L2, L3, L10, L13 **M2** L1, L3, L9, L12, L13, L15 **M2 SL** L1, L6, L7, L8, L9 **M3** L1, L2, L9, L12, L17, L20, L25, L26 **M3 SL** L1, L4, L5
1.13B	Develop and follow a research plan with adult assistance.	N/A
1.13C	Identify and gather relevant sources and information to answer the questions with adult assistance.	**M1 SL** L4 **M2 SL** L1, L2, L6 **M3** L1, L8, L12, L18, L19, L21, L30
1.13D	Demonstrate understanding of information gathered with adult assistance.	**M1** L1 **M2** L8, L9, L12, L16, L19, L20 **M3** L6, L18, L30 **M3 SL** L1, L3, L4
1.13E	Use an appropriate mode of delivery, whether written, oral, or multimodal, to present results.	**M1** L21 **M2** L25 **M3** L4, L16

Mathematics

Mathematics is a fundamental tool used in both science and engineering. Throughout the *PhD Science Texas* curriculum, students use mathematics to gather information, make quantitative predictions, conduct investigations, and test and evaluate designs. Many of the thinking processes involved in doing mathematics overlap with the science and engineering practices students use to understand scientific ideas. Some of the most common applications of mathematics in the *PhD Science Texas* curriculum are highlighted in the following sections.

MATHEMATICAL PROCESS STANDARDS

Students apply and develop mathematical processes as they think analytically and quantitatively about scientific phenomena. During scientific investigations, students select and use mathematical tools to make observations and gather data to answer scientific questions. Students use mathematical language and representations to communicate evidence that supports scientific arguments.

GEOMETRY AND MEASUREMENT

Students use physical properties such as size and shape to compare objects, systems, and organisms. During scientific investigations, students apply the skills of measurement to identify cause and effect relationships and to analyze relationships.

DATA ANALYSIS

Throughout the *PhD Science Texas* curriculum, students engage with authentic data sets. Analyzing data related to scientific phenomena helps students generate investigative questions. Students also conduct scientific investigations that produce data. Students collect and organize their data in a way that helps them understand their findings. Then students use mathematics and computational thinking to analyze data and determine whether the data support their claims.

Level 1 Modules and Spotlight Lessons

M1 **Pushes and Pulls** WITH SPOTLIGHT LESSONS ON **Weather Conditions**

M2 **Environments** WITH SPOTLIGHT LESSONS ON **Water**

M3 **Survival** WITH SPOTLIGHT LESSONS ON **Earth Materials**

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
1.1A	Apply mathematics to problems arising in everyday life, society, and the workplace.	**M1** L1, L18 **M2** L5, L21, L23
1.1B	Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
1.1C	Select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems.	**M1** L19 **M2** L5
1.1D	Communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate.	**M1** L7, L20 **M2** L20
1.1E	Create and use representations to organize, record, and communicate mathematical ideas.	**M2** L5 **M2 SL** L8
1.1F	Analyze mathematical relationships to connect and communicate mathematical ideas.	**M1** L1, L7, L12 **M2** L5, L20, L23 **M2 SL** L2, L8 **M3 SL** L5
1.1G	Display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.	**M1** L20 **M2** L5
1.2A	Recognize instantly the quantity of structured arrangements.	N/A
1.2B	Use concrete and pictorial models to compose and decompose numbers up to 120 in more than one way as so many hundreds, so many tens, and so many ones.	N/A
1.2C	Use objects, pictures, and expanded and standard forms to represent numbers up to 120.	**M1** L20 **M2 SL** L8
1.2D	Generate a number that is greater than or less than a given whole number up to 120.	N/A
1.2E	Use place value to compare whole numbers up to 120 using comparative language.	**M1** L20
1.2F	Order whole numbers up to 120 using place value and open number lines.	N/A
1.2G	Represent the comparison of two numbers to 100 using the symbols >, <, or =.	N/A
1.3A	Use concrete and pictorial models to determine the sum of a multiple of 10 and a one-digit number in problems up to 99.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
1.3B	Use objects and pictorial models to solve word problems involving joining, separating, and comparing sets within 20 and unknowns as any one of the terms in the problem such as 2 + 4 = [ ]; 3 + [ ] = 7; and 5 = [ ] – 3.	N/A
1.3C	Compose 10 with two or more addends with and without concrete objects.	N/A
1.3D	Apply basic fact strategies to add and subtract within 20, including making 10 and decomposing a number leading to a 10.	N/A
1.3E	Explain strategies used to solve addition and subtraction problems up to 20 using spoken words, objects, pictorial models, and number sentences.	N/A
1.3F	Generate and solve problem situations when given a number sentence involving addition or subtraction of numbers within 20.	N/A
1.4A	Identify U.S. coins, including pennies, nickels, dimes, and quarters, by value and describe the relationships among them.	N/A
1.4B	Write a number with the cent symbol to describe the value of a coin.	N/A
1.4C	Use relationships to count by twos, fives, and tens to determine the value of a collection of pennies, nickels, and/or dimes.	N/A
1.5A	Recite numbers forward and backward from any given number between 1 and 120.	N/A
1.5B	Skip count by twos, fives, and tens to determine the total number of objects up to 120 in a set.	N/A
1.5C	Use relationships to determine the number that is 10 more and 10 less than a given number up to 120.	N/A
1.5D	Represent word problems involving addition and subtraction of whole numbers up to 20 using concrete and pictorial models and number sentences.	N/A
1.5E	Understand that the equal sign represents a relationship where expressions on each side of the equal sign represent the same value(s).	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
1.5F	Determine the unknown whole number in an addition or subtraction equation when the unknown may be any one of the three or four terms in the equation.	N/A
1.5G	Apply properties of operations to add and subtract two or three numbers.	N/A
1.6A	Classify and sort regular and irregular two-dimensional shapes based on attributes using informal geometric language.	N/A
1.6B	Distinguish between attributes that define a two-dimensional or three-dimensional figure and attributes that do not define the shape.	N/A
1.6C	Create two-dimensional figures, including circles, triangles, rectangles, and squares, as special rectangles, rhombuses, and hexagons.	N/A
1.6D	Identify two-dimensional shapes, including circles, triangles, rectangles, and squares, as special rectangles, rhombuses, and hexagons and describe their attributes using formal geometric language.	**M3 SL** L5
1.6E	Identify three-dimensional solids, including spheres, cones, cylinders, rectangular prisms (including cubes), and triangular prisms, and describe their attributes using formal geometric language.	N/A
1.6F	Compose two-dimensional shapes by joining two, three, or four figures to produce a target shape in more than one way if possible.	N/A
1.6G	Partition two-dimensional figures into two and four fair shares or equal parts and describe the parts using words.	N/A
1.6H	Identify examples and non-examples of halves and fourths.	N/A
1.7A	Use measuring tools to measure the length of objects to reinforce the continuous nature of linear measurement.	**M1** L20
1.7B	Illustrate that the length of an object is the number of same-size units of length that, when laid end to end with no gaps or overlaps, reach from one end of the object to the other.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
1.7C	Measure the same object/distance with units of two different lengths and describe how and why the measurements differ.	N/A
1.7D	Describe a length to the nearest whole unit using a number and a unit.	**M1** L20
1.7E	Tell time to the hour and half hour using analog and digital clocks.	N/A
1.8A	Collect, sort, and organize data in up to three categories using models/representations such as tally marks or T-charts.	**M1** L4, L20, L21 **M1 SL** L2 **M2** L12, L13, L22, L23 **M3** L2 **M3 SL** L2
1.8B	Use data to create picture and bar-type graphs.	**M2 SL** L8
1.8C	Draw conclusions and generate and answer questions using information from picture and bar-type graphs.	**M1** L19, L21 **M1 SL** L4 **M2** L1 **M2 SL** L8
1.9A	Define money earned as income.	N/A
1.9B	Identify income as a means of obtaining goods and services, oftentimes making choices between wants and needs.	N/A
1.9C	Distinguish between spending and saving.	N/A
1.9D	Consider charitable giving.	N/A

Social Studies

PhD Science Texas approaches phenomenon-driven instruction by situating scientific phenomena in a cultural context. Students study curated trade texts, artworks, and primary sources that tell the historical and cultural stories surrounding phenomena. They come to see science and engineering as processes of understanding and improving the world in which they live. The following sections highlight some of the social studies content areas students study and the skills they apply while making sense of authentic scientific phenomena.

GEOGRAPHY

Throughout the *PhD Science Texas* curriculum, students apply social studies skills to interpret and analyze geographical information. Students use maps, globes, and other resources to identify and describe physical characteristics of locations where scientific phenomena occur. Students observe natural systems and processes to describe the effects they have on landforms and water bodies.

SCIENCE, TECHNOLOGY, AND SOCIETY

The *PhD Science Texas* curriculum aims to develop scientifically literate citizens. As students identify the contributions of scientists and engineers, they recognize the influence of science, engineering, and technology on society and the natural world. Students explore past and present examples of technology within the context of making sense of scientific phenomena and solving problems.

SOCIAL STUDIES SKILLS

Students apply and develop social studies skills as they build new scientific knowledge. Students gather information from a wide range of authentic resources. Students apply skills, such as sequencing and categorizing, to help interpret information they gather. Then students communicate their knowledge orally or by using written and visual material.

Level 1 Modules and Spotlight Lessons

M1 **Pushes and Pulls** WITH SPOTLIGHT LESSONS ON **Weather Conditions**

M2 **Environments** WITH SPOTLIGHT LESSONS ON **Water**

M3 **Survival** WITH SPOTLIGHT LESSONS ON **Earth Materials**

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
1.1A	Describe the origins of customs, holidays, and celebrations of the community, state, and nation such as Constitution Day, Independence Day, and Veterans Day.	N/A
1.1B	Compare the observance of holidays and celebrations.	N/A
1.2A	Identify contributions of historical figures, including Sam Houston, George Washington, Abraham Lincoln, and Martin Luther King Jr., who have influenced the state and nation.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
1.2B	Compare the lives of historical figures who have influenced the state and nation.	N/A
1.3A	Describe the location of self and objects relative to other locations in the classroom and school using spatial terms.	**M1** L10
1.3B	Locate places using the four cardinal directions.	**M1** L10
1.4A	Create and use simple maps such as maps of the home, classroom, school, and community.	**M1** L2
1.4B	Locate and explore the community, Texas, and the United States on maps and globes.	**M2** L1, L4, L14, L17 **M2 SL** L2
1.5A	Identify and describe the physical characteristics of place such as landforms, bodies of water, Earth's resources, and weather.	**M2 SL** L2
1.5B	Identify and describe how geographic location influences the human characteristics of place such as shelter, clothing, food, and activities.	**M2** L12
1.6A	Describe ways that families meet basic human needs.	N/A
1.6B	Describe similarities and differences in ways families meet basic human needs.	N/A
1.7A	Identify examples of goods and services in the home, school, and community.	N/A
1.7B	Identify ways people exchange goods and services.	N/A
1.7C	Identify the role of markets in the exchange of goods and services.	N/A
1.8A	Identify examples of people wanting more than they can have.	N/A
1.8B	Explain why wanting more than they can have requires that people make choices.	N/A
1.8C	Identify examples of choices families make when buying goods and services.	N/A
1.9A	Describe the tools of various jobs and the characteristics of a job well performed.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
1.9B	Describe how various jobs contribute to the production of goods and services.	N/A
1.10A	Explain the purpose for rules and laws in the home, school, and community.	N/A
1.10B	Identify rules and laws that establish order, provide security, and manage conflict.	N/A
1.11A	Identify the responsibilities of authority figures in the home, school, and community.	N/A
1.11B	Identify and describe the roles of public officials in the community, state, and nation.	N/A
1.12A	Identify characteristics of good citizenship, including truthfulness, justice, equality, respect for oneself and others, responsibility in daily life, and participation in government by educating oneself about the issues, respectfully holding public officials to their word, and voting.	N/A
1.12B	Identify historical figures and other individuals who have exemplified good citizenship such as Benjamin Franklin and Eleanor Roosevelt.	N/A
1.13A	Explain state and national patriotic symbols, including the United States and Texas flags, the Liberty Bell, the Statue of Liberty, and the Alamo.	N/A
1.13B	Recite the Pledge of Allegiance to the United States Flag and the Pledge to the Texas Flag.	N/A
1.13C	Identify anthems and mottoes of Texas and the United States.	N/A
1.13D	Explain and practice voting as a way of making choices and decisions.	N/A
1.13E	Explain how patriotic customs and celebrations reflect American individualism and freedom.	N/A
1.14A	Describe and explain the importance of beliefs, language, and traditions of families and communities.	N/A
1.14B	Explain the way folktales and legends reflect beliefs, language, and traditions of communities.	N/A
1.15A	Describe how technology has affected the ways families live.	**M2** L19, L20 **M3** L11

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
1.15B	Describe how technology has affected communication, transportation, and recreation.	N/A
1.15C	Identify the contributions of scientists and inventors such as Alexander Graham Bell, Thomas Edison, and Garrett Morgan.	**M1** L17 **M2** L21 **M3** L11 **M3 SL** L2
1.16A	Gather information about a topic using a variety of valid oral and visual sources such as interviews, music, pictures, symbols, and artifacts with adult assistance.	**M1** L17 **M1 SL** L5 **M2** L1, L4, L6, L8, L12, L16, L19 **M2 SL** L6 **M3** L4 **M3 SL** L1, L4, L6
1.16B	Sequence and categorize information.	**M1 SL** L3 **M2** L16, L21, L22, L23 **M2 SL** L1, L2, L4, L8 **M3** L2, L7, L22, L25, L26 **M3 SL** L6
1.17A	Use a simple timeline to distinguish among past, present, and future.	N/A
1.17B	Use a calendar to describe and measure time in days, weeks, months, and years.	N/A
1.17C	Express ideas orally based on knowledge and experiences.	**M1** L6, L8, L17, L22 **M2** L6, L9, L14, L16, L17, L25, L26 **M2 SL** L4, L6 **M3** L2, L3, L5, L11, L16, L17, L18, L22, L25, L27, L29 **M3 SL** L3, L4, L6, L7
1.17D	Create and interpret visual and written material.	**M1** L2, L10, L12 **M2** L3, L16, L20, L23 **M3** L2, L3, L7, L11, L12, L13, L14, L25 **M3 SL** L1, L2
1.17E	Use social studies terminology correctly.	N/A
1.18	Use problem-solving and decision-making processes to identify a problem, gather information, list and consider options, consider advantages and disadvantages, choose and implement a solution, and evaluate the effectiveness of the solution.	**M1** L17, L18, L19, L20, L21 **M2** L20, L21, L22, L23, L24, L25 **M3** L12, L13, L14, L15, L16

Cross-Content Standards Addressed

Level 2

Texas Essential Knowledge and Skills

English Language Development

PhD Science® Texas follows an integrated approach to science instruction. The science that students learn as they make sense of authentic phenomena becomes the content for meaningful application of English language arts and reading (ELAR) skills. Many of these ELAR skills are required to gather evidence, construct sound scientific arguments, and communicate scientific explanations effectively. Some of the most common applications of ELAR skills in the *PhD Science Texas* curriculum are highlighted in the following sections.

DEVELOPING AND SUSTAINING FOUNDATIONAL LANGUAGE SKILLS: *listening, speaking, discussion, and thinking—oral language*

Students apply and develop oral language skills as they engage in scientific discourse. During instructional routines such as Think–Pair–Share, Inside–Outside Circles, and Link Up, students develop social communication skills while they work collaboratively by actively listening and sharing scientific ideas. Students further apply these skills during key knowledge-distilling moments such as Socratic Seminars, the Share stage of the engineering design process, assessment debriefs, investigations, and anchor model updates.

COMPREHENSION SKILLS: *listening, speaking, reading, writing, and thinking using multiple texts*

Students apply and develop metacognitive skills to deepen comprehension as they make sense of scientific phenomena. *PhD Science Texas* uses authentic texts in lessons to highlight coherence and build knowledge while allowing students to experience meaningful connections across content areas. Early elementary *PhD Science Texas* modules also have Knowledge Deck™ posters and accompanying Knowledge Deck cards, which feature vibrant images and carefully crafted, engaging, and accessible informational text. Before students engage with texts (written texts, videos, audio recordings, and artwork), they may establish a purpose for reading, generate questions, and make predictions. Students also make connections, infer, and synthesize information to uncover and distill new science knowledge.

INQUIRY AND RESEARCH: *listening, speaking, reading, writing, and thinking using multiple texts*

Students apply and develop writing and research skills as they build and communicate scientific knowledge. As students observe and discuss various sources, they generate questions for inquiry and identify relevant sources of information to answer the questions. These questions are added to a driving question board or used to develop a Phenomenon Question that drives student learning. Students make their thinking visible through drawing or writing. Students draft and revise their ideas many times throughout the learning cycle. Evidence of students' thinking can be found on anchor charts, anchor models, and Science Logbook pages. Through structured conversations, such as the Share stage of the engineering design process, students use appropriate modes of delivery to present their scientific ideas.

Level 2 Modules and Spotlight Lessons

M1 **Matter** WITH SPOTLIGHT LESSONS ON **Weather Events**

M2 **Sound** WITH SPOTLIGHT LESSONS ON **Objects in the Sky**

M3 **Plants** WITH SPOTLIGHT LESSONS ON **Living Things and Their Environment**

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
2.1A	Listen actively, ask relevant questions to clarify information, and answer questions using multi-word responses.	**M1** L1, L2, L3, L4, L7, L16, L21, L25 **M1 SL** L1, L3, L6, L7 **M2** L2, L3, L8, L11, L13, L14, L25 **M2 SL** L1, L2, L3, L4 **M3** L1, L2, L6, L7, L8, L12, L13, L14, L18, L23, L25, L27, L30 **M3 SL** L2, L5, L7, L8
2.1B	Follow, restate, and give oral instructions that involve a short, related sequence of actions.	**M1** L3, L4, L6, L7, L8, L11 **M1 SL** L9, L10 **M2** L5, L6, L7, L13, L14, L24 **M2 SL** L5 **M3** L4, L7, L15, L16, L28 **M3 SL** L8
2.1C	Share information and ideas that focus on the topic under discussion, speaking clearly at an appropriate pace and using the conventions of language.	**M1** L1, L2, L3, L10, L14, L22, L25, L26, L32, L34 **M1 SL** L1, L2, L3, L4, L5, L6, L9, L11, L12, L14 **M2** L3, L7, L10, L15, L16, L17, L19, L21, L25, L26, L29 **M2 SL** L1, L2, L3, L4, L5, L6 **M3** L1, L2, L7, L10, L11, L12, L13, L15, L17, L18, L19, L20, L22, L23, L24, L25, L26, L27, L28, L30 **M3 SL** L1, L2, L3, L4, L5, L6, L8, L10
2.1D	Work collaboratively with others by following agreed-upon rules for discussion, including listening to others, speaking when recognized, making appropriate contributions, and building on the ideas of others.	**M1** L1, L3, L4, L8, L22, L26, L29, L32, L34 **M1 SL** L1, L3, L5, L6, L7, L9, L11, L12, L14 **M2** L7, L10, L15, L17, L19, L21, L22, L25, L26, L29 **M2 SL** L1, L2, L3, L4, L5, L6 **M3** L2, L4, L7, L12, L13, L15, L17, L18, L19, L20, L23, L24, L26, L27, L28, L30 **M3 SL** L1, L2, L3, L5, L6, L7, L8, L10

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
2.1E	Develop social communication such as distinguishing between asking and telling.	**M1** L32 **M1 SL** L14 **M2** L25, L26, L29 **M2 SL** L6 **M3** L28, L30 **M3 SL** L2, L10
2.2A	Demonstrate phonological awareness by: (i) producing a series of rhyming words; (ii) distinguishing between long and short vowel sounds in one-syllable and multi-syllable words; (iii) recognizing the change in spoken word when a specified phoneme is added, changed, or removed; and (iv) manipulating phonemes within base words.	N/A
2.2B	Demonstrate and apply phonetic knowledge by: (i) decoding words with short, long, or variant vowels, trigraphs, and blends; (ii) decoding words with silent letters such as knife and gnat; (iii) decoding multisyllabic words with closed syllables; open syllables; VCe syllables; vowel teams, including digraphs and diphthongs; r-controlled syllables; and final stable syllables; (iv) decoding compound words, contractions, and common abbreviations; (v) decoding words using knowledge of syllable division patterns such as VCCV, VCV, and VCCCV; (vi) decoding words with prefixes, including un-, re-, and dis-, and inflectional endings, including -s, -es, -ed, -ing, -er, and -est; and (vii) identifying and reading high-frequency words from a research-based list.	N/A
2.2C	Demonstrate and apply spelling knowledge by: (i) spelling one-syllable and multisyllabic words with closed syllables; open syllables; VCe syllables; vowel teams, including digraphs and diphthongs; r-controlled syllables; and final stable syllables; (ii) spelling words with silent letters such as knife and gnat; (iii) spelling compound words, contractions, and common abbreviations; (iv) spelling multisyllabic words with multiple sound-spelling patterns; (v) spelling words using knowledge of syllable division patterns, including words with double consonants in the middle of the word; and (vi) spelling words with prefixes, including un-, re-, and dis-, and inflectional endings, including -s, -es, -ed, -ing, -er, and -est.	N/A
2.2D	Alphabetize a series of words and use a dictionary or glossary to find words.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
2.2E	Develop handwriting by accurately forming all cursive letters using appropriate strokes when connecting letters.	N/A
2.3A	Use print or digital resources to determine meaning and pronunciation of unknown words.	N/A
2.3B	Use context within and beyond a sentence to determine the meaning of unfamiliar words.	N/A
2.3C	Identify the meaning of and use words with affixes un-, re-, -ly, -er, and -est (comparative and superlative) and -ion/tion/sion.	N/A
2.3D	Identify, use, and explain the meaning of antonyms, synonyms, idioms, and homographs in context.	N/A
2.4	Use appropriate fluency (rate, accuracy, and prosody) when reading grade-level text.	N/A
2.5	Self-select text and read independently for a sustained period of time.	N/A
2.6A	Establish purpose for reading assigned and self-selected texts.	**M1** L1, L26, L27 **M1 SL** L1 **M2** L15 **M2 SL** L1 **M3** L1, L23
2.6B	Generate questions about text before, during, and after reading to deepen understanding and gain information.	**M2** L2, L14 **M3** L1, L21, L24
2.6C	Make and correct or confirm predictions using text features, characteristics of genre, and structures.	**M1** L1, L12, L22 **M1 SL** L8 **M2** L10, L15 **M3** L1, L25 **M3 SL** L8
2.6D	Create mental images to deepen understanding.	**M1** L10, L18 **M1 SL** L9 **M2** L4 **M2 SL** L2, L4, L5 **M3** L3 **M3 SL** L2, L5

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
2.6E	Make connections to personal experiences, ideas in other texts, and society.	**M1** L3, L4, L13, L15, L22, L25, L27, L33, L34 **M1 SL** L1, L2, L13, L14 **M2** L3, L10, L11, L14, L17, L20, L29 **M2 SL** L1, L2, L3, L5, L6 **M3** L17, L29, L30 **M3 SL** L2, L10
2.6F	Make inferences and use evidence to support understanding.	**M1** L2, L10, L12, L13, L23 **M1 SL** L2, L6, L10, L11 **M2** L5, L6 **M3** L1, L15, L22, L27 **M3 SL** L2, L5
2.6G	Evaluate details read to determine key ideas.	**M1** L23, L25 **M3 SL** L8
2.6H	Synthesize information to create new understanding.	**M1** L2, L3, L7, L12, L14, L16, L19, L21, L22, L24, L25, L26 **M1 SL** L2, L6, L8, L12 **M2** L3, L6, L7, L9, L12, L13, L14, L15, L19, L20 **M2 SL** L1, L2, L3, L4 **M3** L1, L3, L6, L9, L11, L13, L21, L23, L25, L27 **M3 SL** L2, L4, L6
2.6I	Monitor comprehension and make adjustments such as re-reading, using background knowledge, checking for visual cues, and asking questions when understanding breaks down.	**M1 SL** L11
2.7A	Describe personal connections to a variety of sources.	**M2 SL** L2
2.7B	Write brief comments on literary or informational texts that demonstrate an understanding of the text.	**M2** L14, L18 **M3 SL** L5
2.7C	Use text evidence to support an appropriate response.	**M1** L10, L12, L16, L24, L26 **M2** L14, L16 **M2 SL** L1, L2 **M3** L1, L9, L17, L20, L22, L24 **M3 SL** L3
2.7D	Retell and paraphrase texts in ways that maintain meaning and logical order.	**M1** L22, L23 **M3** L23 **M3 SL** L5

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
2.7E	Interact with sources in meaningful ways such as illustrating or writing.	**M2** L9, L11, L12, L13 **M3 SL** L3, L4
2.7F	Respond using newly acquired vocabulary as appropriate.	**M1** L3, L5, L12, L24, L32 **M1 SL** L4, L5, L8, L13 **M2** L5, L11, L14, L26 **M2 SL** L4, L5 **M3** L4, L9, L10, L21, L28 **M3 SL** L9
2.8A	Discuss topics and determine theme using text evidence with adult assistance.	N/A
2.8B	Describe the main character's (characters') internal and external traits.	N/A
2.8C	Describe and understand plot elements, including the main events, the conflict, and the resolution, for texts read aloud and independently.	N/A
2.8D	Describe the importance of the setting.	N/A
2.9A	Demonstrate knowledge of distinguishing characteristics of well-known children's literature such as folktales, fables, and fairy tales.	N/A
2.9B	Explain visual patterns and structures in a variety of poems.	N/A
2.9C	Discuss elements of drama such as characters, dialogue, and setting.	N/A
2.9D	Recognize characteristics and structures of informational text, including: (i) the central idea and supporting evidence with adult assistance, (ii) features and graphics to locate and gain information, and (iii) organizational patterns such as chronological order and cause and effect stated explicitly.	N/A
2.9E	Recognize characteristics of persuasive text, including: (i) stating what the author is trying to persuade the reader to think or do and (ii) distinguishing facts from opinion.	N/A
2.9F	Recognize characteristics of multimodal and digital texts.	N/A
2.10A	Discuss the author's purpose for writing text.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
2.10B	Discuss how the use of text structure contributes to the author's purpose.	N/A
2.10C	Discuss the author's use of print and graphic features to achieve specific purposes.	N/A
2.10D	Discuss the use of descriptive, literal, and figurative language.	N/A
2.10E	Identify the use of first or third person in a text.	N/A
2.10F	Identify and explain the use of repetition.	N/A
2.11A	Plan a first draft by generating ideas for writing such as drawing and brainstorming.	**M1** L1, L3 **M1 SL** L2 **M2** L3, L7, L22 **M2 SL** L1, L2 **M3** L1, L6 **M3 SL** L2
2.11B	Develop drafts into a focused piece of writing by: (i) organizing with structure and (ii) developing an idea with specific and relevant details.	N/A
2.11C	Revise drafts by adding, deleting, or rearranging words, phrases, or sentences.	**M1** L3, L12, L14, L16, L19, L21, L22, L24, L25 **M1 SL** L8, L12 **M2** L6, L9, L12, L13, L14, L15, L19, L20 **M2 SL** L3, L4 **M3** L11, L13, L23, L25, L27 **M3 SL** L4, L6, L8
2.11D	Edit drafts using standard English conventions, including: (i) complete sentences with subject-verb agreement; (ii) past, present, and future verb tense; (iii) singular, plural, common, and proper nouns; (iv) adjectives, including articles; (v) adverbs that convey time and adverbs that convey place; (vi) prepositions and prepositional phrases; (vii) pronouns, including subjective, objective, and possessive cases; (viii) coordinating conjunctions to form compound subjects and predicates; (ix) capitalization of months, days of the week, and the salutation and conclusion of a letter; (x) end punctuation, apostrophes in contractions, and commas with items in a series and in dates; and (xi) correct spelling of words with grade-appropriate orthographic patterns and rules and high-frequency words.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
2.11E	Publish and share writing.	N/A
2.12A	Compose literary texts, including personal narratives and poetry.	N/A
2.12B	Compose informational texts, including procedural texts and reports.	N/A
2.12C	Compose correspondence such as thank you notes or letters.	N/A
2.13A	Generate questions for formal and informal inquiry with adult assistance.	**M1** L3, L7, L21 **M2** L3, L8, L11, L14, L21 **M2 SL** L1, L2, L3 **M3** L2, L4, L6, L7, L8, L12, L14, L27 **M3 SL** L1, L2, L7
2.13B	Develop and follow a research plan with adult assistance.	N/A
2.13C	Identify and gather relevant sources and information to answer the questions.	**M1** L28 **M1 SL** L3, L6, L9 **M2 SL** L3 **M3** L1 **M3 SL** L2, L7
2.13D	Identify primary and secondary sources.	N/A
2.13E	Demonstrate understanding of information gathered.	N/A
2.13F	Cite sources appropriately.	N/A
2.13G	Use an appropriate mode of delivery, whether written, oral, or multimodal, to present results.	**M1** L29, L31 **M3** L18

Mathematics

Mathematics is a fundamental tool used in both science and engineering. Throughout the *PhD Science Texas* curriculum, students use mathematics to gather information, make quantitative predictions, conduct investigations, and test and evaluate designs. Many of the thinking processes involved in doing mathematics overlap with the science and engineering practices students use to understand scientific ideas. Some of the most common applications of mathematics in the *PhD Science Texas* curriculum are highlighted in the following sections.

MATHEMATICAL PROCESS STANDARDS

Students apply and develop mathematical processes as they think analytically and quantitatively about scientific phenomena. During scientific investigations, students select and use mathematical tools to make observations and gather data to answer scientific questions. Students use mathematical language and representations to communicate evidence that supports scientific arguments.

GEOMETRY AND MEASUREMENT

Students use physical properties such as size and shape to compare objects, systems, and organisms. During scientific investigations, students apply the skills of measurement to identify cause and effect relationships and to analyze relationships.

DATA ANALYSIS

Throughout the *PhD Science Texas* curriculum, students engage with authentic data sets. Analyzing data related to scientific phenomena helps students generate investigative questions. Students also conduct scientific investigations that produce data. Students collect and organize their data in a way that helps them understand their findings. Then students use mathematics and computational thinking to analyze data and determine whether the data support their claims.

Level 2 Modules and Spotlight Lessons

M1 **Matter** WITH SPOTLIGHT LESSONS ON **Weather Events**

M2 **Sound** WITH SPOTLIGHT LESSONS ON **Objects in the Sky**

M3 **Plants** WITH SPOTLIGHT LESSONS ON **Living Things and Their Environment**

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
2.1A	Apply mathematics to problems arising in everyday life, society, and the workplace.	**M1** L28 **M1 SL** L4, L5, L6, L7, L13 **M2** L19, L25 **M3** L6, L15, L20, L25, L26 **M3 SL** L1
2.1B	Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
2.1C	Select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems.	**M1 SL** L4
2.1D	Communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate.	**M1 SL** L3, L4, L5, L6 **M2** L19 **M3** L6, L15, L26
2.1E	Create and use representations to organize, record, and communicate mathematical ideas.	**M1** L24 **M1 SL** L3, L4, L5, L6 **M2** L19 **M3** L6, L8, L15, L20, L25, L26 **M3 SL** L1
2.1F	Analyze mathematical relationships to connect and communicate mathematical ideas.	N/A
2.1G	Display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.	N/A
2.2A	Use concrete and pictorial models to compose and decompose numbers up to 1,200 in more than one way as a sum of so many thousands, hundreds, tens, and ones.	N/A
2.2B	Use standard, word, and expanded forms to represent numbers up to 1,200.	N/A
2.2C	Generate a number that is greater than or less than a given whole number up to 1,200.	N/A
2.2D	Use place value to compare and order whole numbers up to 1,200 using comparative language, numbers, and symbols (>, <, or =).	N/A
2.2E	Locate the position of a given whole number on an open number line.	**M3** L2
2.2F	Name the whole number that corresponds to a specific point on a number line.	N/A
2.3A	Partition objects into equal parts and name the parts, including halves, fourths, and eighths, using words.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
2.3B	Explain that the more fractional parts used to make a whole, the smaller the part; and the fewer the fractional parts, the larger the part.	N/A
2.3C	Use concrete models to count fractional parts beyond one whole using words and recognize how many parts it takes to equal one whole.	N/A
2.3D	Identify examples and non-examples of halves, fourths, and eighths.	N/A
2.4A	Recall basic facts to add and subtract within 20 with automaticity.	N/A
2.4B	Add up to four two-digit numbers and subtract two-digit numbers using mental strategies and algorithms based on knowledge of place value and properties of operations.	N/A
2.4C	Solve one-step and multi-step word problems involving addition and subtraction within 1,000 using a variety of strategies based on place value, including algorithms.	N/A
2.4D	Generate and solve problem situations for a given mathematical number sentence involving addition and subtraction of whole numbers within 1,000.	N/A
2.5A	Determine the value of a collection of coins up to one dollar.	N/A
2.5B	Use the cent symbol, dollar sign, and the decimal point to name the value of a collection of coins.	N/A
2.6A	Model, create, and describe contextual multiplication situations in which equivalent sets of concrete objects are joined.	N/A
2.6B	Model, create, and describe contextual division situations in which a set of concrete objects is separated into equivalent sets.	N/A
2.7A	Determine whether a number up to 40 is even or odd using pairings of objects to represent the number.	N/A
2.7B	Use an understanding of place value to determine the number that is 10 or 100 more or less than a given number up to 1,200.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
2.7C	Represent and solve addition and subtraction word problems where unknowns may be any one of the terms in the problem.	N/A
2.8A	Create two-dimensional shapes based on given attributes, including number of sides and vertices.	N/A
2.8B	Classify and sort three-dimensional solids, including spheres, cones, cylinders, rectangular prisms (including cubes as special rectangular prisms), and triangular prisms, based on attributes using formal geometric language.	N/A
2.8C	Classify and sort polygons with 12 or fewer sides according to attributes, including identifying the number of sides and number of vertices.	N/A
2.8D	Compose two-dimensional shapes and three-dimensional solids with given properties or attributes.	N/A
2.8E	Decompose two-dimensional shapes such as cutting out a square from a rectangle, dividing a shape in half, or partitioning a rectangle into identical triangles and identify the resulting geometric parts.	N/A
2.9A	Find the length of objects using concrete models for standard units of length.	N/A
2.9B	Describe the inverse relationship between the size of the unit and the number of units needed to equal the length of an object.	N/A
2.9C	Represent whole numbers as distances from any given location on a number line.	N/A
2.9D	Determine the length of an object to the nearest marked unit using rulers, yardsticks, meter sticks, or measuring tapes.	**M1 SL** L4 **M3** L6, L15
2.9E	Determine a solution to a problem involving length, including estimating lengths.	N/A
2.9F	Use concrete models of square units to find the area of a rectangle by covering it with no gaps or overlaps, counting to find the total number of square units, and describing the measurement using a number and the unit.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
2.9G	Read and write time to the nearest one-minute increment using analog and digital clocks and distinguish between a.m. and p.m.	N/A
2.10A	Explain that the length of a bar in a bar graph or the number of pictures in a pictograph represents the number of data points for a given category.	**M1** L24 **M1 SL** L6, L7 **M2 SL** L26 **M3** L8, L25, L26 **M3 SL** L1
2.10B	Organize a collection of data with up to four categories using pictographs and bar graphs with intervals of one or more.	**M1** L24 **M1 SL** L6, L7 **M3** L26 **M3 SL** L1
2.10C	Write and solve one-step word problems involving addition or subtraction using data represented within pictographs and bar graphs with intervals of one.	N/A
2.10D	Draw conclusions and make predictions from information in a graph.	**M1** L24 **M1 SL** L6, L7, L11 **M2** L19 **M3** L8, L20, L25, L26, L27 **M3 SL** L1
2.11A	Calculate how money saved can accumulate into a larger amount over time.	N/A
2.11B	Explain that saving is an alternative to spending.	N/A
2.11C	Distinguish between a deposit and a withdrawal.	N/A
2.11D	Identify examples of borrowing and distinguish between responsible and irresponsible borrowing.	N/A
2.11E	Identify examples of lending and use concepts of benefits and costs to evaluate lending decisions.	N/A
2.11F	Differentiate between producers and consumers and calculate the cost to produce a simple item.	N/A

Social Studies

PhD Science Texas approaches phenomenon-driven instruction by situating scientific phenomena in a cultural context. Students study curated trade texts, artworks, and primary sources that tell the historical and cultural stories surrounding phenomena. They come to see science and engineering as processes of understanding and improving the world in which they live. The following sections highlight some of the social studies content areas students study and the skills they apply while making sense of authentic scientific phenomena.

GEOGRAPHY

Throughout the *PhD Science Texas* curriculum, students apply social studies skills to interpret and analyze geographical information. Students use maps, globes, and other resources to identify and describe physical characteristics of locations where scientific phenomena occur. Students observe natural systems and processes to describe the effects they have on landforms and water bodies.

SCIENCE, TECHNOLOGY, AND SOCIETY

The *PhD Science Texas* curriculum aims to develop scientifically literate citizens. As students identify the contributions of scientists and engineers, they recognize the influence of science, engineering, and technology on society and the natural world. Students explore past and present examples of technology within the context of making sense of scientific phenomena and solving problems.

SOCIAL STUDIES SKILLS

Students apply and develop social studies skills as they build new scientific knowledge. Students gather information from a wide range of authentic resources. Students apply skills, such as sequencing and categorizing, to help interpret information they gather. Then students communicate their knowledge orally or by using written and visual material.

Level 2 Modules and Spotlight Lessons

M1 **Matter** WITH SPOTLIGHT LESSONS ON **Weather Events**

M2 **Sound** WITH SPOTLIGHT LESSONS ON **Objects in the Sky**

M3 **Plants** WITH SPOTLIGHT LESSONS ON **Living Things and Their Environment**

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
2.1A	Explain the significance of various community, state, and national celebrations such as Veterans Day, Memorial Day, Independence Day, and Thanksgiving.	N/A
2.1B	Identify and explain the significance of various community, state, and national landmarks such as monuments and government buildings.	N/A
2.2A	Identify contributions of historical figures, including Thurgood Marshall, Irma Rangel, and Theodore Roosevelt, who have influenced the state and nation.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
2.2B	Describe how people and events have influenced local community history.	N/A
2.3A	Identify and use information on maps and globes using basic map elements such as title, cardinal directions, and legend.	**M1 SL** L1, L11, L12, L13 **M3** L14, L20 **M3 SL** L2
2.3B	Create maps to show places and routes within the home, school, and community.	N/A
2.4A	Identify major landforms and bodies of water, including each of the seven continents and each of the oceans, on maps and globes.	**M1 SL** L1, L11 **M3 SL** L2
2.4B	Locate places, including the local community, Texas, the United States, the state capital, the U.S. capital, and the bordering countries of Canada and Mexico, on maps and globes.	**M1 SL** L1, L9, L10, L11 **M2** L2 **M3** L14 **M3 SL** L1, L9
2.5A	Identify ways in which people have modified the physical environment such as clearing land, building roads, using land for agriculture, and drilling for oil.	**M1 SL** L12 **M2** L1, L2
2.5B	Identify consequences of human modification of the physical environment.	**M2** L2
2.5C	Identify ways people can conserve and replenish Earth's resources.	**M2** L2
2.6A	Explain how work provides income to purchase goods and services.	N/A
2.6B	Explain the choices people can make about earning, spending, and saving money.	N/A
2.7A	Distinguish between producing and consuming.	N/A
2.7B	Identify ways in which people are both producers and consumers.	N/A
2.7C	Trace the development of a product from a natural resource to a finished product.	**M1** L23
2.8A	Identify functions of governments such as establishing order, providing security, and managing conflict.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
2.8B	Identify governmental services in the community such as police and fire protection, libraries, schools, and parks and explain their value to the community.	N/A
2.9A	Name current public officials, including mayor, governor, and president.	N/A
2.9B	Compare the roles of public officials, including mayor, governor, and president.	N/A
2.9C	Identify ways that public officials are selected, including election and appointment to office.	N/A
2.9D	Identify how citizens participate in their own governance through staying informed of what public officials are doing, providing input to them, and volunteering to participate in government functions.	N/A
2.10A	Identify characteristics of good citizenship, including truthfulness, justice, equality, respect for oneself and others, responsibility in daily life, and participation in government by educating oneself about the issues, respectfully holding public officials to their word, and voting.	N/A
2.10B	Identify historical figures and other individuals who have exemplified good citizenship such as Paul Revere, Abigail Adams, World War II Women Airforce Service Pilots (WASPs), Navajo Code Talkers, and Sojourner Truth.	N/A
2.10C	Identify ways to actively practice good citizenship, including involvement in community service.	N/A
2.11A	Recite the Pledge of Allegiance to the United States Flag and the Pledge to the Texas Flag.	N/A
2.11B	Sing, recite, or identify selected patriotic songs, including “The Star-Spangled Banner” and “America the Beautiful.”	N/A
2.11C	Identify symbols such as state and national birds and flowers and Uncle Sam.	N/A
2.11D	Identify how selected symbols, customs, and celebrations reflect an American love of individualism, inventiveness, and freedom.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
2.12A	Identify the significance of various ethnic and/or cultural celebrations.	N/A
2.12B	Compare ethnic and/or cultural celebrations.	N/A
2.13A	Describe how science and technology have affected communication, transportation, and recreation.	**M1 SL** L1, L12, L14 **M2** L19, L20, L21, L22, L23, L24, L25
2.13B	Explain how science and technology have affected the ways in which people meet basic needs.	**M1 SL** L12, L14 **M2** L20
2.14	Identify individuals who have exhibited individualism and inventiveness such as Amelia Earhart and George Washington Carver.	**M1** L23 **M2** L21 **M3** L14, L17
2.15A	Gather information about a topic using a variety of valid oral and visual sources such as interviews, music, pictures, maps, and artifacts.	**M1 SL** L1, L6, L12 **M3** L20, L21, L23 **M3 SL** L2, L8
2.15B	Interpret oral, visual, and print material by sequencing, categorizing, identifying the main idea, predicting, comparing, and contrasting.	**M1** L3 **M1 SL** L3 **M2** L1, L21 **M2 SL** L2 **M3** L14, L20, L21 **M3 SL** L2, L5, L8
2.16A	Describe the order of events by using designations of time periods such as historical and present times.	N/A
2.16B	Apply vocabulary related to chronology, including past, present, and future.	N/A
2.16C	Create and interpret timelines for events in the past and present.	N/A
2.16D	Use social studies terminology correctly.	N/A
2.16E	Express ideas orally based on knowledge and experiences.	**M1** L1, L4, L6, L8, L28, L32 **M2** L15, L16, L26, L27, L28, L29 **M3** L18, L20

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
2.16F	Create written and visual material such as stories, maps, and graphic organizers to express ideas.	**M1** L1, L2, L3, L4, L6, L12, L14, L17, L19, L20, L23, L28, L29 **M1 SL** L2, L3, L8, L11 **M2** L1, L3, L4, L5, L6, L7, L8, L9, L11, L12, L15, L16, L18, L20, L21, L22, L25 **M2 SL** L1, L2, L3 **M3** L1, L2, L3, L6, L11, L12, L14, L16, L19, L22, L23, L24, L27 **M3 SL** L1, L2, L3, L4, L5, L7, L8
2.17	Use problem-solving and decision-making processes to identify a problem, gather information, list and consider options, consider advantages and disadvantages, choose and implement a solution, and evaluate the effectiveness of the solution.	**M1** L27, L28, L29, L30, L31 **M2** L21, L22, L23, L24, L25 **M3** L14, L15, L16, L17, L18

Cross-Content Standards Addressed

Level 3

Texas Essential Knowledge and Skills

English Language Development

PhD Science® Texas follows an integrated approach to science instruction. The science that students learn as they make sense of authentic phenomena becomes the content for meaningful application of English language arts and reading (ELAR) skills. Many of these ELAR skills are required to gather evidence, construct sound scientific arguments, and communicate scientific explanations effectively. Some of the most common applications of ELAR skills in the *PhD Science Texas* curriculum are highlighted in the following sections.

DEVELOPING AND SUSTAINING FOUNDATIONAL LANGUAGE SKILLS: *listening, speaking, discussion, and thinking—oral language*

Students apply and develop oral language skills as they engage in scientific discourse. During instructional routines such as Think–Pair–Share, Inside–Outside Circles, and Link Up, students develop social communication skills while they work collaboratively by actively listening and sharing scientific ideas. Students further apply these skills during key knowledge-distilling moments such as Socratic Seminars, the Share stage of the engineering design process, assessment debriefs, investigations, and anchor model updates.

COMPREHENSION SKILLS: *listening, speaking, reading, writing, and thinking using multiple texts*

Students apply and develop metacognitive skills to deepen comprehension as they make sense of scientific phenomena. *PhD Science Texas* uses authentic texts in lessons to highlight coherence and build knowledge while allowing students to experience meaningful connections across content areas. Before students engage with texts (written texts, videos, audio recordings, and artwork), they may establish a purpose for reading, generate questions, and make predictions. Students also make connections, infer, and synthesize information to uncover and distill new science knowledge.

INQUIRY AND RESEARCH: *listening, speaking, reading, writing, and thinking using multiple texts*

Students apply and develop writing and research skills as they build and communicate scientific knowledge. As students observe and discuss various sources, they generate questions for inquiry and identify relevant sources of information to answer such questions. These questions are added to a driving question board or used to develop a Phenomenon Question that drives student learning. Students make their thinking visible through drawing or writing. Students draft and revise their ideas many times throughout the learning cycle. Evidence of students' thinking can be found on anchor charts, anchor models, and Science Logbook pages. Through structured conversations, such as the Share stage of the engineering design process, students use appropriate modes of delivery to present their scientific ideas.

Level 3 Modules and Spotlight Lessons

M1 **Earth Changes** WITH SPOTLIGHT LESSONS ON **Changes in Matter**

M2 **Survival and Change**

M3 **Forces and Motion** WITH SPOTLIGHT LESSONS ON **the Solar System**

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
3.1A	Listen actively, ask relevant questions to clarify information, and make pertinent comments.	**M1** L1, L2, L9, L18, L21, L23 **M1 SL** L8, L10 **M2** L13, L14, L15, L17, L26, L29, L30 **M3** L1, L6, L7, L11, L14, L22, L27 **M3 SL** L1, L2, L6, L7
3.1B	Follow, restate, and give oral instructions that involve a series of related sequences of action.	**M1** L5, L16, L21 **M1 SL** L6 **M2** L9, L10, L13, L14, L21 **M3** L2, L6, L9, L11, L17 **M3 SL** L2, L4, L6, L7
3.1C	Speak coherently about the topic under discussion, employing eye contact, speaking rate, volume, enunciation, and the conventions of language to communicate ideas effectively.	**M1** L1, L9, L18, L23, L25 **M1 SL** L8, L10 **M2** L14, L15, L17, L20, L29, L30, L32 **M3** L4, L8, L11, L14, L20, L22, L27, L30 **M3 SL** L1, L2, L3, L6, L7, L8, L9
3.1D	Work collaboratively with others by following agreed-upon rules, norms, and protocols.	**M1** L4, L9, L16, L23 **M1 SL** L5, L8 **M2** L13, L14, L21, L28, L29, L30 **M3** L1, L8, L15, L17, L20, L23, L27 **M3 SL** L2, L4, L6, L7
3.1E	Develop social communication such as conversing politely in all situations.	**M1** L18, L21, L23 **M1 SL** L10 **M2** L14, L15, L29, L30 **M3** L8, L14, L22, L27 **M3 SL** L2

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
3.2A	Demonstrate and apply phonetic knowledge by: (i) decoding multisyllabic words with multiple sound-spelling patterns such as eigh, ough, and en; (ii) decoding multisyllabic words with closed syllables; open syllables; VCe syllables; vowel teams, including digraphs and diphthongs; r-controlled syllables; and final stable syllables; (iii) decoding compound words, contractions, and abbreviations; (iv) decoding words using knowledge of syllable division patterns such as VCCV, VCV, and VCCCV with accent shifts; (v) decoding words using knowledge of prefixes; (vi) decoding words using knowledge of suffixes, including how they can change base words such as dropping e, changing y to i, and doubling final consonants; and (vii) identifying and reading high-frequency words from a research-based list.	N/A
3.2B	Demonstrate and apply spelling knowledge by: (i) spelling multisyllabic words with closed syllables; open syllables; VCe syllables; vowel teams, including digraphs and diphthongs; r-controlled syllables; and final stable syllables; (ii) spelling homophones; (iii) spelling compound words, contractions, and abbreviations; (iv) spelling multisyllabic words with multiple sound-spelling patterns; (v) spelling words using knowledge of syllable division patterns such as VCCV, VCV, and VCCCV; (vi) spelling words using knowledge of prefixes; and (vii) spelling words using knowledge of suffixes, including how they can change base words such as dropping e, changing y to i, and doubling final consonants.	N/A
3.2C	Alphabetize a series of words to the third letter.	N/A
3.2D	Write complete words, thoughts, and answers legibly in cursive, leaving appropriate spaces between words.	N/A
3.3A	Use print or digital resources to determine meaning, syllabication, and pronunciation.	**M1** L10 **M2** L17 **M3** L22
3.3B	Use context within and beyond a sentence to determine the meaning of unfamiliar words and multiple-meaning words.	**M2** L15

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
3.3C	Identify the meaning of and use words with affixes such as im- (into), non-, dis-, in- (not, non), pre-, -ness, -y, and -ful.	N/A
3.3D	Identify, use, and explain the meaning of antonyms, synonyms, idioms, homophones, and homographs in a text.	N/A
3.4	Use appropriate fluency (rate, accuracy, and prosody) when reading grade-level text.	**M1** L10, L21 **M2** L17 **M3** L22
3.5	Self-select text and read independently for a sustained period of time.	N/A
3.6A	Establish purpose for reading assigned and self-selected texts.	**M1** L2, L10, L14, L20, L21, L23 **M2** L15, L16, L17, L23, L26 **M3** L7, L13, L22
3.6B	Generate questions about text before, during, and after reading to deepen understanding and gain information.	**M1** L2, L21, L23 **M2** L1, L12, L15
3.6C	Make and correct or confirm predictions using text features, characteristics of genre, and structures.	**M1** L2, L10 **M2** L1, L12, L15, L23 **M3** L1, L6, L7, L8, L15 **M3 SL** L2
3.6D	Create mental images to deepen understanding.	**M1** L2, L3, L12 **M3** L1, L14 **M3 SL** L6
3.6E	Make connections to personal experiences, ideas in other texts, and society.	**M1** L3, L5, L20, L21 **M1 SL** L1, L3 **M2** L1, L4, L6, L14, L23 **M3** L1, L2, L3, L6, L7, L11, L13 **M3 SL** L2, L3, L4, L6, L22
3.6F	Make inferences and use evidence to support understanding.	**M1** L2, L8, L12, L13, L18 **M1 SL** L4 **M2** L5, L9, L11, L12, L13, L14 **M3** L1, L3, L6, L9, L12, L16, L17 **M3 SL** L2
3.6G	Evaluate details read to determine key ideas.	**M2** L26

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
3.6H	Synthesize information to create new understanding.	**M1** L2, L4, L6, L7, L9, L12, L13, L21, L22 **M1 SL** L2, L3, L5, L10 **M2** L1, L5, L9, L10, L11, L13, L14, L16, L17, L21, L22, L23, L24, L25 **M3** L3, L5, L6, L9, L10, L13, L14, L18, L20, L21 **M3 SL** L1, L2, L3, L4, L5, L6, L7
3.6I	Monitor comprehension and make adjustments such as re-reading, using background knowledge, asking questions, and annotating when understanding breaks down.	**M2** L17 **M3** L22
3.7A	Describe personal connections to a variety of sources, including self-selected texts.	N/A
3.7B	Write a response to a literary or informational text that demonstrates an understanding of a text.	**M2** L17 **M3** L22
3.7C	Use text evidence to support an appropriate response.	**M1** L2, L10, L11, L20 **M2** L16, L17 **M3** L7, L22
3.7D	Retell and paraphrase texts in ways that maintain meaning and logical order.	**M2** L16
3.7E	Interact with sources in meaningful ways such as notetaking, annotating, freewriting, or illustrating.	**M1** L2, L3, L9, L12, L14 **M1 SL** L5 **M2** L10, L15, L18, L19, L24 **M3** L1, L2, L4, L23 **M3 SL** L1, L2, L3, L5, L8
3.7F	Respond using newly acquired vocabulary as appropriate.	**M1** L4, L22 **M1 SL** L3, L4 **M2** L1, L13, L15, L30 **M3** L4
3.7G	Discuss specific ideas in the text that are important to the meaning.	**M1** L10, L20 **M2** L16, L17 **M3** L22
3.8A	Infer the theme of a work, distinguishing theme from topic.	N/A
3.8B	Explain the relationships among the major and minor characters.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
3.8C	Analyze plot elements, including the sequence of events, the conflict, and the resolution.	N/A
3.8D	Explain the influence of the setting on the plot.	N/A
3.9A	Demonstrate knowledge of distinguishing characteristics of well-known children's literature such as folktales, fables, fairy tales, legends, and myths.	N/A
3.9B	Explain rhyme scheme, sound devices, and structural elements such as stanzas in a variety of poems.	N/A
3.9C	Discuss elements of drama such as characters, dialogue, setting, and acts.	N/A
3.9D	Recognize characteristics and structures of informational text, including: (i) the central idea with supporting evidence; (ii) features such as sections, tables, graphs, timelines, bullets, numbers, and bold and italicized font to support understanding; and (iii) organizational patterns such as cause and effect and problem and solution.	N/A
3.9E	Recognize characteristics and structures of argumentative text by: (i) identifying the claim, (ii) distinguishing facts from opinion, and (iii) identifying the intended audience or reader.	N/A
3.9F	Recognize characteristics of multimodal and digital texts.	N/A
3.10A	Explain the author's purpose and message within a text.	**M1** L2
3.10B	Explain how the use of text structure contributes to the author's purpose.	N/A
3.10C	Explain the author's use of print and graphic features to achieve specific purposes.	N/A
3.10D	Describe how the author's use of imagery, literal and figurative language such as simile, and sound devices such as onomatopoeia achieves specific purposes.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
3.10E	Identify the use of literary devices, including first- or third-person point of view.	N/A
3.10F	Discuss how the author's use of language contributes to voice.	N/A
3.10G	Identify and explain the use of hyperbole.	N/A
3.11A	Plan a first draft by selecting a genre for a particular topic, purpose, and audience using a range of strategies such as brainstorming, freewriting, and mapping.	**M1** L2, L4 **M2** L1, L9, L10 **M3** L2, L11, L16 **M3 SL** L1
3.11B	Develop drafts into a focused, structured, and coherent piece of writing by: (i) organizing with purposeful structure, including an introduction and a conclusion, and (ii) developing an engaging idea with relevant detail.	N/A
3.11C	Revise drafts to improve sentence structure and word choice by adding, deleting, combining, and rearranging ideas for coherence and clarity.	**M1** L7, L13, L22 **M2** L9, L11, L14, L17, L22 **M3** L3, L6, L9, L14, L16, L18, L21 **M3 SL** L2, L3, L5, L7
3.11D	Edit drafts using standard English conventions, including: (i) complete simple and compound sentences with subject-verb agreement; (ii) past, present, and future verb tense; (iii) singular, plural, common, and proper nouns; (iv) adjectives, including their comparative and superlative forms; (v) adverbs that convey time and adverbs that convey manner; (vi) prepositions and prepositional phrases; (vii) pronouns, including subjective, objective, and possessive cases; (viii) coordinating conjunctions to form compound subjects, predicates, and sentences; (ix) capitalization of official titles of people, holidays, and geographical names and places; (x) punctuation marks, including apostrophes in contractions and possessives and commas in compound sentences and items in a series; and (xi) correct spelling of words with grade-appropriate orthographic patterns and rules and high-frequency words.	N/A
3.11E	Publish written work for appropriate audiences.	**M2** L28

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
3.12A	Compose literary texts, including personal narratives and poetry, using genre characteristics and craft.	N/A
3.12B	Compose informational texts, including brief compositions that convey information about a topic, using a clear central idea and genre characteristics and craft.	N/A
3.12C	Compose argumentative texts, including opinion essays, using genre characteristics and craft.	N/A
3.12D	Compose correspondence such as thank you notes or letters.	**M2** L28
3.13A	Generate questions on a topic for formal and informal inquiry.	**M1** L2, L5, L9, L12, L13, L19 **M1 SL** L3 **M2** L1, L2, L3, L4, L8, L9, L11, L18, L19, L27 **M3** L3, L9, L15, L16, L18, L19, L21 **M3 SL** L3, L4, L7
3.13B	Develop and follow a research plan with adult assistance.	**M3** L4, L15 **M3 SL** L2
3.13C	Identify and gather relevant information from a variety of sources.	**M1** L5, L7, L10, L12, L20 **M2** L3, L4, L6, L12, L15 **M3** L1, L22, L23
3.13D	Identify primary and secondary sources.	N/A
3.13E	Demonstrate understanding of information gathered.	**M1** L2, L4, L6, L9, L12, L13, L21, L22 **M1 SL** L2, L3, L5, L10 **M2** L5, L9, L10, L11, L14, L16, L17, L22, L25 **M3** L5, L6, L9, L10, L13, L14, L18, L20, L21 **M3 SL** L1, L2, L4, L6
3.13F	Recognize the difference between paraphrasing and plagiarism when using source materials.	N/A
3.13G	Create a works cited page.	N/A
3.13H	Use an appropriate mode of delivery, whether written, oral, or multimodal, to present results.	**M1** L18 **M1 SL** L10 **M2** L17, L25, L28 **M3 SL** L1, L6

Mathematics

Mathematics is a fundamental tool used in both science and engineering. Throughout the *PhD Science Texas* curriculum, students use mathematics to gather information, make quantitative predictions, conduct investigations, and test and evaluate designs. Many of the thinking processes involved in doing mathematics overlap with the science and engineering practices students use to understand scientific ideas. Some of the most common applications of mathematics in the *PhD Science Texas* curriculum are highlighted in the following sections.

MATHEMATICAL PROCESS STANDARDS

Students apply and develop mathematical processes as they think analytically and quantitatively about scientific phenomena. During scientific investigations students select and use mathematical tools to make observations and gather data to answer scientific questions. Students use mathematical language and representations to communicate evidence that supports scientific arguments.

GEOMETRY AND MEASUREMENT

Students use physical properties such as size and shape to compare objects, systems, and organisms. During scientific investigations, students apply the skills of measurement to gather quantifiable data and use the data to identify cause and effect relationships.

DATA ANALYSIS

Throughout the *PhD Science Texas* curriculum, students engage with authentic data sets. Analyzing data related to scientific phenomena helps students generate investigative questions. Students also conduct scientific investigations that produce data. Students collect and organize their data in a way that helps them understand their findings. Then students use mathematics and computational thinking to analyze data and determine whether the data support their claims.

Level 3 Modules and Spotlight Lessons

M1 **Earth Changes** WITH SPOTLIGHT LESSONS ON **Changes in Matter**

M2 **Survival and Change**

M3 **Forces and Motion** WITH SPOTLIGHT LESSONS ON **the Solar System**

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
3.1A	Apply mathematics to problems arising in everyday life, society, and the workplace.	**M1** L10, L15, L17 **M2** L3, L6, L26 **M3** L4, L5, L7, L8, L11, L16 **M3 SL** L2, L4
3.1B	Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
3.1C	Select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems.	**M1** L8 **M2** L2, L3, L6, L23 **M3** L4, L5, L7, L8, L9, L11, L12, L14, L15, L17, L24, L29 **M3 SL** L2, L4, L5
3.1D	Communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate.	**M2** L6, L7, L8, L11, L26 **M3** L8, L9, L15, L16 **M3 SL** L2, L5
3.1E	Create and use representations to organize, record, and communicate mathematical ideas.	**M1** L21 **M2** L3, L8 **M3** L8, L9, L16, L24 **M3 SL** L2
3.1F	Analyze mathematical relationships to connect and communicate mathematical ideas.	**M1** L8, L20 **M3** L8, L9, L16
3.1G	Display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.	**M3** L8
3.2A	Compose and decompose numbers up to 100,000 as a sum of so many ten thousands, so many thousands, so many hundreds, so many tens, and so many ones using objects, pictorial models, and numbers, including expanded notation as appropriate.	N/A
3.2B	Describe the mathematical relationships found in the base-10 place value system through the hundred thousands place.	N/A
3.2C	Represent a number on a number line as being between two consecutive multiples of 10; 100; 1,000; or 10,000 and use words to describe relative size of numbers in order to round whole numbers.	N/A
3.2D	Compare and order whole numbers up to 100,000 and represent comparisons using the symbols >, <, or =.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
3.3A	Represent fractions greater than zero and less than or equal to one with denominators of 2, 3, 4, 6, and 8 using concrete objects and pictorial models, including strip diagrams and number lines.	N/A
3.3B	Determine the corresponding fraction greater than zero and less than or equal to one with denominators of 2, 3, 4, 6, and 8 given a specified point on a number line.	N/A
3.3C	Explain that the unit fraction 1/b represents the quantity formed by one part of a whole that has been partitioned into b equal parts where b is a non-zero whole number.	N/A
3.3D	Compose and decompose a fraction a/b with a numerator greater than zero and less than or equal to b as a sum of parts 1/b.	N/A
3.3E	Solve problems involving partitioning an object or a set of objects among two or more recipients using pictorial representations of fractions with denominators of 2, 3, 4, 6, and 8.	N/A
3.3F	Represent equivalent fractions with denominators of 2, 3, 4, 6, and 8 using a variety of objects and pictorial models, including number lines.	N/A
3.3G	Explain that two fractions are equivalent if and only if they are both represented by the same point on the number line or represent the same portion of a same size whole for an area model.	N/A
3.3H	Compare two fractions having the same numerator or denominator in problems by reasoning about their sizes and justifying the conclusion using symbols, words, objects, and pictorial models.	N/A
3.4A	Solve with fluency one-step and two-step problems involving addition and subtraction within 1,000 using strategies based on place value, properties of operations, and the relationship between addition and subtraction.	**M3** L8, L16, L24 **M3 SL** L5

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
3.4B	Round to the nearest 10 or 100 or use compatible numbers to estimate solutions to addition and subtraction problems.	N/A
3.4C	Determine the value of a collection of coins and bills.	N/A
3.4D	Determine the total number of objects when equally sized groups of objects are combined or arranged in arrays up to 10 by 10.	N/A
3.4E	Represent multiplication facts by using a variety of approaches such as repeated addition, equal-sized groups, arrays, area models, equal jumps on a number line, and skip counting.	N/A
3.4F	Recall facts to multiply up to 10 by 10 with automaticity and recall the corresponding division facts.	N/A
3.4G	Use strategies and algorithms, including the standard algorithm, to multiply a two-digit number by a one-digit number. Strategies may include mental math, partial products, and the commutative, associative, and distributive properties.	N/A
3.4H	Determine the number of objects in each group when a set of objects is partitioned into equal shares or a set of objects is shared equally.	N/A
3.4I	Determine if a number is even or odd using divisibility rules.	N/A
3.4J	Determine a quotient using the relationship between multiplication and division.	N/A
3.4K	Solve one-step and two-step problems involving multiplication and division within 100 using strategies based on objects; pictorial models, including arrays, area models, and equal groups; properties of operations; or recall of facts.	N/A
3.5A	Represent one- and two-step problems involving addition and subtraction of whole numbers to 1,000 using pictorial models, number lines, and equations.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
3.5B	Represent and solve one- and two-step multiplication and division problems within 100 using arrays, strip diagrams, and equations.	N/A
3.5C	Describe a multiplication expression as a comparison such as 3 × 24 represents 3 times as much as 24.	N/A
3.5D	Determine the unknown whole number in a multiplication or division equation relating three whole numbers when the unknown is either a missing factor or product.	N/A
3.5E	Represent real-world relationships using number pairs in a table and verbal descriptions.	N/A
3.6A	Classify and sort two- and three-dimensional figures, including cones, cylinders, spheres, triangular and rectangular prisms, and cubes, based on attributes using formal geometric language.	N/A
3.6B	Use attributes to recognize rhombuses, parallelograms, trapezoids, rectangles, and squares as examples of quadrilaterals and draw examples of quadrilaterals that do not belong to any of these subcategories.	N/A
3.6C	Determine the area of rectangles with whole number side lengths in problems using multiplication related to the number of rows times the number of unit squares in each row.	N/A
3.6D	Decompose composite figures formed by rectangles into non-overlapping rectangles to determine the area of the original figure using the additive property of area.	N/A
3.6E	Decompose two congruent two-dimensional figures into parts with equal areas and express the area of each part as a unit fraction of the whole and recognize that equal shares of identical wholes need not have the same shape.	N/A
3.7A	Represent fractions of halves, fourths, and eighths as distances from zero on a number line.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
3.7B	Determine the perimeter of a polygon or a missing length when given perimeter and remaining side lengths in problems.	N/A
3.7C	Determine the solutions to problems involving addition and subtraction of time intervals in minutes using pictorial models or tools such as a 15-minute event plus a 30-minute event equals 45 minutes.	N/A
3.7D	Determine when it is appropriate to use measurements of liquid volume (capacity) or weight.	N/A
3.7E	Determine liquid volume (capacity) or weight using appropriate units and tools.	N/A
3.8A	Summarize a data set with multiple categories using a frequency table, dot plot, pictograph, or bar graph with scaled intervals.	**M3** L8, L9, L16
3.8B	Solve one- and two-step problems using categorical data represented with a frequency table, dot plot, pictograph, or bar graph with scaled intervals.	**M3** L8
3.9A	Explain the connection between human capital/labor and income.	N/A
3.9B	Describe the relationship between the availability or scarcity of resources and how that impacts cost.	N/A
3.9C	Identify the costs and benefits of planned and unplanned spending decisions.	N/A
3.9D	Explain that credit is used when wants or needs exceed the ability to pay and that it is the borrower's responsibility to pay it back to the lender, usually with interest.	N/A
3.9E	List reasons to save and explain the benefit of a savings plan, including for college.	N/A
3.9F	Identify decisions involving income, spending, saving, credit, and charitable giving.	N/A

Social Studies

PhD Science Texas approaches phenomenon-driven instruction by situating scientific phenomena in a cultural context. Students study curated trade texts, artworks, and primary sources that tell the historical and cultural stories surrounding phenomena. They come to see science and engineering as processes of understanding and improving the world in which they live. The following sections highlight some of the social studies content areas students study and the skills they apply while making sense of authentic scientific phenomena.

GEOGRAPHY

Throughout the *PhD Science Texas* curriculum, students apply social studies skills to interpret and analyze geographical information. Students use maps, globes, and other resources to identify and describe physical characteristics of locations where scientific phenomena occur. Students observe natural systems and processes to describe the effects they have on landforms and water bodies. They design solutions that model how humans can reduce impacts of natural and human processes on the physical environment.

SCIENCE, TECHNOLOGY, AND SOCIETY

The *PhD Science Texas* curriculum aims to develop scientifically literate citizens. As students identify the contributions of scientists and engineers, they recognize the influence of science, engineering, and technology on society and the natural world. Students explore past and present examples of technology within the context of making sense of scientific phenomena and solving problems.

SOCIAL STUDIES SKILLS

Students apply and develop social studies skills as they seek to build new scientific knowledge. Students gather information from a wide range of authentic resources. Students apply skills such as sequencing and categorizing to help interpret information they gather. Then students communicate their knowledge orally or by using written and visual material.

Level 3 Modules and Spotlight Lessons

M1 **Earth Changes** WITH SPOTLIGHT LESSONS ON **Changes in Matter**

M2 **Survival and Change**

M3 **Forces and Motion** WITH SPOTLIGHT LESSONS ON **the Solar System**

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
3.1A	Describe how individuals, events, and ideas have changed communities, past and present.	**M1** L9 **M2** L24, L25, L28
3.1B	Identify individuals, including Pierre-Charles L'Enfant, Benjamin Banneker, and Benjamin Franklin, who have helped to shape communities.	N/A
3.1C	Describe how individuals, including Daniel Boone and the Founding Fathers, have contributed to the expansion of existing communities or to the creation of new communities.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
3.2A	Identify reasons people have formed communities, including a need for security and laws, religious freedom, and material well-being.	N/A
3.2B	Compare ways in which people in the local community and other communities meet their needs for government, education, communication, transportation, and recreation.	N/A
3.3A	Describe similarities and differences in the physical environment, including climate, landforms, natural resources, and natural hazards.	**M1** L6, L14, L15 **M2** L4, L10
3.3B	Identify and compare how people in different communities adapt to or modify the physical environment in which they live such as deserts, mountains, wetlands, and plains.	**M1** L9, L12
3.3C	Describe the effects of human processes such as building new homes, conservation, and pollution in shaping the landscape.	**M1** L9, L16 **M2** L28
3.4A	Use cardinal and intermediate directions to locate places on maps and globes in relation to the local community.	**M2** L7, L27, L28
3.4B	Use a scale to determine the distance between places on maps and globes.	N/A
3.4C	Identify, create, and interpret maps of places that contain map elements, including a title, compass rose, legend, scale, and grid system.	**M2** L27, L28
3.5A	Identify ways of earning, spending, saving, and donating money.	N/A
3.5B	Create a simple budget that allocates money for spending and saving.	N/A
3.6A	Explain how supply and demand affect the price of a good or service.	N/A
3.6B	Define and identify examples of scarcity.	N/A
3.6C	Explain how the cost of production and selling price affect profits.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
3.6D	Identify individuals, past and present, such as Henry Ford and Sam Walton who have started new businesses.	**M1** L14 **M2** L26
3.7A	Describe the basic structure of government in the local community, state, and nation.	N/A
3.7B	Identify local, state, and national government officials and explain how they are chosen.	N/A
3.7C	Identify services commonly provided by local, state, and national governments.	N/A
3.8A	Identify the purposes of the Declaration of Independence and the U.S. Constitution, including the Bill of Rights.	N/A
3.8B	Describe the concept of "consent of the governed."	N/A
3.9A	Identify characteristics of good citizenship, including truthfulness, justice, equality, respect for oneself and others, responsibility in daily life, and participation in government by educating oneself about the issues, respectfully holding public officials to their word, and voting.	N/A
3.9B	Identify figures such as Helen Keller, Clara Barton, and Ruby Bridges who exemplify good citizenship.	N/A
3.9C	Identify and describe individual acts of civic responsibility, including obeying laws, serving and improving the community, serving on a jury, and voting.	N/A
3.9D	Identify examples of nonprofit and/or civic organizations such as the Red Cross and explain how they serve the common good.	N/A
3.10A	Explain the significance of various ethnic and/or cultural celebrations in the local community and other communities.	N/A
3.10B	Compare ethnic and/or cultural celebrations in the local community with other communities.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
3.11A	Identify and describe the heroic deeds of state and national heroes and military and first responders such as Hector P. Garcia, James A. Lovell, and the Four Chaplains.	N/A
3.11B	Identify and describe the heroic deeds of individuals such as Harriet Tubman, Todd Beamer, and other contemporary heroes.	N/A
3.12	Identify how various writers and artists such as Kadir Nelson, Tomie dePaola, Carmen Lomas Garza, and Laura Ingalls Wilder and their stories, poems, statues, and paintings contribute to the cultural heritage of communities.	N/A
3.13A	Identify individuals who have discovered scientific breakthroughs or created or invented new technology such as Jonas Salk, Cyrus McCormick, Bill Gates, Louis Pasteur, and others.	**M1** L14 **M2** L26 **M3** L13, L23
3.13B	Describe the impact of scientific breakthroughs and new technology in computers, pasteurization, and medical vaccines on various communities.	N/A
3.14A	Gather information, including historical and current events and geographic data, about the community using a variety of resources.	**M2** L4, L5
3.14B	Interpret oral, visual, and print material by sequencing, categorizing, identifying the main idea, distinguishing between fact and opinion, identifying cause and effect, comparing, and contrasting.	**M1** L19, L20 **M2** L1, L4, L5, L8, L9, L10, L12, L13, L20, L24, L26 **M3** L2, L5, L10, L12, L19, L20 **M3 SL** L1, L2, L3, L4, L5, L6, L7
3.14C	Interpret and create visuals, including graphs, charts, tables, timelines, illustrations, and maps.	**M1** L16, L19 **M1 SL** L10 **M2** L6, L12, L19, L24, L26 **M3** L5, L10, L15, L19, L23, L25, L26 **M3 SL** L2
3.15A	Use social studies terminology correctly.	N/A
3.15B	Create and interpret timelines.	**M1** L19 **M2** L2

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
3.15C	Apply the terms year, decade, and century to describe historical times.	N/A
3.15D	Express ideas orally based on knowledge and experiences.	**M1** L12, L13, L25 **M1 SL** L5 **M2** L5, L11, L13, L32 **M3** L8, L11, L26, L30 **M3 SL** L9
3.15E	Create written and visual material such as stories, pictures, maps, and graphic organizers to express ideas.	**M1** L2, L4, L10, L16, L17 **M1 SL** L2, L3, L7, L10 **M2** L5, L12, L15, L24, L26 **M3** L5, L6, L8, L10, L11, L12, L13, L14, L15, L16, L17, L20, L22, L23, L24 **M3 SL** L1, L2, L4, L5, L8
3.16	Use problem-solving and decision-making processes to identify a problem, gather information, list and consider options, consider advantages and disadvantages, choose and implement a solution, and evaluate the effectiveness of the solution.	**M1** L14, L15, L16, L17, L18 **M1 SL** L6, L7, L8, L9, L10 **M2** L26, L27, L28, L29 **M3** L22, L23, L24, L25, L26, L27

Cross-Content Standards Addressed

Level 4

Texas Essential Knowledge and Skills

English Language Development

PhD Science® Texas follows an integrated approach to science instruction. The science that students learn as they make sense of authentic phenomena becomes the content for meaningful application of English language arts and reading (ELAR) skills. Many of these ELAR skills are required to gather evidence, construct sound scientific arguments, and communicate scientific explanations effectively. Some of the most common applications of ELAR skills in the *PhD Science Texas* curriculum are highlighted in the following sections.

DEVELOPING AND SUSTAINING FOUNDATIONAL LANGUAGE SKILLS: *listening, speaking, discussion, and thinking—oral language*

Students apply and develop oral language skills as they engage in scientific discourse. During instructional routines such as Think–Pair–Share, Inside–Outside Circles, and Link Up, students develop social communication skills while they work collaboratively by actively listening and sharing scientific ideas. Students further apply these skills during key knowledge-distilling moments such as Socratic Seminars, the Share stage of the engineering design process, assessment debriefs, investigations, and anchor model updates.

COMPREHENSION SKILLS: *listening, speaking, reading, writing, and thinking using multiple texts*

Students apply and develop metacognitive skills to deepen comprehension as they make sense of scientific phenomena. *PhD Science Texas* uses authentic texts in lessons to highlight coherence and build knowledge while allowing students to experience meaningful connections across content areas. Before students engage with texts (written texts, videos, audio recordings, and artwork), they may establish a purpose for reading, generate questions, and make predictions. Students also make connections, infer, and synthesize information to uncover and distill new science knowledge.

INQUIRY AND RESEARCH: *listening, speaking, reading, writing, and thinking using multiple texts*

Students apply and develop writing and research skills as they build and communicate scientific knowledge. As students observe and discuss various sources, they generate questions for inquiry and identify relevant sources of information to answer such questions. These questions are added to a driving question board or used to develop a Phenomenon Question that drives student learning. Students make their thinking visible through drawing or writing. Students draft and revise their ideas many times throughout the learning cycle. Evidence of students' thinking can be found on anchor charts, anchor models, and Science Logbook pages. Through structured conversations, such as the Share stage of the engineering design process, students use appropriate modes of delivery to present their scientific ideas.

Level 4 Modules and Spotlight Lessons

M1 **Earth Features** WITH SPOTLIGHT LESSONS ON **Mixtures and Solutions**

M2 **Energy** WITH SPOTLIGHT LESSONS ON **Earth and Space**

M3 **Plants in the Environment**

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
4.1A	Listen actively, ask relevant questions to clarify information, and make pertinent comments.	**M1** L1, L2, L3, L5, L6, L8, L11, L12, L13, L16, L17, L18, L19, L20, L22, L23, L24, L25, L26 **M1 SL** L1, L2, L5, L6 **M2** L2, L3, L5, L9, L11, L12, L14, L15, L19, L20, L22, L23, L25, L26, L27, L28 **M2 SL** L1, L4, L5, L6 **M3** L1, L2, L3, L4, L5, L6, L7, L8, L10, L12, L13, L15, L16, L17, L18, L20, L21, L22
4.1B	Follow, restate, and give oral instructions that involve a series of related sequences of action.	**M1** L15, L16, L22, L23, L24, L26 **M1 SL** L1, L4 **M2** L6, L16, L22, L25, L27 **M2 SL** L2, L4 **M3** L5, L6, L7, L9, L15, L17, L18, L22
4.1C	Express an opinion supported by accurate information, employing eye contact, speaking rate, volume, enunciation, and the conventions of language to communicate ideas effectively.	**M1** L8, L11, L12, L16, L18, L20, L26 **M1 SL** L1 **M2** L13, L14, L15, L22, L27, L28 **M2 SL** L5 **M3** L4, L7, L10, L17, L22
4.1D	Work collaboratively with others to develop a plan of shared responsibilities.	**M1** L17 **M2** L7
4.2A	Demonstrate and apply phonetic knowledge by: (i) decoding words with specific orthographic patterns and rules, including regular and irregular plurals; (ii) decoding multisyllabic words with closed syllables; open syllables; VCe syllables; vowel teams, including digraphs and diphthongs; r-controlled syllables; and final stable syllables; (iii) decoding words using advanced knowledge of syllable division patterns such as VV; (iv) decoding words using knowledge of prefixes; (v) decoding words using knowledge of suffixes, including how they can change base words such as dropping e, changing y to i, and doubling final consonants; and (vi) identifying and reading high-frequency words from a research-based list.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
4.2B	Demonstrate and apply spelling knowledge by: (i) spelling multisyllabic words with closed syllables; open syllables; VCe syllables; vowel teams, including digraphs and diphthongs; r-controlled syllables; and final stable syllables; (ii) spelling homophones; (iii) spelling multisyllabic words with multiple sound-spelling patterns; (iv) spelling words using advanced knowledge of syllable division patterns; (v) spelling words using knowledge of prefixes; and (vi) spelling words using knowledge of suffixes, including how they can change base words such as dropping e, changing y to i, and doubling final consonants.	N/A
4.2C	Write legibly in cursive to complete assignments.	N/A
4.3A	Use print or digital resources to determine meaning, syllabication, and pronunciation.	**M1** L22, L24 **M1 SL** L1
4.3B	Use context within and beyond a sentence to determine the relevant meaning of unfamiliar words or multiple-meaning words.	N/A
4.3C	Determine the meaning of and use words with affixes such as mis-, sub-, -ment, and -ity/ty and roots such as auto, graph, and meter.	**M2** L8
4.3D	Identify, use, and explain the meaning of homophones such as reign/rain.	N/A
4.4	Use appropriate fluency (rate, accuracy, and prosody) when reading grade-level text.	**M1** L22, L24 **M1 SL** L1 **M3** L16, L21
4.5	Self-select text and read independently for a sustained period of time.	N/A
4.6A	Establish purpose for reading assigned and self-selected texts.	**M1** L5, L13, L21, L22, L24 **M1 SL** L1 **M2** L2 **M3** L6, L15, L16, L21
4.6B	Generate questions about text before, during, and after reading to deepen understanding and gain information.	**M1** L5, L21
4.6C	Make and correct or confirm predictions using text features, characteristics of genre, and structures.	**M1** L5, L21, L22, L24 **M2** L2 **M3** L15

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
4.6D	Create mental images to deepen understanding.	**M1** L1, L4, L13, L14 **M1 SL** L5 **M2** L7, L21 **M3** L8, L11
4.6E	Make connections to personal experiences, ideas in other texts, and society.	**M1** L1, L2, L5, L6, L13, L14, L18, L19, L20, L21, L23, L24, L25, L26 **M1 SL** L1, L2, L3, L4 **M2** L1, L3, L6, L8, L15, L17, L20, L21, L27 **M2 SL** L1, L3, L4 **M3** L3, L10, L12, L13, L15, L16, L17, L19, L22
4.6F	Make inferences and use evidence to support understanding.	**M1** L5, L6, L8, L12, L21, L23, L24, L25 **M1 SL** L1, L2, L3, L4, L5, L6 **M2** L1, L2, L15, L16, L19, L21 **M2 SL** L3, L4, L5 **M3** L1, L2, L3, L8, L10, L11, L12, L18
4.6G	Evaluate details read to determine key ideas.	**M1** L3, L5, L13, L21, L22 **M1 SL** L1 **M2** L2, L20 **M3** L10
4.6H	Synthesize information to create new understanding.	**M1** L2, L5, L6, L8, L12, L14, L16, L20, L22, L23, L24, L25, L26, L27, L28 **M1 SL** L1, L2, L4, L5, L7 **M2** L3, L5, L9, L11, L13, L15, L16, L18, L19, L20, L27, L29 **M2 SL** L1, L4, L5, L7 **M3** L2, L3, L4, L6, L7, L11, L13, L14, L16, L18, L19, L21, L22, L24
4.6I	Monitor comprehension and make adjustments such as re-reading, using background knowledge, asking questions, and annotating when understanding breaks down.	**M1** L13, L24 **M1 SL** L1 **M2** L2, L20, L21 **M3** L15
4.7A	Describe personal connections to a variety of sources, including self-selected texts.	N/A
4.7B	Write responses that demonstrate understanding of texts, including comparing and contrasting ideas across a variety of sources.	**M1** L22, L24, L26 **M2** L27 **M3** L16, L22

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
4.7C	Use text evidence to support an appropriate response.	**M1** L3, L4, L6, L20, L21, L22, L24, L25, L27 **M2** L1, L2, L21 **M2 SL** L1, L2, L5 **M3** L3, L4, L5, L7, L8, L13, L14, L15, L16, L18, L21
4.7D	Retell, paraphrase, or summarize texts in ways that maintain meaning and logical order.	**M1** L4, L22 **M2** L21 **M3** L16
4.7E	Interact with sources in meaningful ways such as notetaking, annotating, freewriting, or illustrating.	**M1** L1, L2, L4, L5, L6, L8, L11, L12, L13, L14, L16, L19, L20, L21, L22, L23, L24, L25, L26, L27, L28 **M1 SL** L1, L2, L3, L4, L5, L7 **M2** L1, L3, L4, L5, L9, L13, L15, L18, L19, L22, L27, L29 **M2 SL** L1, L2, L3, L4, L5, L7 **M3** L1, L2, L3, L4, L5, L6, L7, L9, L10, L11, L12, L13, L14, L15, L16, L17, L18, L19, L20, L21, L22, L24
4.7F	Respond using newly acquired vocabulary as appropriate.	**M1** L1, L8, L10, L12, L19, L20, L22, L23, L24, L26 **M1 SL** L1, L3, L4, L5, L6 **M2** L3, L7, L13, L14, L15, L16, L27 **M2 SL** L2, L5, L6 **M3** L3, L4, L8, L13, L15, L22
4.7G	Discuss specific ideas in the text that are important to the meaning.	**M1** L13, L21, L22, L24 **M1 SL** L1 **M2** L21 **M3** L16, L18, L21
4.8A	Infer basic themes supported by text evidence.	N/A
4.8B	Explain the interactions of the characters and the changes they undergo.	N/A
4.8C	Analyze plot elements, including the rising action, climax, falling action, and resolution.	N/A
4.8D	Explain the influence of the setting, including historical and cultural settings, on the plot.	N/A
4.9A	Demonstrate knowledge of distinguishing characteristics of well-known children's literature such as folktales, fables, legends, myths, and tall tales.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
4.9B	Explain figurative language such as simile, metaphor, and personification that the poet uses to create images.	N/A
4.9C	Explain structure in drama such as character tags, acts, scenes, and stage directions.	N/A
4.9D	Recognize characteristics and structures of informational text, including: (i) the central idea with supporting evidence, (ii) features such as pronunciation guides and diagrams to support understanding, and (iii) organizational patterns such as compare and contrast.	N/A
4.9E	Recognize characteristics and structures of argumentative text by: (i) identifying the claim, (ii) explaining how the author has used facts for an argument, and (iii) identifying the intended audience or reader.	N/A
4.9F	Recognize characteristics of multimodal and digital texts.	N/A
4.10A	Explain the author's purpose and message within a text.	N/A
4.10B	Explain how the use of text structure contributes to the author's purpose.	N/A
4.10C	Analyze the author's use of print and graphic features to achieve specific purposes.	N/A
4.10D	Describe how the author's use of imagery, literal and figurative language such as simile and metaphor, and sound devices such as alliteration and assonance achieves specific purposes.	N/A
4.10E	Identify and understand the use of literary devices, including first- or third-person point of view.	N/A
4.10F	Discuss how the author's use of language contributes to voice.	N/A
4.10G	Identify and explain the use of anecdote.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
4.11A	Plan a first draft by selecting a genre for a particular topic, purpose, and audience using a range of strategies such as brainstorming, freewriting, and mapping.	**M1** L2, L6, L14 **M1 SL** L2, L3 **M2** L2, L3, L5, L9, L13, L14, L19, L22, L25 **M2 SL** L4 **M3** L1, L2, L3, L8, L12, L13, L15
4.11B	Develop drafts into a focused, structured, and coherent piece of writing by: (i) organizing with purposeful structure, including an introduction, transitions, and a conclusion, and (ii) developing an engaging idea with relevant details.	N/A
4.11C	Revise drafts to improve sentence structure and word choice by adding, deleting, combining, and rearranging ideas for coherence and clarity.	**M1** L4, L5, L6, L8, L12, L20, L22, L23, L24, L25, L28 **M1 SL** L1, L4, L5, L7 **M2** L2, L9, L13, L15, L18, L19, L29 **M2 SL** L1, L3, L4, L5, L7 **M3** L2, L4, L6, L7, L9, L11, L12, L13, L14, L16, L19, L21, L24
4.11D	Edit drafts using standard English conventions, including: (i) complete simple and compound sentences with subject-verb agreement and avoidance of splices, run-ons, and fragments; (ii) past tense of irregular verbs; (iii) singular, plural, common, and proper nouns; (iv) adjectives, including their comparative and superlative forms; (v) adverbs that convey frequency and adverbs that convey degree; (vi) prepositions and prepositional phrases; (vii) pronouns, including reflexive; (viii) coordinating conjunctions to form compound subjects, predicates, and sentences; (ix) capitalization of historical periods, events, and documents; titles of books; stories and essays; and languages, races, and nationalities; (x) punctuation marks, including apostrophes in possessives, commas in compound sentences, and quotation marks in dialogue; and (xi) correct spelling of words with grade-appropriate orthographic patterns and rules and high-frequency words.	N/A
4.11E	Publish written work for appropriate audiences.	N/A
4.12A	Compose literary texts such as personal narratives and poetry using genre characteristics and craft.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
4.12B	Compose informational texts, including brief compositions that convey information about a topic, using a clear central idea and genre characteristics and craft.	N/A
4.12C	Compose argumentative texts, including opinion essays, using genre characteristics and craft.	N/A
4.12D	Compose correspondence that requests information.	N/A
4.13A	Generate and clarify questions on a topic for formal and informal inquiry.	**M1** L1, L2, L4, L6, L8, L10, L20, L21, L23, L24, L25, L27, L28 **M1 SL** L1, L3, L5, L6, L7 **M2** L1, L3, L6, L8, L10, L13, L28, L29 **M2 SL** L1, L4, L6, L7 **M3** L2, L4, L5, L7, L8, L14, L15, L16, L17, L19, L22, L24
4.13B	Develop and follow a research plan with adult assistance.	**M1 SL** L3 **M2** L22 **M3** L8
4.13C	Identify and gather relevant information from a variety of sources.	**M1** L17, L20, L22 **M1 SL** L1, L6 **M2** L4, L6, L11, L13, L22, L24 **M2 SL** L3 **M3** L1, L3, L5, L10, L11, L15, L16, L17, L20, L21
4.13D	Identify primary and secondary sources.	**M1** L1
4.13E	Demonstrate understanding of information gathered.	**M1** L10, L11, L20, L21, L23, L25, L26, L27, L28 **M1 SL** L4, L5, L7 **M2** L3, L5, L6, L10, L12, L13, L14, L15, L16, L19, L20, L25, L26, L27, L29 **M2 SL** L2, L3, L4, L6, L7 **M3** L2, L6, L11, L12, L13, L16, L19, L20, L21, L22, L24
4.13F	Recognize the difference between paraphrasing and plagiarism when using source materials.	N/A
4.13G	Develop a bibliography.	N/A
4.13H	Use an appropriate mode of delivery, whether written, oral, or multimodal, to present results.	**M1** L17 **M2** L26 **M3** L21

Mathematics

Mathematics is a fundamental tool used in both science and engineering. Throughout the *PhD Science Texas* curriculum, students use mathematics to gather information, make quantitative predictions, conduct investigations, and test and evaluate designs. Many of the thinking processes involved in doing mathematics overlap with the science and engineering practices students use to understand scientific ideas. Some of the most common applications of mathematics in the *PhD Science Texas* curriculum are highlighted in the following sections.

MATHEMATICAL PROCESS STANDARDS

Students apply and develop mathematical processes as they think analytically and quantitatively about scientific phenomena. During scientific investigations students select and use mathematical tools to make observations and gather data to answer scientific questions. Students use mathematical language and representations to communicate evidence that supports scientific arguments.

GEOMETRY AND MEASUREMENT

Students use physical properties such as size and shape to compare objects, systems, and organisms. During scientific investigations, students apply the skills of measurement to gather quantifiable data and use the data to identify cause and effect relationships.

DATA ANALYSIS

Throughout the *PhD Science Texas* curriculum, students engage with authentic data sets. Analyzing data related to scientific phenomena helps students generate investigative questions. Students also conduct scientific investigations that produce data. Students collect and organize their data in a way that helps them understand their findings. Then students use mathematics and computational thinking to analyze data and determine whether the data support their claims.

Level 4 Modules and Spotlight Lessons

M1 **Earth Features** WITH SPOTLIGHT LESSONS ON **Mixtures and Solutions**

M2 **Energy** WITH SPOTLIGHT LESSONS ON **Earth and Space**

M3 **Plants in the Environment**

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
4.1A	Apply mathematics to problems arising in everyday life, society, and the workplace.	**M1** L21 **M1 SL** L3 **M2** L7 **M2 SL** L2, L4 **M3** L8, L11
4.1B	Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution.	**M1** L21 **M2** L8

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
4.1C	Select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems.	**M1** L21 **M1 SL** L3 **M2** L8 **M3** L11
4.1D	Communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate.	**M1** L25 **M1 SL** L3, L4 **M2** L7, L8, L11 **M2 SL** L2, L3, L4 **M3** L7, L8, L10, L11
4.1E	Create and use representations to organize, record, and communicate mathematical ideas.	**M1 SL** L4 **M2** L7, L8, L10 **M2 SL** L2, L3, L4 **M3** L6, L8, L10, L11
4.1F	Analyze mathematical relationships to connect and communicate mathematical ideas.	**M2** L7, L8, L11 **M2 SL** L2, L3, L4
4.1G	Display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.	**M1** L21
4.2A	Interpret the value of each place-value position as 10 times the position to the right and as one-tenth of the value of the place to its left.	N/A
4.2B	Represent the value of the digit in whole numbers through 1,000,000,000 and decimals to the hundredths using expanded notation and numerals.	N/A
4.2C	Compare and order whole numbers to 1,000,000,000 and represent comparisons using the symbols >, <, or =.	N/A
4.2D	Round whole numbers to a given place value through the hundred thousands place.	N/A
4.2E	Represent decimals, including tenths and hundredths, using concrete and visual models and money.	N/A
4.2F	Compare and order decimals using concrete and visual models to the hundredths.	N/A
4.2G	Relate decimals to fractions that name tenths and hundredths.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
4.2H	Determine the corresponding decimal to the tenths or hundredths place of a specified point on a number line.	N/A
4.3A	Represent a fraction a/b as a sum of fractions $1/b$, where a and b are whole numbers and $b > 0$, including when $a > b$.	N/A
4.3B	Decompose a fraction in more than one way into a sum of fractions with the same denominator using concrete and pictorial models and recording results with symbolic representations.	N/A
4.3C	Determine if two given fractions are equivalent using a variety of methods.	N/A
4.3D	Compare two fractions with different numerators and different denominators and represent the comparison using the symbols >, =, or <.	N/A
4.3E	Represent and solve addition and subtraction of fractions with equal denominators using objects and pictorial models that build to the number line and properties of operations.	N/A
4.3F	Evaluate the reasonableness of sums and differences of fractions using benchmark fractions 0, 1/4, 1/2, 3/4, and 1, referring to the same whole.	N/A
4.3G	Represent fractions and decimals to the tenths or hundredths as distances from zero on a number line.	N/A
4.4A	Add and subtract whole numbers and decimals to the hundredths place using the standard algorithm.	**M1** L21 **M1 SL** L4
4.4B	Determine products of a number and 10 or 100 using properties of operations and place value understandings.	N/A
4.4C	Represent the product of 2 two-digit numbers using arrays, area models, or equations, including perfect squares through 15 by 15.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
4.4D	Use strategies and algorithms, including the standard algorithm, to multiply up to a four-digit number by a one-digit number and to multiply a two-digit number by a two-digit number. Strategies may include mental math, partial products, and the commutative, associative, and distributive properties.	N/A
4.4E	Represent the quotient of up to a four-digit whole number divided by a one-digit whole number using arrays, area models, or equations.	N/A
4.4F	Use strategies and algorithms, including the standard algorithm, to divide up to a four-digit dividend by a one-digit divisor.	N/A
4.4G	Round to the nearest 10, 100, or 1,000 or use compatible numbers to estimate solutions involving whole numbers.	N/A
4.4H	Solve with fluency one- and two-step problems involving multiplication and division, including interpreting remainders.	N/A
4.5A	Represent multi-step problems involving the four operations with whole numbers using strip diagrams and equations with a letter standing for the unknown quantity.	N/A
4.5B	Represent problems using an input-output table and numerical expressions to generate a number pattern that follows a given rule representing the relationship of the values in the resulting sequence and their position in the sequence.	N/A
4.5C	Use models to determine the formulas for the perimeter of a rectangle ($l + w + l + w$ or $2l + 2w$), including the special form for perimeter of a square ($4s$) and the area of a rectangle ($l \times w$).	N/A
4.5D	Solve problems related to perimeter and area of rectangles where dimensions are whole numbers.	N/A
4.6A	Identify points, lines, line segments, rays, angles, and perpendicular and parallel lines.	N/A
4.6B	Identify and draw one or more lines of symmetry, if they exist, for a two-dimensional figure.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
4.6C	Apply knowledge of right angles to identify acute, right, and obtuse triangles.	N/A
4.6D	Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines or the presence or absence of angles of a specified size.	N/A
4.7A	Illustrate the measure of an angle as the part of a circle whose center is at the vertex of the angle that is "cut out" by the rays of the angle. Angle measures are limited to whole numbers.	N/A
4.7B	Illustrate degrees as the units used to measure an angle, where 1/360 of any circle is one degree and an angle that "cuts" *n*/360 out of any circle whose center is at the angle's vertex has a measure of *n* degrees. Angle measures are limited to whole numbers.	N/A
4.7C	Determine the approximate measures of angles in degrees to the nearest whole number using a protractor.	N/A
4.7D	Draw an angle with a given measure.	N/A
4.7E	Determine the measure of an unknown angle formed by two non-overlapping adjacent angles given one or both angle measures.	N/A
4.8A	Identify relative sizes of measurement units within the customary and metric systems.	N/A
4.8B	Convert measurements within the same measurement system, customary or metric, from a smaller unit into a larger unit or a larger unit into a smaller unit when given other equivalent measures represented in a table.	N/A
4.8C	Solve problems that deal with measurements of length, intervals of time, liquid volumes, mass, and money using addition, subtraction, multiplication, or division as appropriate.	N/A
4.9A	Represent data on a frequency table, dot plot, or stem-and-leaf plot marked with whole numbers and fractions.	**M2** L11
4.9B	Solve one- and two-step problems using data in whole number, decimal, and fraction form in a frequency table, dot plot, or stem-and-leaf plot.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
4.10A	Distinguish between fixed and variable expenses.	N/A
4.10B	Calculate profit in a given situation.	N/A
4.10C	Compare the advantages and disadvantages of various savings options.	N/A
4.10D	Describe how to allocate a weekly allowance among spending; saving, including for college; and sharing.	N/A
4.10E	Describe the basic purpose of financial institutions, including keeping money safe, borrowing money, and lending.	N/A

Social Studies

PhD Science Texas approaches phenomenon-driven instruction by situating scientific phenomena in a cultural context. Students study curated trade texts, artworks, and primary sources that tell the historical and cultural stories surrounding phenomena. They come to see science and engineering as processes of understanding and improving the world in which they live. The following sections highlight some of the social studies content areas students study and the skills they apply while making sense of authentic scientific phenomena.

GEOGRAPHY

Throughout the *PhD Science Texas* curriculum, students apply social studies skills to interpret and analyze geographical information. Students use maps, globes, and other resources to identify and describe physical characteristics of locations where scientific phenomena occur. Students observe natural systems and processes to describe the effects they have on landforms and water bodies. They design solutions that model how humans can reduce impacts of natural and human processes on the physical environment.

SCIENCE, TECHNOLOGY, AND SOCIETY

The *PhD Science Texas* curriculum aims to develop scientifically literate citizens. As students identify the contributions of scientists and engineers, they recognize the influence of science, engineering, and technology on society and the natural world. Students explore past and present examples of technology within the context of making sense of scientific phenomena and solving problems.

SOCIAL STUDIES SKILLS

Students apply and develop social studies skills as they seek to build new scientific knowledge. Students gather information from a wide range of authentic resources. Students apply skills such as sequencing and categorizing to help interpret information they gather. Then students communicate their knowledge orally or by using written and visual material.

Level 4 Modules and Spotlight Lessons

M1 **Earth Features** WITH SPOTLIGHT LESSONS ON **Mixtures and Solutions**

M2 **Energy** WITH SPOTLIGHT LESSONS ON **Earth and Space**

M3 **Plants in the Environment**

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
4.1A	Explain the possible origins of American Indian groups in Texas.	N/A
4.1B	Identify and compare the ways of life of American Indian groups in Texas before European exploration such as the Lipan Apache, Karankawa, Caddo, and Jumano.	N/A
4.1C	Describe the cultural regions in which American Indians lived such as Gulf, Plains, Puebloan, and Southeastern.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
4.1D	Locate American Indian groups remaining in Texas such as the Ysleta Del Sur Pueblo, Alabama-Coushatta, and Kickapoo.	N/A
4.2A	Summarize motivations for European exploration and settlement of Texas, including economic opportunity, competition, and the desire for expansion.	N/A
4.2B	Identify the accomplishments and explain the impact of significant explorers, including Cabeza de Vaca; Francisco Coronado; and René Robert Cavelier, Sieur de la Salle, on the settlement of Texas.	N/A
4.2C	Explain when, where, and why the Spanish established settlements and Catholic missions in Texas as well as important individuals.	N/A
4.2D	Identify Texas' role in the Mexican War of Independence and the war's impact on the development of Texas.	N/A
4.2E	Identify the accomplishments and explain the economic motivations and impact of significant empresarios, including Stephen F. Austin and Martín de León, on the settlement of Texas.	N/A
4.3A	Analyze the causes, major events, and effects of the Texas Revolution, including the Battle of the Alamo, the Texas Declaration of Independence, the Runaway Scrape, and the Battle of San Jacinto.	N/A
4.3B	Summarize the significant contributions of individuals such as William B. Travis, James Bowie, David Crockett, Juan N. Seguín, Plácido Benavides, José Francisco Ruiz, Antonio López de Santa Anna, Susanna Dickinson, and Enrique Esparza.	N/A
4.3C	Identify leaders important to the founding of Texas as a republic and state, including José Antonio Navarro, Sam Houston, Mirabeau Lamar, and Anson Jones.	N/A
4.3D	Describe the successes, problems, and organizations of the Republic of Texas such as the establishment of a constitution, economic struggles, relations with American Indians, and the Texas Rangers.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
4.3E	Explain the events that led to the annexation of Texas to the United States and the impact of the U.S.-Mexican War.	N/A
4.4A	Describe the impact of the Civil War and Reconstruction on Texas.	N/A
4.4B	Explain the growth, development, and impact of the cattle industry such as contributions made by Charles Goodnight, Richard King, and Lizzie Johnson.	N/A
4.4C	Explain the effects of the railroad industry on life in Texas, including changes to cities and major industries.	N/A
4.4D	Explain the effects on American Indian life brought about by the Red River War, building of U.S. forts and railroads, and loss of buffalo.	N/A
4.5A	Explain the impact of various events on life in Texas such as the Great Depression, the Dust Bowl, and World War II and notable individuals such as Audie Murphy, Cleto Rodríguez, and Bessie Coleman and other local individuals.	N/A
4.5B	Explain the development and impact of the oil and gas industry on industrialization and urbanization in Texas, including Spindletop and important people such as Pattillo Higgins.	N/A
4.6A	Identify, locate, and describe the physical regions of Texas (Mountains and Basins, Great Plains, North Central Plains, Coastal Plains), including their characteristics such as landforms, climate, vegetation, and economic activities.	N/A
4.6B	Compare the physical regions of Texas (Mountains and Basins, Great Plains, North Central Plains, Coastal Plains).	N/A
4.7A	Explain the geographic factors such as landforms and climate that influence patterns of settlement and the distribution of population in Texas, past and present.	N/A
4.7B	Identify and explain patterns of settlement such as the location of towns and cities in Texas at different time periods.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
4.8A	Describe ways people have adapted to and modified their environment in Texas, past and present, such as timber clearing, agricultural production, wetlands drainage, energy production, and construction of dams.	N/A
4.8B	Explain reasons why people have adapted to and modified their environment in Texas, past and present, such as the use of natural resources to meet basic needs, facilitate transportation, and enhance recreational activities.	N/A
4.8C	Compare the positive and negative consequences of human modification of the environment in Texas, past and present.	N/A
4.9A	Explain the economic activities various early American Indian groups in Texas used to meet their needs and wants such as farming, trading, and hunting.	N/A
4.9B	Explain the economic activities early settlers to Texas used to meet their needs and wants.	N/A
4.10A	Describe how the free enterprise system works, including supply and demand.	N/A
4.10B	Identify examples of the benefits of the free enterprise system such as choice and opportunity.	N/A
4.10C	Describe the development of the free enterprise system in Texas such as the growth of cash crops by early colonists and the railroad boom.	N/A
4.11A	Identify how people in different regions of Texas earn their living, past and present.	N/A
4.11B	Explain how physical geographic factors such as climate and natural resources have influenced the location of economic activities in Texas.	N/A
4.11C	Identify the effects of exploration, immigration, migration, and limited resources on the economic development and growth of Texas.	N/A
4.11D	Explain how developments in transportation and communication have influenced economic activities in Texas.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
4.12A	Compare how various American Indian groups such as the Caddo and the Comanche governed themselves.	N/A
4.12B	Compare characteristics of the Spanish colonial government and the early Mexican governments in Texas.	N/A
4.13A	Identify the purposes and explain the importance of the Texas Declaration of Independence and the Texas Constitution.	N/A
4.13B	Identify and explain the basic functions of the three branches of government according to the Texas Constitution.	N/A
4.13C	Identify the intent, meaning, and importance of the Declaration of Independence, the U.S. Constitution, and the Bill of Rights (Celebrate Freedom Week).	N/A
4.14A	Explain the meaning of various patriotic symbols and landmarks of Texas, including the six flags that flew over Texas, the Alamo, and the San Jacinto Monument.	N/A
4.14B	Sing or recite "Texas, Our Texas."	N/A
4.14C	Recite and explain the meaning of the Pledge to the Texas Flag.	N/A
4.14D	Describe the origins and significance of state celebrations such as Texas Independence Day and Juneteenth.	N/A
4.15A	Identify important individuals who have participated voluntarily in civic affairs at state and local levels such as Adina de Zavala and Clara Driscoll.	N/A
4.15B	Explain how individuals can participate voluntarily in civic affairs at state and local levels through activities such as respectfully holding public officials to their word, writing letters, and participating in historic preservation and service projects.	N/A
4.15C	Explain the duty of the individual in state and local elections such as being informed and voting.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
4.15D	Identify the importance of historical figures and important individuals who modeled active participation in the democratic process such as Sam Houston, Barbara Jordan, Lorenzo de Zavala, Ann Richards, Henry B. González, Wallace Jefferson, and other local individuals.	N/A
4.15E	Explain how to contact elected and appointed leaders in state and local governments.	N/A
4.16A	Identify leaders in state, local, and national governments, including the governor, local members of the Texas Legislature, the local mayor, U.S. senators, local U.S. representatives, and Texans who have been president of the United States.	N/A
4.16B	Identify leadership qualities of state and local leaders, past and present.	N/A
4.17A	Identify customs, celebrations, and traditions of various cultural, regional, and local groups in Texas such as Cinco de Mayo, Oktoberfest, and Fiesta San Antonio.	N/A
4.17B	Summarize the contributions of artists of various racial, ethnic, and religious groups in the development of Texas culture such as Lydia Mendoza, Chelo Silva, and Julius Lorenzo Cobb Bledsoe.	N/A
4.18A	Identify famous inventors and scientists such as Gail Borden, Joseph Glidden, Michael DeBakey, and Millie Hughes-Fulford and their contributions.	**M1** L1, L13
4.18B	Describe how scientific discoveries and innovations such as in aerospace, agriculture, energy, and technology have benefited individuals, businesses, and society in Texas.	N/A
4.19A	Differentiate between, locate, and use valid primary and secondary sources such as technology; interviews; biographies; oral, print, and visual material; documents; and artifacts to acquire information about Texas.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
4.19B	Analyze information by applying absolute and relative chronology through sequencing, categorizing, identifying cause-and-effect relationships, comparing, contrasting, finding the main idea, summarizing, making generalizations and predictions, and drawing inferences and conclusions.	**M1** L4, L5 **M2** L11 **M2 SL** L2, L3, L4, L5
4.19C	Organize and interpret information in outlines, reports, databases, and visuals, including graphs, charts, timelines, and maps.	**M1** L2, L3, L4, L5, L6, L7, L8, L10, L11, L12, L17, L19, L20, L21, L22, L23, L24, L25, L26, L27 **M1 SL** L4, L5 **M2** L3, L5, L6, L9, L12, L13, L15, L18, L19, L21, L23, L25, L26, L27 **M2 SL** L1, L2, L3, L4, L5, L6 **M3** L1, L2, L3, L4, L5, L6, L7, L8, L9, L10, L11, L12, L13, L14, L15, L16, L17, L18, L19, L20, L21, L22, L23
4.19D	Identify different points of view about an issue, topic, historical event, or current event.	N/A
4.20A	Apply mapping elements, including grid systems, legends, symbols, scales, and compass roses, to create and interpret maps.	**M1** L12, L19, L20, L25, L27 **M1 SL** L6 **M2 SL** L6 **M3** L1, L10, L11
4.20B	Interpret geographic data, population distribution, and natural resources into a variety of formats such as graphs and maps.	**M1** L6, L12, L19, L20, L21, L22, L25 **M2 SL** L6 **M3** L10, L11
4.21A	Use social studies terminology correctly.	N/A
4.21B	Incorporate main and supporting ideas in verbal and written communication.	**M1** L17, L22, L25, L26, L28 **M1 SL** L6 **M2** L27, L29 **M2 SL** L7 **M3** L22, L24
4.21C	Express ideas orally based on research and experiences.	**M1** L16, L17, L18, L22, L25, L26, L28 **M1 SL** L1, L7 **M2** L5, L9, L22, L23, L26, L27, L29 **M2 SL** L6, L7 **M3** L6, L12, L13, L21, L22, L24

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
4.21D	Create written and visual material such as journal entries, reports, graphic organizers, outlines, and bibliographies.	**M1** L2, L4, L5, L6, L8, L12, L17, L20, L22, L23, L24, L25, L26 **M1 SL** L2, L3, L4, L5 **M2** L2, L3, L5, L6, L9, L10, L12, L13, L14, L15, L18, L19, L21, L22, L23, L24, L25, L26, L27 **M2 SL** L1, L2, L3, L4, L5, L6 **M3** L1, L2, L3, L4, L5, L6, L7, L8, L9, L10, L11, L12, L13, L14, L15, L16, L17, L18, L19, L20, L21, L22
4.22	Use problem-solving and decision-making processes to identify a problem, gather information, list and consider options, consider advantages and disadvantages, choose and implement a solution, and evaluate the effectiveness of the solution.	**M1** L13 **M2** L2, L7, L8, L10, L14, L16, L21 **M3** L8, L9

Cross-Content Standards Addressed

Level 5

Texas Essential Knowledge and Skills

English Language Development

PhD Science® Texas follows an integrated approach to science instruction. The science that students learn as they make sense of authentic phenomena becomes the content for meaningful application of English language arts and reading (ELAR) skills. Many of these ELAR skills are required to gather evidence, construct sound scientific arguments, and communicate scientific explanations effectively. Some of the most common applications of ELAR skills in the *PhD Science Texas* curriculum are highlighted in the following sections.

DEVELOPING AND SUSTAINING FOUNDATIONAL LANGUAGE SKILLS: *listening, speaking, discussion, and thinking—oral language*

Students apply and develop oral language skills as they engage in scientific discourse. During instructional routines such as Think–Pair–Share, Inside–Outside Circles, and Link Up, students develop social communication skills while they work collaboratively by actively listening and sharing scientific ideas. Students further apply these skills during key knowledge-distilling moments such as Socratic Seminars, the Share stage of the engineering design process, assessment debriefs, investigations, and anchor model updates.

COMPREHENSION SKILLS: *listening, speaking, reading, writing, and thinking using multiple texts*

Students apply and develop metacognitive skills to deepen comprehension as they make sense of scientific phenomena. *PhD Science Texas* uses authentic texts in lessons to highlight coherence and build knowledge while allowing students to experience meaningful connections across content areas. Before students engage with texts (written texts, videos, audio recordings, and artwork), they may establish a purpose for reading, generate questions, and make predictions. Students also make connections, infer, and synthesize information to uncover and distill new science knowledge.

INQUIRY AND RESEARCH: *listening, speaking, reading, writing, and thinking using multiple texts*

Students apply and develop writing and research skills as they build and communicate scientific knowledge. As students observe and discuss various sources, they generate questions for inquiry and identify relevant sources of information to answer such questions. These questions are added to a driving question board or used to develop a Phenomenon Question that drives student learning. Students make their thinking visible through drawing or writing. Students draft and revise their ideas many times throughout the learning cycle. Evidence of students' thinking can be found on anchor charts, anchor models, and Science Logbook pages. Through structured conversations, such as the Share stage of the engineering design process, students use appropriate modes of delivery to present their scientific ideas.

Level 5 Modules and Spotlight Lessons

M1 **Earth Processes** WITH SPOTLIGHT LESSONS ON **Physical Properties of Matter**

M2 **Ecosystems**

M3 **Sun, Earth, and Moon System** WITH SPOTLIGHT LESSONS AND A CAPSTONE PROJECT ON **Forces, Motion, and Energy**

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
5.1A	Listen actively to interpret verbal and non-verbal messages, ask relevant questions, and make pertinent comments.	**M1** L2, L3, L4, L7, L8, L9, L11, L12, L13, L14, L15, L17, L18, L20, L21, L22, L23, L25 **M1 SL** L7 **M2** L1, L2, L4, L5, L6, L8, L9, L11, L12, L14, L16, L17, L20, L21, L22, L23, L24, L26, L27 **M3** L1, L2, L7, L8, L10, L11, L15, L17, L18, L22, L23, L26, L28 **M3 SL** L1, L2, L4, L5, L8, L9, L10, L11, L15, L17
5.1B	Follow, restate, and give oral instructions that include multiple action steps.	**M1** L1, L7, L8, L14, L18, L19, L22 **M1 SL** L4, L5 **M2** L3, L4, L9, L11, L16, L24, L27 **M3** L4, L5, L26 **M3 SL** L2, L6, L11
5.1C	Give an organized presentation employing eye contact, speaking rate, volume, enunciation, natural gestures, and conventions of language to communicate ideas effectively.	**M1** L15, L21 **M2** L26 **M3** L10, L11 **M3 SL** L15
5.1D	Work collaboratively with others to develop a plan of shared responsibilities.	**M1** L8, L10, L11, L22 **M2** L26 **M3** L3, L4, L6, L10 **M3 SL** L2, L3, L9, L12, L14

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
5.2A	Demonstrate and apply phonetic knowledge by: (i) decoding words with consonant changes, including /t/ to /sh/ such as in select and selection and /k/ to /sh/ such as music and musician; (ii) decoding multisyllabic words with closed syllables; open syllables; VCe syllable; vowel teams, including digraphs and diphthongs; r-controlled syllables; and final stable syllables; (iii) decoding words using advanced knowledge of syllable division patterns; (iv) decoding words using advanced knowledge of the influence of prefixes and suffixes on base words; and (v) identifying and reading high-frequency words from a research-based list.	N/A
5.2B	Demonstrate and apply spelling knowledge by: (i) spelling multisyllabic words with closed syllables; open syllables; VCe syllables; vowel teams, including digraphs and diphthongs; r-controlled syllables; and final stable syllables; (ii) spelling words with consonant changes, including /t/ to /sh/ such as in select and selection and /k/ to /sh/ such as music and musician; (iii) spelling multisyllabic words with multiple sound-spelling patterns; (iv) spelling words using advanced knowledge of syllable division patterns; (v) spelling words using knowledge of prefixes; and (vi) spelling words using knowledge of suffixes, including how they can change base words such as dropping e, changing y to i, and doubling final consonants.	N/A
5.2C	Write legibly in cursive.	N/A
5.3A	Use print or digital resources to determine meaning, syllabication, pronunciation, and word origin.	N/A
5.3B	Use context within and beyond a sentence to determine the relevant meaning of unfamiliar words or multiple-meaning words.	N/A
5.3C	Identify the meaning of and use words with affixes such as trans-, super-, -ive, and -logy and roots such as geo and photo.	N/A
5.3D	Identify, use, and explain the meaning of adages and puns.	N/A
5.4	Use appropriate fluency (rate, accuracy, and prosody) when reading grade-level text.	**M1** L1, L14, L15

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
5.5	Self-select text and read independently for a sustained period of time.	N/A
5.6A	Establish purpose for reading assigned and self-selected texts.	**M1** L1, L4, L14, L15 **M2** L11, L14, L17, L20, L21, L22, L24 **M3** L2, L6, L14, L21
5.6B	Generate questions about text before, during, and after reading to deepen understanding and gain information.	**M2** L14, L20 **M3** L6
5.6C	Make and correct or confirm predictions using text features, characteristics of genre, and structures.	**M1** L1 **M2** L6 **M3** L2, L14
5.6D	Create mental images to deepen understanding.	**M1** L4, L5 **M2** L25 **M3** L1, L2, L17
5.6E	Make connections to personal experiences, ideas in other texts, and society.	**M1** L1, L2, L5 **M2** L1, L8, L10, L11, L12, L13, L18, L19, L21 **M3** L1, L2, L9, L22, L23 **M3 SL** L1, L2, L5, L10, L12, L15
5.6F	Make inferences and use evidence to support understanding.	**M1** L1, L4, L5, L7, L10, L11, L13, L14, L17, L24 **M1 SL** L3 **M2** L6, L8, L9, L10, L11, L12, L13, L15, L16, L19, L20, L21, L22, L23, L24, L25 **M3** L5, L7, L8, L9, L15, L23, L24, L25
5.6G	Evaluate details read to determine key ideas.	**M1** L14, L21 **M2** L14, L21, L24 **M3** L1, L6
5.6H	Synthesize information to create new understanding.	**M1** L4, L5, L6, L8, L9, L11, L14, L16, L21 **M1 SL** L3, L4, L5, L7 **M2** L2, L5, L7, L8, L9, L12, L14, L16, L17, L18, L20, L22, L24, L25, L26, L27, L29 **M3** L1, L3, L4, L5, L7, L8, L12, L13, L14, L15, L16, L17, L18, L19, L20, L21, L22, L23, L24, L25 **M3 SL** L1, L3, L4, L5, L7, L9, L10, L15
5.6I	Monitor comprehension and make adjustments such as re-reading, using background knowledge, asking questions, and annotating when understanding breaks down.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
5.7A	Describe personal connections to a variety of sources, including self-selected texts.	N/A
5.7B	Write responses that demonstrate understanding of texts, including comparing and contrasting ideas across a variety of sources.	**M1** L15 **M2** L14, L16, L25, L27 **M3** L1, L20
5.7C	Use text evidence to support an appropriate response.	**M1** L1, L4, L14, L15, L21 **M2** L11, L14, L16, L17, L18, L19, L20, L22, L23, L26 **M3** L1, L7, L8, L14, L18
5.7D	Retell, paraphrase, or summarize texts in ways that maintain meaning and logical order.	**M1** L15
5.7E	Interact with sources in meaningful ways such as notetaking, annotating, freewriting, or illustrating.	**M1** L1, L5, L8, L9, L10, L11, L14, L15, L17, L23 **M1 SL** L3 **M2** L1, L2, L5, L6, L7, L8, L9, L10, L11, L12, L14, L15, L16, L18, L19, L20, L21, L23, L24 **M3** L3, L5, L6, L8, L12, L13, L18, L20, L24, L25 **M3 SL** L1, L2, L3, L4, L5, L6, L7, L8
5.7F	Respond using newly acquired vocabulary as appropriate.	**M1** L1, L4, L10, L15, L23 **M1 SL** L4, L6 **M2** L1, L6, L14, L15, L27 **M3** L1, L3, L6, L12, L17, L26 **M3 SL** L16
5.7G	Discuss specific ideas in the text that are important to the meaning.	**M2** L1, L14, L18, L21, L24 **M3** L6, L20
5.8A	Infer multiple themes within a text using text evidence.	N/A
5.8B	Analyze the relationships of and conflicts among the characters.	N/A
5.8C	Analyze plot elements, including rising action, climax, falling action, and resolution.	N/A
5.8D	Analyze the influence of the setting, including historical and cultural settings, on the plot.	N/A
5.9A	Demonstrate knowledge of distinguishing characteristics of well-known children's literature such as folktales, fables, legends, myths, and tall tales.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
5.9B	Explain the use of sound devices and figurative language and distinguish between the poet and the speaker in poems across a variety of poetic forms.	N/A
5.9C	Explain structure in drama such as character tags, acts, scenes, and stage directions.	N/A
5.9D	Recognize characteristics and structures of informational text, including: (i) the central idea with supporting evidence; (ii) features such as insets, timelines, and sidebars to support understanding; and (iii) organizational patterns such as logical order and order of importance.	N/A
5.9E	Recognize characteristics and structures of argumentative text by: (i) identifying the claim, (ii) explaining how the author has used facts for or against an argument, and (iii) identifying the intended audience or reader.	N/A
5.9F	Recognize characteristics of multimodal and digital texts.	N/A
5.10A	Explain the author's purpose and message within a text.	N/A
5.10B	Analyze how the use of text structure contributes to the author's purpose.	N/A
5.10C	Analyze the author's use of print and graphic features to achieve specific purposes.	N/A
5.10D	Describe how the author's use of imagery, literal and figurative language such as simile and metaphor, and sound devices achieves specific purposes.	N/A
5.10E	Identify and understand the use of literary devices, including first- or third-person point of view.	N/A
5.10F	Examine how the author's use of language contributes to voice.	N/A
5.10G	Explain the purpose of hyperbole, stereotyping, and anecdote.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
5.11A	Plan a first draft by selecting a genre for a particular topic, purpose, and audience using a range of strategies such as brainstorming, freewriting, and mapping.	**M1** L2, L3, L17, L18 **M2** L2, L5, L19, L25 **M3** L1, L2, L3 **M3 SL** L1, L12
5.11B	Develop drafts into a focused, structured, and coherent piece of writing by: (i) organizing with purposeful structure, including an introduction, transitions, and a conclusion, and (ii) developing an engaging idea reflecting depth of thought with specific facts and details.	N/A
5.11C	Revise drafts to improve sentence structure and word choice by adding, deleting, combining, and rearranging ideas for coherence and clarity.	**M1** L3, L6, L8, L12, L16, L17, L18 **M1 SL** L2, L3, L4, L5, L7 **M2** L7, L8, L9, L12, L14, L17, L19, L22, L25, L26, L29 **M3** L3, L5, L7, L12, L13, L14, L16, L17, L18, L19, L20, L21, L22, L24, L25 **M3 SL** L4, L5, L9, L10
5.11D	Edit drafts using standard English conventions, including: (i) complete simple and compound sentences with subject-verb agreement and avoidance of splices, run-ons, and fragments; (ii) past tense of irregular verbs; (iii) collective nouns; (iv) adjectives, including their comparative and superlative forms; (v) conjunctive adverbs; (vi) prepositions and prepositional phrases and their influence on subject–verb agreement; (vii) pronouns, including indefinite; (viii) subordinating conjunctions to form complex sentences; (ix) capitalization of abbreviations, initials, acronyms, and organizations; (x) italics and underlining for titles and emphasis, and punctuation marks, including quotation marks in dialogue and commas in compound and complex sentences; and (xi) correct spelling of words with grade-appropriate orthographic patterns and rules and high-frequency words.	N/A
5.11E	Publish written work for appropriate audiences.	N/A
5.12A	Compose literary texts such as personal narratives, fiction, and poetry using genre characteristics and craft.	N/A
5.12B	Compose informational texts, including brief compositions that convey information about a topic, using a clear central idea and genre characteristics and craft.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
5.12C	Compose argumentative texts, including opinion essays, using genre characteristics and craft.	N/A
5.12D	Compose correspondence that requests information.	N/A
5.13A	Generate and clarify questions on a topic for formal and informal inquiry.	**M1** L2, L3, L4, L6, L8, L12, L16, L22 **M1 SL** L4 **M2** L2, L5, L6, L7, L8, L13, L23, L24, L28 **M3** L2, L3, L8, L15, L18, L23 **M3 SL** L1, L4, L6, L7, L9, L11
5.13B	Develop and follow a research plan with adult assistance.	**M1** L7, L8, L10, L11, L17 **M2** L25 **M3** L3, L4 **M3 SL** L2
5.13C	Identify and gather relevant information from a variety of sources.	**M1** L1, L2, L3, L5, L6, L10, L14, L17 **M1 SL** L1, L5 **M2** L6, L10, L11, L12, L15, L19, L20, L21, L23, L24, L25 **M3** L5, L12, L14, L15, L16, L18, L20 **M3 SL** L11, L12
5.13D	Understand credibility of primary and secondary sources.	N/A
5.13E	Demonstrate understanding of information gathered.	**M1** L2, L6, L7, L8, L11, L14, L16, L17, L21, L23, L25 **M1 SL** L4, L5, L7 **M2** L2, L5, L7, L8, L9, L12, L14, L17, L21, L22, L23, L24, L27, L29 **M3** L4, L9, L12, L18, L20, L23, L25, L26, L28 **M3 SL** L3, L6
5.13F	Differentiate between paraphrasing and plagiarism when using source materials.	N/A
5.13G	Develop a bibliography.	N/A
5.13H	Use an appropriate mode of delivery, whether written, oral, or multimodal, to present results.	**M1** L3, L8, L10, L11, L21 **M1 SL** L5 **M2** L25, L26 **M3** L10 **M3 SL** L3, L7, L15

Mathematics

Mathematics is a fundamental tool used in both science and engineering. Throughout the *PhD Science Texas* curriculum, students use mathematics to gather information, make quantitative predictions, conduct investigations, and test and evaluate designs. Many of the thinking processes involved in doing mathematics overlap with the science and engineering practices students use to understand scientific ideas. Some of the most common applications of mathematics in the *PhD Science Texas* curriculum are highlighted in the following sections.

MATHEMATICAL PROCESS STANDARDS

Students apply and develop mathematical processes as they think analytically and quantitatively about scientific phenomena. During scientific investigations students select and use mathematical tools to make observations and gather data to answer scientific questions. Students use mathematical language and representations to communicate evidence that supports scientific arguments.

GEOMETRY AND MEASUREMENT

Students use physical properties such as size and shape to compare objects, systems, and organisms. During scientific investigations, students apply the skills of measurement to gather quantifiable data and use the data to identify cause and effect relationships.

DATA ANALYSIS

Throughout the *PhD Science Texas* curriculum, students engage with authentic data sets. Analyzing data related to scientific phenomena helps students generate investigative questions. Students also conduct scientific investigations that produce data. Students collect and organize their data in a way that helps them understand their findings. Then students use mathematics and computational thinking to analyze data and determine whether the data support their claims.

Level 5 Modules and Spotlight Lessons

M1 **Earth Processes** WITH SPOTLIGHT LESSONS ON **Physical Properties of Matter**

M2 **Ecosystems**

M3 **Sun, Earth, and Moon System** WITH SPOTLIGHT LESSONS AND A CAPSTONE PROJECT ON **Forces, Motion, and Energy**

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
5.1A	Apply mathematics to problems arising in everyday life, society, and the workplace.	**M1** L8, L19, L20 **M1 SL** L2 **M2** L4, L5, L8, L15, L21, L23 **M3** L3, L4, L5, L12, L15, L16 **M3 SL** L2, L10, L12, L13, L14
5.1B	Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution.	**M1** L18 **M1 SL** L2, L4

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
5.1C	Select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems.	**M1** L19, L20 **M1 SL** L2 **M2** L3, L4, L5, L13, L15, L21, L23 **M3** L3, L4, L5 **M3 SL** L2, L3, L4, L5, L6, L7
5.1D	Communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate.	**M1** L3, L22 **M1 SL** L4 **M2** L8, L15, L18, L20, L23 **M3** L3, L4, L24 **M3 SL** L2, L3, L4
5.1E	Create and use representations to organize, record, and communicate mathematical ideas.	**M1** L19, L20, L22 **M1 SL** L3 **M2** L4, L5, L6, L13, L15, L18, L21 **M3** L12, L15, L16 **M3 SL** L3, L4, L10, L12, L13
5.1F	Analyze mathematical relationships to connect and communicate mathematical ideas.	**M1 SL** L3, L4 **M2** L7, L8, L13, L18, L23 **M3** L4 **M3 SL** L13, L14
5.1G	Display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.	N/A
5.2A	Represent the value of the digit in decimals through the thousandths using expanded notation and numerals.	N/A
5.2B	Compare and order two decimals to thousandths and represent comparisons using the symbols >, <, or =.	N/A
5.2C	Round decimals to tenths or hundredths.	**M3 SL** L3
5.3A	Estimate to determine solutions to mathematical and real-world problems involving addition, subtraction, multiplication, or division.	N/A
5.3B	Multiply with fluency a three-digit number by a two-digit number using the standard algorithm.	N/A
5.3C	Solve with proficiency for quotients of up to a four-digit dividend by a two-digit divisor using strategies and the standard algorithm.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
5.3D	Represent multiplication of decimals with products to the hundredths using objects and pictorial models, including area models.	N/A
5.3E	Solve for products of decimals to the hundredths, including situations involving money, using strategies based on place-value understandings, properties of operations, and the relationship to the multiplication of whole numbers.	N/A
5.3F	Represent quotients of decimals to the hundredths, up to four-digit dividends and two-digit whole number divisors, using objects and pictorial models, including area models.	N/A
5.3G	Solve for quotients of decimals to the hundredths, up to four-digit dividends and two-digit whole number divisors, using strategies and algorithms, including the standard algorithm.	N/A
5.3H	Represent and solve addition and subtraction of fractions with unequal denominators referring to the same whole using objects and pictorial models and properties of operations.	N/A
5.3I	Represent and solve multiplication of a whole number and a fraction that refers to the same whole using objects and pictorial models, including area models.	N/A
5.3J	Represent division of a unit fraction by a whole number and the division of a whole number by a unit fraction such as 1/3 ÷ 7 and 7 ÷ 1/3 using objects and pictorial models, including area models.	N/A
5.3K	Add and subtract positive rational numbers fluently.	**M1 SL** L2, L4
5.3L	Divide whole numbers by unit fractions and unit fractions by whole numbers.	N/A
5.4A	Identify prime and composite numbers.	N/A
5.4B	Represent and solve multi-step problems involving the four operations with whole numbers using equations with a letter standing for the unknown quantity.	N/A
5.4C	Generate a numerical pattern when given a rule in the form $y = ax$ or $y = x + a$ and graph.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
5.4D	Recognize the difference between additive and multiplicative numerical patterns given in a table or graph.	N/A
5.4E	Describe the meaning of parentheses and brackets in a numeric expression.	N/A
5.4F	Simplify numerical expressions that do not involve exponents, including up to two levels of grouping.	N/A
5.4G	Use concrete objects and pictorial models to develop the formulas for the volume of a rectangular prism, including the special form for a cube ($V = l \times w \times h$, $V = s \times s \times s$, and $V = Bh$).	N/A
5.4H	Represent and solve problems related to perimeter and/or area and related to volume.	N/A
5.5	Classify two-dimensional figures in a hierarchy of sets and subsets using graphic organizers based on their attributes and properties.	N/A
5.6A	Recognize a cube with side length of one unit as a unit cube having one cubic unit of volume and the volume of a three-dimensional figure as the number of unit cubes (n cubic units) needed to fill it with no gaps or overlaps if possible.	N/A
5.6B	Determine the volume of a rectangular prism with whole number side lengths in problems related to the number of layers times the number of unit cubes in the area of the base.	N/A
5.7	Solve problems by calculating conversions within a measurement system, customary or metric.	N/A
5.8A	Describe the key attributes of the coordinate plane, including perpendicular number lines (axes) where the intersection (origin) of the two lines coincides with zero on each number line and the given point (0, 0); the x-coordinate, the first number in an ordered pair, indicates movement parallel to the x-axis starting at the origin; and the y-coordinate, the second number, indicates movement parallel to the y-axis starting at the origin.	N/A
5.8B	Describe the process for graphing ordered pairs of numbers in the first quadrant of the coordinate plane.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
5.8C	Graph in the first quadrant of the coordinate plane ordered pairs of numbers arising from mathematical and real-world problems, including those generated by number patterns or found in an input-output table.	N/A
5.9A	Represent categorical data with bar graphs or frequency tables and numerical data, including data sets of measurements in fractions or decimals, with dot plots or stem-and-leaf plots.	**M2** L8, L20
5.9B	Represent discrete paired data on a scatterplot.	N/A
5.9C	Solve one- and two-step problems using data from a frequency table, dot plot, bar graph, stem-and-leaf plot, or scatterplot.	N/A
5.10A	Define income tax, payroll tax, sales tax, and property tax.	N/A
5.10B	Explain the difference between gross income and net income.	N/A
5.10C	Identify the advantages and disadvantages of different methods of payment, including check, credit card, debit card, and electronic payments.	N/A
5.10D	Develop a system for keeping and using financial records.	N/A
5.10E	Describe actions that might be taken to balance a budget when expenses exceed income.	N/A
5.10F	Balance a simple budget.	**M1** L19, L20

Social Studies

PhD Science Texas approaches phenomenon-driven instruction by situating scientific phenomena in a cultural context. Students study curated trade texts, artworks, and primary sources that tell the historical and cultural stories surrounding phenomena. They come to see science and engineering as processes of understanding and improving the world in which they live. The following sections highlight some of the social studies content areas students study and the skills they apply while making sense of authentic scientific phenomena.

GEOGRAPHY

Throughout the *PhD Science Texas* curriculum, students apply social studies skills to interpret and analyze geographical information. Students use maps, globes, and other resources to identify and describe physical characteristics of locations where scientific phenomena occur. Students observe natural systems and processes to describe the effects they have on landforms and water bodies. They design solutions that model how humans can reduce impacts of natural and human processes on the physical environment.

SCIENCE, TECHNOLOGY, AND SOCIETY

The *PhD Science Texas* curriculum aims to develop scientifically literate citizens. As students identify the contributions of scientists and engineers, they recognize the influence of science, engineering, and technology on society and the natural world. Students explore past and present examples of technology within the context of making sense of scientific phenomena and solving problems.

SOCIAL STUDIES SKILLS

Students apply and develop social studies skills as they seek to build new scientific knowledge. Students gather information from a wide range of authentic resources. Students apply skills such as sequencing and categorizing to help interpret information they gather. Then students communicate their knowledge orally or by using written and visual material.

Level 5 Modules and Spotlight Lessons

M1 **Earth Processes** WITH SPOTLIGHT LESSONS ON **Physical Properties of Matter**

M2 **Ecosystems**

M3 **Sun, Earth, and Moon System** WITH SPOTLIGHT LESSONS AND A CAPSTONE PROJECT ON **Forces, Motion, and Energy**

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
5.1A	Explain when, where, and why groups of people explored, colonized, and settled in the United States, including the search for religious freedom and economic gain.	N/A
5.1B	Describe the accomplishments of significant individuals who settled for religious freedom and economic gain during the colonial period, including William Bradford, Anne Hutchinson, William Penn, John Smith, and Roger Williams.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
5.2A	Analyze the causes and effects of events prior to and during the American Revolution, including the taxation resulting from the French and Indian War and the colonist response to taxation such as the Boston Tea Party.	N/A
5.2B	Identify the Founding Fathers and Patriot heroes, including John Adams, Benjamin Franklin, Thomas Jefferson, the Sons of Liberty, and George Washington, and their motivations and contributions during the revolutionary period.	N/A
5.2C	Summarize the results of the American Revolution, including the establishment of the United States.	N/A
5.3	Identify the contributions of Founding Fathers James Madison and George Mason, who helped create the U.S. Constitution.	N/A
5.4A	Describe the causes and effects of the War of 1812 such as impressment of sailors, territorial conflicts with Great Britain, and the increase in U.S. manufacturing.	N/A
5.4B	Identify and explain how changes resulting from the Industrial Revolution led to conflict among sections of the United States.	N/A
5.4C	Identify significant events and concepts associated with U.S. territorial expansion, including the Louisiana Purchase, the expedition of Lewis and Clark, and Manifest Destiny.	N/A
5.4D	Explain the central role of the expansion of slavery in causing sectionalism, disagreement over states' rights, and the Civil War.	N/A
5.4E	Explain the effects of the Civil War, including Reconstruction and the 13th, 14th, and 15th amendments to the U.S. Constitution.	N/A
5.4F	Identify the challenges, opportunities, and contributions of people from various American Indian and immigrant groups such as the settlement of the frontier and building of the Transcontinental Railroad.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
5.5A	Explain the significance of issues and events of the 20th century such as industrialization, urbanization, the Great Depression, the world wars, the civil rights movement, and military actions.	N/A
5.5B	Analyze various issues and events of the 21st century such as the War on Terror and the 2008 presidential election.	N/A
5.5C	Identify the accomplishments and contributions of individuals and groups such as Susan B. Anthony, Martin Luther King Jr., Rosa Parks, Cesar Chavez, Franklin D. Roosevelt, Ronald Reagan, the Tuskegee Airmen, and the 442nd Regimental Combat Team in the areas of civil rights, women's rights, military actions, and politics.	N/A
5.6A	Describe political and economic regions in the United States that result from patterns of human activity.	N/A
5.6B	Describe regions in the United States based on physical characteristics such as landform, climate, and vegetation.	**M1** L1, L3
5.6C	Locate on a map important political features such as the five largest cities by population in the United States and the 50 states.	N/A
5.6D	Create a map of important physical features such as the Appalachian Mountains, Great Lakes, Mississippi River, Great Plains, and Rocky Mountains.	N/A
5.7A	Identify and describe the patterns of settlement such as rural, urban, and suburban.	N/A
5.7B	Explain the geographic factors that influence patterns of settlement and the distribution of population in the United States.	N/A
5.7C	Analyze the geographic factors that influence the location of the five largest urban areas in the United States and explain their distribution.	N/A
5.8A	Describe how and why people have adapted to and modified their environment in the United States such as the use of human resources to meet basic needs.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
5.8B	Analyze the positive and negative consequences of human modification of the environment in the United States.	N/A
5.9A	Explain the economic patterns of early European colonies.	N/A
5.9B	Identify major industries of colonial America such as shipbuilding and growing of cash crops.	N/A
5.10A	Identify the development of the free enterprise system in colonial America and the United States.	N/A
5.10B	Describe how the free enterprise system works in the United States.	N/A
5.10C	Give examples of the benefits of the free enterprise system in the United States.	N/A
5.11A	Explain how supply and demand affects consumers in the United States.	N/A
5.11B	Evaluate the effects of supply and demand on industry and agriculture, including the plantation system, in the United States.	N/A
5.12A	Compare how people in different regions of the United States earn a living, past and present.	N/A
5.12B	Identify and explain how geographic factors have influenced the location of economic activities in the United States.	N/A
5.12C	Analyze the effects of immigration and migration on the economic development and growth of the United States.	N/A
5.12D	Describe the impact of mass production, specialization, and division of labor on the economic growth of the United States.	N/A
5.13A	Compare the systems of government of early European colonists, including representative government and monarchy.	N/A
5.13B	Identify examples of representative government in the American colonies, including the Mayflower Compact and the Virginia House of Burgesses.	N/A
5.14A	Explain the purposes, key elements, and the importance of the Declaration of Independence.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
5.14B	Explain the purposes of the U.S. Constitution as identified in the Preamble.	N/A
5.14C	Explain the reasons for the creation of the Bill of Rights and its importance.	N/A
5.15A	Identify and explain the basic functions of the three branches of government.	N/A
5.15B	Identify the reasons for and describe the system of checks and balances outlined in the U.S. Constitution.	N/A
5.15C	Distinguish between national and state governments and compare their responsibilities in the U.S. federal system.	N/A
5.16A	Explain various patriotic symbols, including Uncle Sam; national celebrations such as Labor Day; and political symbols such as the donkey and elephant.	N/A
5.16B	Sing or recite "The Star-Spangled Banner" and explain its history.	N/A
5.16C	Recite and explain the meaning of the Pledge of Allegiance to the United States Flag.	N/A
5.16D	Explain the significance of important landmarks, including the White House, the Statue of Liberty, and Mount Rushmore.	N/A
5.17A	Explain why individuals have a duty to participate in civic affairs at the local, state, and national levels.	N/A
5.17B	Explain how to contact elected and appointed leaders in local, state, and national governments.	N/A
5.18A	Identify past and present leaders in the national government, including the president and various members of Congress, and their political parties.	N/A
5.18B	Identify leadership qualities of national leaders, past and present.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
5.19	Describe the fundamental rights guaranteed in the Bill of Rights, including freedom of religion, speech, and press; the right to assemble and petition the government; the right to keep and bear arms; the right to trial by jury; and the right to an attorney.	N/A
5.20A	Identify significant examples of art, music, and literature from various periods in U.S. history such as the painting *American Progress*, "Yankee Doodle," and "Paul Revere's Ride."	N/A
5.20B	Explain how examples of art, music, and literature reflect the times during which they were created.	N/A
5.21A	Describe customs and traditions of various racial, ethnic, and religious groups in the United States.	N/A
5.21B	Summarize the contributions of people of various racial, ethnic, and religious groups to our national identity.	N/A
5.22A	Identify the accomplishments of notable individuals in the fields of science and technology such as Benjamin Franklin, Eli Whitney, John Deere, Thomas Edison, Alexander Graham Bell, George Washington Carver, the Wright Brothers, and Neil Armstrong.	**M1 SL** L5, L7 **M2** L7
5.22B	Identify how scientific discoveries, technological innovations, and the rapid growth of technology industries have advanced the economic development of the United States, including the transcontinental railroad and the space program.	N/A
5.22C	Explain how scientific discoveries and technological innovations in the fields of medicine, communication, and transportation have benefited individuals and society in the United States.	**M3 SL** L11
5.23A	Differentiate between, locate, and use valid primary and secondary sources such as technology; interviews; biographies; oral, print, and visual material; documents; and artifacts to acquire information about the United States.	N/A

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
5.23B	Analyze information by applying absolute and relative chronology through sequencing, categorizing, identifying cause-and-effect relationships, comparing, contrasting, finding the main idea, summarizing, making generalizations and predictions, and drawing inferences and conclusions.	**M1** L1, L9, L10, L11, L12, L14, L23 **M1 SL** L1, L2, L3, L4, L5, L6 **M2** L6, L8, L11, L14, L20, L21, L23 **M3** L9, L11, L12, L14, L15, L16, L24 **M3 SL** L6, L8, L9, L16
5.23C	Organize and interpret information in outlines, reports, databases, and visuals, including graphs, charts, timelines, and maps.	**M1** L2, L3, L4, L8, L9, L11, L12, L14, L15, L16, L19, L20, L21, L22, L23 **M1 SL** L1, L4, L5, L6 **M2** L1, L2, L3, L4, L5, L6, L7, L8, L9, L10, L11, L12, L13, L14, L15, L16, L17, L18, L19, L20, L21, L22, L23, L24, L25, L27 **M3** L1, L2, L3, L4, L5, L7, L8, L9, L11, L12, L13, L14, L15, L16, L17, L18, L19, L20, L21, L22, L23, L24, L25 **M3 SL** L2, L7, L10, L16
5.23D	Identify different points of view about an issue, topic, historical event, or current event.	N/A
5.23E	Identify the historical context of an event.	N/A
5.24A	Apply mapping elements, including grid systems, legends, symbols, scales, and compass roses, to create and interpret maps.	**M1** L3, L5, L6 **M2** L6 **M3** L1, L9, L24
5.24B	Interpret geographic data, population distribution, and natural resources into a variety of formats such as graphs and maps.	**M1** L2, L3, L6, L13, L22 **M2** L11
5.25A	Use social studies terminology correctly.	N/A
5.25B	Incorporate main and supporting ideas in verbal and written communication.	**M2** L29
5.25C	Express ideas orally based on research and experiences.	**M1** L2, L6, L11, L14, L16, L21, L25 **M1 SL** L5, L7 **M2** L11, L12, L15, L21, L23, L24, L26, L27, L29 **M3** L4, L14, L16, L17, L21, L28 **M3 SL** L17

Standard	Student Expectation	Module (M) / Spotlight (SL) / Lesson (L)
5.25D	Create written and visual material such as journal entries, reports, graphic organizers, outlines, and bibliographies.	**M1** L4, L8, L9, L10, L11, L13, L14, L15, L16, L17, L18, L19, L21, L22 **M1 SL** L1, L6 **M2** L1, L2, L3, L4, L5, L6, L7, L8, L9, L10, L11, L12, L13, L14, L15, L16, L17, L18, L19, L20, L21, L22, L23, L24, L25, L27 **M3** L1, L2, L3, L4, L5, L8, L9, L11, L12, L14, L17, L18, L19, L20, L21, L23, L24 **M3 SL** L1, L2, L6, L7, L8, L9
5.26	Use problem-solving and decision-making processes to identify a problem, gather information, list and consider options, consider advantages and disadvantages, choose and implement a solution, and evaluate the effectiveness of the solution.	**M1** L17, L18, L19, L20, L21 **M1 SL** L6 **M2** L2, L3, L4, L24, L25, L26 **M3 SL** L11, L12, L13, L14, L15