2022 - 2023, Seventh Grade, Science, Quarter 1

Big Ideas/Key Concepts:

- The atom is the fundamental structure that interacts in various ways to build and give properties to all matter.
- Temperature and pressure affect the behavior of atomic structures in ways that can be described as the state of the matter.
- The periodic table is a model representing patterns in the properties of elements, compounds, and mixtures that can be used to identify and manipulate matter.

Embedded K-8 TN Computer Science Standards

- None for Quarter 1

Phenomenon Based I Can Statements (Based on SEPs & CCCs)

Suggested Use: These I Can's can be used during phenomena-based lessons as needed per quarter but are suggestions and NOT required for each quarter. These would best fit during the introduction of a phenomenon or during student-led investigations following the introduction of a phenomenon.

Asking questions

- I can formulate questions that address the phenomenon.

Develop & Use Models

- I can use models to identify relationships or connections within the phenomenon (or system).
- I can use models to describe, explain and predict results.

Plan & Carry out an Investigation

- I can plan an investigation that tests and analyzes a scientific question.
- I can analyze & interpret results.

Analyze & Interpret Data

- I can identify patterns & relationships within and between datasets.

Use Math & Computational Thinking

- I can use math and mathematical modeling or computational thinking to analyze, represent and model data.

Construct Explanations or Design Solutions

- I can construct and explain my scientific thinking.
- I can identify and explain the relationship between events in a phenomenon (or system).
- I can identify a problem and design a solution using provided criteria and constraints.

Engage in Argument with Evidence

- I can identify and construct scientific claims.
- I can provide evidence to a scientific claim.
- I can construct scientific reasoning for a claim using evidence.

Obtain, Evaluate & Communicate Info

- I can obtain, evaluate and communicate information for a phenomenon (or investigation).

Quick Links within this Document

Quarter 2 Quarter 3 Quarter 4
TN Science Standards Reference Guide
OER

Standards	Student Friendly "I Can" Statements
Matter and Its Interactions **7.PS1.1:** Develop and use models to illustrate the structure of atoms, including the subatomic particles with their relative positions and charge.	**Matter and Its Interactions** A. I can develop and use models to explain the structure of atoms. B. I can explain how the charge and relative position of subatomic particles give atoms their identity and characteristic properties. C. I can identify and explain the importance of valence electrons.
7.PS1.2: Compare and contrast elemental molecules and compound molecules.	A. I can develop an explanation for how atoms, elements, elemental molecules, and compound molecules are all unique parts of matter.

	B. I can distinguish between element and compound molecules based on their characteristics
7.PS1.3: Classify matter as pure substances or mixtures based on composition.	A. I can experiment to understand how to separate pure substances, heterogeneous mixtures, and homogeneous mixtures into component parts. B. I can analyze data in order to classify matter as either a pure substance or mixture. C. I can classify matter as either a pure substance (element or compound) or mixture based on its composition and characteristics. D. I can make an argument for how all samples of matter are made from different combinations of atoms. E. I can develop and utilize models to distinguish between pure substances and mixtures.
7.PS1.6: Create and interpret models of substances whose atoms represent the states of matter with respect to temperature and pressure.	A. I can develop and use models to explain the structure, movement, and energy level of particles as solids, liquids, and gases. B. I can interpret Triple point diagrams to identify and/or predict a substance's state at different temperatures and pressures. C. I can develop and use models to explain how a change in pressure can cause a change in state. D. I can develop and use models to explain particle structure, movement, and energy level during state changes. E. I can analyze data on temperature and pressure to determine the likely effect on state.

7. PS1.5: Use the periodic table as a model to analyze and interpret evidence relating to physical and chemical properties to identify a sample of matter.	A. I can plan and conduct experiments to determine the physical and chemical properties of different samples of matter. (Examples: density, melting point, boiling point, solubility, flammability, color and conductivity) B. I can examine and differentiate the difference between physical and chemical properties of matter. C. I can interpret and analyze the information contained on the periodic table. Examples: period vs. row, atomic mass, atomic number, chemical symbol, and name. D. I can identify unknown samples of matter by analyzing data related to physical and chemical properties. E. I can use the periodic table to identify patterns in the properties of elements. (Examples: atomic mass, reactivity and valence electrons, metallic/nonmetallic properties,) F. I can use the periodic table to determine properties of specific elements.

2022 - 2023, Seventh Grade, Science, Quarter 2

Big Ideas/Key Concepts:

- Changes in matter occur in such a way to produce new substances with distinct properties while maintaining the overall number of atoms.
- The cell and the work of its specialized structures contribute to the life activities of the organism.
- Cells maintain homeostasis within an organism through passive transport.
- Cell size contributes to the efficiency of cell processes within the organism.

Embedded K-8 TN Computer Science Standards

- AIT.6 Collect, organize, analyze, and interpret data to identify solutions and/or make informed decisions.
- AIT.7 Infer and predict or propose relationships with data.

Phenomenon Based I Can Statements (Based on SEPs & CCCs)

Suggested Use: These I Cans can be used during phenomena-based lessons as needed per quarter but are suggestions and NOT required for each quarter. These would best fit during the introduction of a phenomenon or during student-led investigations following the introduction of a phenomenon.

Asking questions

- I can formulate questions that address the phenomenon.

Develop & Use Models

- I can use models to identify relationships or connections within the phenomenon (or system).
- I can use models to describe, explain and predict results.

Plan & Carry out an Investigation

- I can plan an investigation that tests and analyzes a scientific question.
- I can analyze & interpret results.

Analyze & Interpret Data

- I can identify patterns & relationships within and between datasets.

Use Math & Computational Thinking

- I can use math and mathematical modeling or computational thinking to analyze, represent and model data.

Construct Explanations or Design Solutions

- I can construct and explain my scientific thinking.
- I can identify and explain the relationship between events in a phenomenon (or system).
- I can identify a problem and design a solution using provided criteria and constraints.

Engage in Argument with Evidence

- I can identify and construct scientific claims.
- I can provide evidence to a scientific claim.
- I can construct scientific reasoning for a claim using evidence.

Obtain, Evaluate & Communicate Info

- I can obtain, evaluate, and communicate information for a phenomenon (or investigation).

Quick Links within this Document

Quarter 1 Quarter 3 Quarter 4
TN Science Standards Reference Guide
OER

Standards	Student Friendly "I Can" Statements
Matter and Its Interactions **7.PS1.4:** Analyze and interpret chemical reactions to determine if the total number of atoms in the reactants and products support the Law of Conservation of Mass.	**Matter and Its Interactions** A. I can develop and use models to show the rearrangement of atoms during a chemical reaction. B. I can analyze data in order to identify the reactants and products in a chemical reaction. C. I can use a chemical equation to represent a chemical reaction. D. I can analyze and interpret various models (either equations or other models) of chemical equations to determine if they follow the Law of Conservation of Mass. E. I can use coefficients and subscripts to identify the number of molecules and atoms represented in a chemical equation.

	F. I can evaluate a chemical equation to determine if it adheres to the Law of Conservation of Mass.
From Molecules to Organisms: Structures and Processes	**From Molecules to Organisms: Structures and Processes**
7.LS1.1: Develop and construct models that identify and explain the structure and function of major cell organelles as they contribute to the life activities of the cell and organism.	A. I can develop models that explain the structure and function of major cell parts as they contribute to the life activities of the cell and organism. (nucleus, chloroplast, mitochondria, cell membrane, cell wall, vacuole, ribosome, lysosome, endoplasmic reticulum, Golgi body, cytoplasm, and centriole). B. I can construct a model identifying how organelles work together for the survival of the cell and the larger organism.
7.LS1.3: Evaluate evidence that cells have structural similarities and differences in organisms across kingdoms.	A. I can use a microscope to analyze the differences between microscopic images of cells and scientific diagrams. B. I can investigate the structures and compare cells from several organisms using a microscope. (plants, animals, and bacteria) C. I can differentiate between organisms by using cellular structural differences of each to classify them into the six current kingdoms. D. I can investigate the similarities and differences between prokaryotic and eukaryotic cells.
7.LS1.2: Conduct an investigation to demonstrate how the cell membrane maintains homeostasis through the process of passive transport.	A. I can investigate and defend the need for homeostasis in cells. B. I can illustrate a representation of the cell membrane's role in passive transport of biological molecules. C. I can investigate and describe the structure of the cell membrane, to explain the movement of biological molecules into and out of the cell.

	D. I can investigate and predict how the cell membrane will maintain homeostasis in highly concentrated solutions and less concentrated solutions. E. I can compare and contrast osmosis and diffusion. F. I can justify the importance of passive transport for maintaining homeostasis within an organism.

2022 - 2023, Seventh Grade, Science, Quarter 3

Big Ideas/Key Concepts:

- Organisms exchange energy and nutrients with the environment through several processes such as photosynthesis and cellular respiration.
- Earth's climate consists of an atmosphere whose mixture changes as a result of natural and human caused chemical changes.
- Cells reproduce through mitosis for the growth and repair of the organism.

Embedded K-8 TN Computer Science Standards

- AIT.1 Identify and define problems and form significant questions for investigation.
- AIT.2 Develop a plan to use technology to find a solution and create projects.
- AIT.6 Collect, organize, analyze, and interpret data to identify solutions and/or make informed decisions.
- AIT.7 Infer and predict or propose relationships with data.

Phenomenon Based I Can Statements (Based on SEPs & CCCs)

Suggested Use: These I Cans can be used during phenomena-based lessons as needed per quarter but are suggestions and NOT required for each quarter. These would best fit during the introduction of a phenomenon or during student-led investigations following the introduction of a phenomenon.

Asking questions

- I can formulate questions that address the phenomenon.

Develop & Use Models

- I can use models to identify relationships or connections within the phenomenon (or system).
- I can use models to describe, explain and predict results.

Plan & Carry out an Investigation

- I can plan an investigation that tests and analyzes a scientific question.

- I can analyze & interpret results.

Analyze & Interpret Data

- I can identify patterns & relationships within and between datasets.

Use Math & Computational Thinking

- I can use math and mathematical modeling or computational thinking to analyze, represent and model data.

Construct Explanations or Design Solutions

- I can construct and explain my scientific thinking.
- I can identify and explain the relationship between events in a phenomenon (or system).
- I can identify a problem and design a solution using provided criteria and constraints.

Engage in Argument with Evidence

- I can identify and construct scientific claims.
- I can provide evidence to a scientific claim.
- I can construct scientific reasoning for a claim using evidence.

Obtain, Evaluate & Communicate Info

- I can obtain, evaluate, and communicate information for a phenomenon (or investigation).

Quick Links within this Document

Quarter 1 Quarter 2 Quarter 4
TN Science Standards Reference Guide
OER

Standards	Student Friendly "I Can" Statements
From Molecules to Organisms: Structures and Processes **7.LS1.9:** Construct a scientific explanation based on compiled evidence for the processes of photosynthesis, cellular respiration, and anaerobic respiration in the cycling of matter and flow of energy into and out of organisms.	**From Molecules to Organisms: Structures and Processes** A. I can use the chemical equations for photosynthesis and cellular respiration to describe their processes. B. I can identify and define patterns when comparing the reactants and products of photosynthesis and cellular respiration. C. I can associate photosynthesis and cellular respiration with the appropriate cell structures (chloroplast, mitochondria).

	D. I can compare and discuss the processes of cellular respiration and anaerobic respiration in terms of the reactants and products (glucose ⟶ lactic acid + carbon dioxide + energy). E. I can research and justify a scenario in which anaerobic respiration would be necessary for an organism to obtain energy.
Ecosystems: Interactions, Energy, and Dynamics **7.LS2.1:** Develop a model to depict the cycling of matter, including carbon and oxygen, including the flow of energy among biotic and abiotic parts of an ecosystem.	**Ecosystems: Interactions, Energy, and Dynamics** A. I can explain the connection between cycling of matter and energy with chemical changes, such as photosynthesis and cellular respiration. B. I can develop a model for how photosynthesis, cellular respiration, plants, and animals contribute to the global carbon cycle. C. I can investigate and explain how specific structures and processes are used by plants and animals to obtain nutrients from their environment. (Example: roots, leaves, stomata) D. I can develop and use models to explain how matter and energy cycle through the biotic and abiotic parts of an ecosystem.
Earth and Human Activity **7.ESS3.1:** Graphically represent the composition of the atmosphere as a mixture of gases and discuss the potential for atmospheric change.	**Earth and Human Activity** A. I can analyze data and create graphs that represent the composition of Earth's atmosphere. B. I can develop an argument for why Earth's atmosphere is classified as a mixture. C. I can research and communicate specific chemical changes that impact the composition of Earth's atmosphere.

7.ESS3.2: Engage in a scientific argument through graphing and translating data regarding human activity and climate. **<u>From Molecules to Organisms: Structures and Processes</u>** **7.LS1.8:** Construct an explanation demonstrating that the function of mitosis for multicellular organisms is for growth and repair through the production of genetically identical daughter cells. **<u>Heredity: Inheritance and Variation of Traits</u>** **7.LS3.2:** Distinguish between mitosis and meiosis and compare the resulting daughter cells.	D. I can develop questions that evaluate the implications of changes to the atmosphere's composition. A. I can analyze data to determine how human activities affect the condition of Earth's atmosphere and climate. B. I can research and develop an argument using data regarding the connection between human activity and changes to Earth's climate **<u>From Molecules to Organisms: Structures and Processes</u>** A. I can justify an argument that mitosis is a process that supports growth, replacement, and repair within an organism. B. I can research and explain how mitosis develops two identical daughter cells with the same number of chromosomes. **<u>Heredity: Inheritance and Variation of Traits</u>** A. I can differentiate between mitosis and meiosis based on chromosome number, number of daughter cells and purpose. B. I can construct an explanation detailing why the process of meiosis is needed to maintain the number of chromosomes after the combination of gametes. C. I can evaluate and justify the relationship between meiosis and genetic variation.

2022 - 2023, Seventh Grade, Science, Quarter 4

Big Ideas/Key Concepts:

- Cells form the basis of the hierarchy of living things.
- For sexually reproducing organisms, specialized cells are created through meiosis.
- Meiosis is a major component of genetic variation which determines similarities and differences in sexually reproducing organisms.
- Sexual and asexual reproduction both have advantages and disadvantages to the continuation of a species.
- Adaptations of organisms increase their chances of survival and reproduction.
- Engineers must consider design constraints and criteria when designing solutions to biomedical problems.

Embedded K-8 TN Computer Science Standards

- AIT.1 Identify and define problems and form significant questions for investigation.
- AIT.2 Develop a plan to use technology to find a solution and create projects.
- AIT.6 Collect, organize, analyze, and interpret data to identify solutions and/or make informed decisions.
- AIT.7 Infer and predict or propose relationships with data.
- DC.1 Advocate, demonstrate, and routinely practice safe, legal, and responsible use of information and technology.
- DC.2 Exhibit a positive mindset toward using technology that supports collaboration, learning, and productivity.
- DC.3 Exhibit leadership for digital citizenship.
- DC.4 Recognize and describe the potential risks and dangers associated with various forms of online communications (e.g., cell phones, social media, digital photos).
- DC.5 Explain responsible uses of technology and digital information; describe possible consequences of inappropriate use such as copyright infringement and piracy.

Phenomenon Based I Can Statements (Based on SEPs & CCCs)

Suggested Use: These I Cans can be used during phenomena-based lessons as needed per quarter but are suggestions and NOT required for each quarter. These would best fit during the introduction of a phenomenon or during student-led investigations following the introduction of a phenomenon.

Asking questions

- I can formulate questions that address the phenomenon.

Develop & Use Models

- I can use models to identify relationships or connections within the phenomenon (or system).
- I can use models to describe, explain and predict results.

Plan & Carry out an Investigation

- I can plan an investigation that tests and analyzes a scientific question.
- I can analyze & interpret results.

Analyze & Interpret Data

- I can identify patterns & relationships within and between datasets.

Use Math & Computational Thinking

- I can use math and mathematical modeling or computational thinking to analyze, represent and model data.

Construct Explanations or Design Solutions

- I can construct and explain my scientific thinking.
- I can identify and explain the relationship between events in a phenomenon (or system).
- I can identify a problem and design a solution using provided criteria and constraints.

Engage in Argument with Evidence

- I can identify and construct scientific claims.
- I can provide evidence to a scientific claim.
- I can construct scientific reasoning for a claim using evidence.

Obtain, Evaluate & Communicate Info

- I can obtain, evaluate, and communicate information for a phenomenon (or investigation).

Quick Links within this Document

Quarter 1 Quarter 2 Quarter 3
TN Science Standards Reference Guide
OER

Standards	Student Friendly "I Can" Statements

Heredity: Inheritance and Variation of Traits	**Heredity: Inheritance and Variation of Traits**
7.LS3.1: Hypothesize that the impact of structural changes to genes (i.e., mutations) located on chromosomes may result in harmful, beneficial, or neutral effects to the structure and function of the organism.	A. I can hypothesize how a genetic mutation can create harmful, beneficial, or neutral effects to the structure and function of an organism. B. I can model and explain the structural hierarchy of DNA, genes, chromatin, and chromosomes along with their roles in determining inherited traits. C. I can investigate and develop an argument for how changes to a gene can cause changes in a protein which can affect its function.
7.LS3.3: Predict the probability of individual dominant and recessive alleles to be transmitted from each parent to offspring during sexual reproduction and represent the phenotypic and genotypic patterns using ratios.	A. I can identify and explain the difference between dominant and recessive traits, genotype and phenotype, and homozygous and heterozygous alleles through the evaluation of a monohybrid cross. B. I can predict the probability of a genotype and/or phenotype passing from one generation to another through the development of a Punnett Square. C. I can represent genotype and phenotype probability as a ratio. D. I can analyze and interpret the information found in a Punnett square to determine genotypes and phenotypes that result from sexual reproduction.
From Molecules to Organisms: Structures and Processes	**From Molecules to Organisms: Structures and Processes**
7.LS1.7: Evaluate and communicate evidence that compares and contrasts the advantages and disadvantages of sexual and asexual reproduction.	A. I can classify organisms according to whether they reproduce sexually or asexually. B. I can develop a logical argument with evidence detailing the advantages and disadvantages of sexual and asexual reproduction.

	C. I can predict the ability for asexually or sexually reproducing species to survive and thrive under changing environmental conditions.
7.LS1.6: Develop an argument based on empirical evidence and scientific reasoning to explain how behavioral and structural adaptations in animals and plants affect the probability of survival and reproductive success.	A. I can identify adaptations in animals and plants that increase the chance of reproductive success. B. I can differentiate between behavioral and structural adaptations. C. I can develop an argument for how a specific adaptation will increase the chances of an animal or plant reproducing.
From Molecules to Organisms: Structures and Processes	**From Molecules to Organisms: Structures and Processes**
7.LS1.4: Diagram the hierarchical organization of multicellular organisms from cell to organism.	A. I can justify and explain the relationship that exists among cells, tissues, organs, organ systems, and organisms. B. I can design a diagram displaying the hierarchical organization of multicellular organisms from cell to organism in plants and animals (cell, tissue, organ, organ system, and organism). C. I can develop an explanation for how the various levels of the hierarchy work independently and together for the overall survival of the organism.
7.LS1.5: Explain that the body is a system comprising subsystems that maintain equilibrium and support life through digestion, respiration, excretion, circulation, sensation (nervous and integumentary), and locomotion (musculoskeletal).	A. I can investigate the role of the major body systems in maintaining homeostasis and supporting life within an organism. (digestive, excretory, respiratory, circulatory, nervous, integumentary, muscular, and skeletal) B. I can identify and communicate the connectedness of three or more organ systems in terms of how they work together to carry out life processes and maintain homeostasis.
-	

Links Among Engineering, Technology, and Applications of Science	**Links Among Engineering, Technology, and Applications of Science**
7.ETS2.1: Examine a problem from the medical field pertaining to biomaterials and design a solution taking into consideration the criteria, constraints, and relevant scientific principles of the problem that may limit possible solutions.	A. I can research global medical concerns and design a possible solution while considering criteria, constraints, and relevant scientific principles.