Alignment of Texas Pre-Admission Content Test (PACT) Science: Grades 7–12 (736) Framework with Texas Essential Knowledge and Skills

This alignment study identifies the Texas Essential Knowledge and Skills that are addressed in whole or in part by each competency of the exam framework. An indication of alignment does not necessarily imply complete congruence of the content of an exam competency with the relevant standard. The information in this document is subject to change if revisions are made to the exam framework. Any changes will fully supersede the information contained in this document.

Competencies		Texas Essential Knowledge and Skills
Field 736: TX PACT: Science: Grades 7–12		**Texas Essential Knowledge and Skills for Science**
Content Domain I **NATURE OF SCIENCE**		
001	Understand principles and procedures of scientific inquiry.	**Grades 7–8:** **112.19 b 1; 112.20 b 1** Scientific investigation and reasoning. The student, for at least 40% of instructional time, conducts laboratory and field investigations following safety procedures and environmentally appropriate and ethical practices. **112.19 b 2; 112.20 b 2** Scientific investigation and reasoning. The student uses scientific practices during laboratory and field investigations. **112.19 b 3; 112.20 b 3** Scientific investigation and reasoning. The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions and knows the contributions of relevant scientists. **112.19 b 4; 112.20 b 4** Scientific investigation and reasoning. The student knows how to use a variety of tools and safety equipment to conduct science inquiry.

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		Grades 9–12: **112.32 c 1; 112.33 c 1; 112.34 c 1; 112.35 c 1; 112.36 c 1; 112.37 c 1; 112.38 c 1; 112.39 c 1** Scientific processes. The student, for at least 40% of instructional time, conducts laboratory and field investigations using safe, environmentally appropriate, and ethical practices. **112.32 c 2; 112.33 c 2; 112.34 c 2; 112.35 c 2; 112.36 c 2; 112.37 c 1; 112.38 c 1; 112.39 c 1** Scientific processes. The student uses scientific methods during laboratory and field investigations. **112.32 c 3; 112.33 c 3; 112.34 c 3; 112.35 c 3; 112.36 c 3; 112.37 c 3; 112.38 c 3; 112.39 c 3** The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom.
002	Understand the history and nature of science.	**Grades 7–8:** **112.19 b 2; 112.20 b 2** Scientific investigation and reasoning. The student uses scientific practices during laboratory and field investigations. **112.19 b 3; 112.20 b 3** Scientific investigation and reasoning. The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions and knows the contributions of relevant scientists.
		Grades 9–12: **112.32 c 2; 112.33 c 2; 112.34 c 2; 112.35 c 2; 112.36 c 2; 112.37 c 2; 112.38 c 2; 112.39 c 2** Scientific processes. The student uses scientific methods during laboratory and field investigations. **112.32 c 3; 112.33 c 3; 112.34 c 3; 112.35 c 3; 112.36 c 3; 112.37 c 3; 112.38 c 3; 112.39 c 3** Scientific processes. The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom.

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003	Understand the relationships among science, technology, engineering, mathematics, and society.	**Grades 7–8:** **112.19 b 2; 112.20 b 2** Scientific investigation and reasoning. The student uses scientific practices during laboratory and field investigations. **112.19 b 3; 112.20 b 3** Scientific investigation and reasoning. The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions and knows the contributions of relevant scientists.
		Grades 9–12: **112.32 c 2; 113.33 c 2; 112.34 c 2; 112.35 c 2; 112.36 c 2; 112.37 c 2; 112.38 c 2** Scientific processes. The student uses scientific methods during laboratory and field investigations. **112.32 c 3; 112.33 c 3; 112.34 c 3; 112.35 c 3; 112.36 c 3; 112.37 c 3; 112.38 c 3; 112.39 c 3** Scientific processes. The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom.
Content Domain II **PHYSICAL SCIENCE**		
004	Understand the properties and characteristics of matter.	**Grades 7–8:** **112.19 b 6** Matter and energy. The student knows that matter has physical and chemical properties and can undergo physical and chemical changes. **112.20 b 5** Matter and energy. The student knows that matter is composed of atoms and has chemical and physical properties.

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		Grades 9–12: **112.35 c 4** Science concepts. The student knows the characteristics of matter and can analyze the relationships between chemical and physical changes and properties. **112.35 c 5** Science concepts. The student understands the historical development of the Periodic Table and can apply its predictive power. **112.35 c 6** Science concepts. The student knows and understands the historical development of atomic theory. **112.35 c 9** Science concepts. The student understands the principles of ideal gas behavior, kinetic molecular theory, and the conditions that influence the behavior of gases. **112.35 c 10** Science concepts. The student understands and can apply the factors that influence the behavior of solutions. **112.35 c 12** Science concepts. The student understands the basic processes of nuclear chemistry. **112.38 c 6** Science concepts. The student knows that relationships exist between the structure and properties of matter. **112.38 c 7** Science concepts. The student knows that changes in matter affect everyday life. **112.39 c 8** Science concepts. The student knows simple examples of atomic, nuclear, and quantum phenomena.
005	Understand chemical bonding, different types of chemical reactions, and stoichiometry.	**Grades 7–8:** **112.20 b 5** Matter and energy. The student knows that matter is composed of atoms and has chemical and physical properties.

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		Grades 9–12: **112.35 c 7** Science concepts. The student knows how atoms form ionic, covalent, and metallic bonds. **112.35 c 8** Science concepts. The student can quantify the changes that occur during chemical reactions. **112.35 c 10** Science concepts. The student understands and can apply the factors that influence the behavior of solutions. **112.35 c 11** Science concepts. The student understands the energy changes that occur in chemical reactions. **112.38 c 6** Science concepts. The student knows that relationships exist between the structure and properties of matter. **112.38 c 7** Science concepts. The student knows that changes in matter affect everyday life.
006	Understand the characteristics of energy transformations in physical and chemical systems.	**Grades 7–8:** **112.19 b 6** Matter and energy. The student knows that matter has physical and chemical properties and can undergo physical and chemical changes. **112.20 b 5** Matter and energy. The student knows that matter is composed of atoms and has chemical and physical properties.

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		Grades 9–12: **112.35 c 10** Science concepts. The student understands and can apply the factors that influence the behavior of solutions. **112.35 c 11** Science concepts. The student understands the energy changes that occur in chemical reactions. **112.37 c 6** Science concepts. The student knows the sources and flow of energy through an environmental system. **112.38 c 5** Science concepts. The student recognizes multiple forms of energy and knows the impact of energy transfer and energy conservation in everyday life. **112.38 c 6** Science concepts. The student knows that relationships exist between the structure and properties of matter. **112.38 c 7** Science concepts. The student knows that changes in matter affect everyday life. **112.39 c 6** Science concepts. The student knows that changes occur within a physical system and applies the laws of conservation of energy and momentum.
007	Understand force, motion, and energy.	**Grades 7–8:** **112.19 b 5** Matter and energy. The student knows that matter has physical and chemical properties and can undergo physical and chemical changes. **112.19 b 7; 112.20 b 6** Force, motion, and energy. The student knows that there is a relationship among force, motion, and energy.

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Field 736: TX PACT: Science: Grades 7–12		**Texas Essential Knowledge and Skills for Science**
		Grades 9–12: **112.37 c 6** Science concepts. The student knows the sources and flow of energy through an environmental system. **112.38 c 4** Science concepts. The student knows concepts of force and motion evident in everyday life. **112.38 c 5** Science concepts. The student recognizes multiple forms of energy and knows the impact of energy transfer and energy conservation in everyday life. **112.39 c 4** Science concepts. The student knows and applies the laws governing motion in a variety of situations. **112.39 c 5** Science concepts. The student knows the nature of forces in the physical world. **112.39 c 6** Science concepts. The student knows that changes occur within a physical system and applies the laws of conservation of energy and momentum.
008	Understand the characteristics and properties of mechanical and electromagnetic waves.	**Grades 7–8:** **112.20 b 8** Earth and space. The student knows characteristics of the universe.
		Grades 9–12: **112.35 c 6** Science concepts. The student knows and understands the historical development of atomic theory. **112.39 c 5** Science concepts. The student knows the nature of forces in the physical world. **112.39 c 7** Science concepts. The student knows the characteristics and behavior of waves. **112.39 c 8** Science concepts. The student knows simple examples of atomic, nuclear, and quantum phenomena.
009	Understand electricity and magnetism.	**Grades 7–8:** n/a

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		Grades 9–12: **112.38 c 4** Science concepts. The student knows concepts of force and motion evident in everyday life. **112.38 c 5** Science concepts. The student recognizes multiple forms of energy and knows the impact of energy transfer and energy conservation in everyday life. **112.39 c 5** Science concepts. The student knows the nature of forces in the physical world.
Content Domain III **LIFE SCIENCE**		
010	Understand the characteristics, organization, and processes of cells.	**Grades 7–8:** **112.19 b 12** Organisms and environments. The student knows that living systems at all levels of organization demonstrate the complementary nature of structure and function. **112.19 b 14** Organisms and environments. The student knows that reproduction is a characteristic of living organisms and that the instructions for traits are governed in the genetic material.
		Grades 9–12: **112.34 c 6** Science concepts. The student knows the mechanisms of genetics such as the role of nucleic acids and the principles of Mendelian and non-Mendelian genetics. **112.34 c 9** Science concepts. The student knows the significance of various molecules involved in metabolic processes and energy conversions that occur in living organisms.

Competencies		Texas Essential Knowledge and Skills
Field 736: TX PACT: Science: Grades 7–12		**Texas Essential Knowledge and Skills for Science**
011	Understand the classification and characteristics of organisms.	**Grades 7–8:** **112.19 b 11** Organisms and environments. The student knows that populations and species demonstrate variation and inherit many of their unique traits through gradual processes over many generations. **112.19 b 12** Organisms and environments. The student knows that living systems at all levels of organization demonstrate the complementary nature of structure and function. **112.19 b 13** Organisms and environments. The student knows that a living organism must be able to maintain balance in stable internal conditions in response to external and internal stimuli.
		Grades 9–12: **112.32 c 10** Science concepts. The student knows environmental adaptations of aquatic organisms. **112.34 c 4** Science concepts. The student knows that cells are the basic structures of all living things with specialized parts that perform specific functions and that viruses are different from cells. **112.34 c 8** Science concepts. The student knows that taxonomy is a branching classification based on the shared characteristics of organisms and can change as new discoveries are made. **112.34 c 10** Science concepts. The student knows that biological systems are composed of multiple levels. **112.34 c 11** Science concepts. The student knows that biological systems work to achieve and maintain balance. **112.37 c 4** Science concepts. The student knows the relationships of biotic and abiotic factors within habitats, ecosystems, and biomes.

Competencies		Texas Essential Knowledge and Skills
Field 736: TX PACT: Science: Grades 7–12		**Texas Essential Knowledge and Skills for Science**
012	Understand concepts and principles related to genetics and evolution.	**Grades 7–8:** **112.19 b 11** Organisms and environments. The student knows that populations and species demonstrate variation and inherit many of their unique traits through gradual processes over many generations. **112.19 b 14** Organisms and environments. The student knows that reproduction is a characteristic of living organisms and that the instructions for traits are governed in the genetic material.
		Grades 9–12: **112.32 c 10** Science concepts. The student knows environmental adaptations of aquatic organisms. **112.34 c 6** Science concepts. The student knows the mechanisms of genetics such as the role of nucleic acids and the principles of Mendelian and non-Mendelian genetics. **112.34 c 7** Science concepts. The student knows evolutionary theory is a scientific explanation for the unity and diversity of life. **112.36 c 8** Earth in space and time. The student knows that fossils provide evidence for geological and biological evolution.
013	Understand characteristics of different biomes, relationships among organisms, and the flow of matter and energy through ecosystems.	**Grades 7–8:** **112.19 b 5** Matter and energy. The student knows that matter has physical and chemical properties and can undergo physical and chemical changes. **112.19 b 10** Organisms and environments. The student knows that there is a relationship between organisms and the environment. **112.19 b 13** Organisms and environments. The student knows that a living organism must be able to maintain balance in stable internal conditions in response to external and internal stimuli. **112.20 b 11** Organisms and environments. The student knows that interdependence occurs among living systems and the environment and that human activities can affect these systems.

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Field 736: TX PACT: Science: Grades 7–12		**Texas Essential Knowledge and Skills for Science**
		Grades 9–12: **112.32 c 4** Science concepts. Students know that aquatic environments are the product of Earth systems interactions. **112.32 c 5** Science concepts. The student conducts long-term studies on local aquatic environments. Local natural environments are to be preferred over artificial or virtual environments. **112.32 c 9** Science concepts. The student knows the types and components of aquatic ecosystems. **112.32 c 10** Science concepts. The student knows environmental adaptations of aquatic organisms. **112.32 c 11** Science concepts. The student knows about the interdependence and interactions that occur in aquatic environments. **112.32 c 12** Science concepts. The student understands how human activities impact aquatic environments. **112.34 c 11** Science concepts. The student knows that biological systems work to achieve and maintain balance. **112.34 c 12** Science concepts. The student knows that interdependence and interactions occur within an environmental system. **112.37 c 4** Science concepts. The student knows the relationships of biotic and abiotic factors within habitats, ecosystems, and biomes. **112.37 c 6** Science concepts. The student knows the sources and flow of energy through an environmental system. **112.37 c 7** Science concepts. The student knows the relationship between carrying capacity and changes in populations and ecosystems. **112.37 c 8** Science concepts. The student knows that environments change naturally. **112.37 c 9** Science concepts. The student knows the impact of human activities on the environment.

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Content Domain IV **EARTH AND SPACE SCIENCE**		
014	Understand physical geology and the history of Earth.	**Grades 7–8:** **112.19 b 8** Earth and space. The student knows that natural events and human activity can impact Earth systems. **112.20 b 9** Earth and space. The student knows that natural events can impact Earth systems.

Competencies		Texas Essential Knowledge and Skills
Field 736: TX PACT: Science: Grades 7–12		**Texas Essential Knowledge and Skills for Science**
		Grades 9–12: **112.36 c 6** Earth in space and time. The student knows the evidence for how Earth's atmospheres, hydrosphere, and geosphere formed and changed through time. **112.36 c 7** Earth in space and time. The student knows that scientific dating methods of fossils and rock sequences are used to construct a chronology of Earth's history expressed in the geologic time scale. **112.36 c 8** Earth in space and time. The student knows that fossils provide evidence for geological and biological evolution. **112.36 c 9** Solid Earth. The student knows Earth's interior is differentiated chemically, physically, and thermally. **112.36 c 10** Solid Earth. The student knows that plate tectonics is the global mechanism for major geologic processes and that heat transfer, governed by the principles of thermodynamics, is the driving force. **112.36 c 11** Solid Earth. The student knows that the geosphere continuously changes over a range of time scales involving dynamic and complex interactions among Earth's subsystems. **112.36 c 12** Solid Earth. The student knows that Earth contains energy, water, mineral, and rock resources and that use of these resources impacts Earth's subsystems. **112.36 c 13** Fluid Earth. The student knows that the fluid Earth is composed of the hydrosphere, cryosphere, and atmosphere subsystems that interact on various time scales with the biosphere and geosphere. **112.36 c 15** Fluid Earth. The student knows that interactions among Earth's five subsystems influence climate and resource availability, which affect Earth's habitability. **112.37 c 6** Science concepts. The student knows the sources and flow of energy through an environmental system. **112.37 c 8** Science concepts. The student knows that environments change naturally.

Competencies		Texas Essential Knowledge and Skills
Field 736: TX PACT: Science: Grades 7–12		**Texas Essential Knowledge and Skills for Science**
015	Understand characteristics of the hydrosphere, weather, and climate.	**Grades 7–8:** **112.19 b 8** Earth and space. The student knows that natural events and human activity can impact Earth systems. **112.20 b 10** Earth and space. The student knows that climatic interactions exist among Earth, ocean, and weather systems.
		Grades 9–12: **112.32 c 4** Science concepts. Students know that aquatic environments are the product of Earth systems interactions. **112.32 c 6** Science concepts. The student knows the role of cycles in an aquatic environment. **112.32 c 7** Science concepts. The student knows the origin and use of water in a watershed. **112.32 c 8** Science concepts. The student knows that geological phenomena and fluid dynamics affect aquatic systems. **112.32 c 9** Science concepts. The student knows the types and components of aquatic ecosystems. **112.36 c 6** Earth in space and time. The student knows the evidence for how Earth's atmospheres, hydrosphere, and geosphere formed and changed through time. **112.36 c 9** Solid Earth. The student knows Earth's interior is differentiated chemically, physically, and thermally. **112.36 c 10** Solid Earth. The student knows that plate tectonics is the global mechanism for major geologic processes and that heat transfer, governed by the principles of thermodynamics, is the driving force. **112.36 c 11** Solid Earth. The student knows that the geosphere continuously changes over a range of time scales involving dynamic and complex interactions among Earth's subsystems. **112.36 c 13** Fluid Earth. The student knows that the fluid Earth is composed of the hydrosphere, cryosphere, and atmosphere subsystems that interact on various time scales with the biosphere and geosphere.

Competencies		Texas Essential Knowledge and Skills
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		112.36 c 14 Fluid Earth. The student knows that Earth's global ocean stores solar energy and is a major driving force for weather and climate through complex atmospheric interactions. **112.36 c 15** Fluid Earth. The student knows that interactions among Earth's five subsystems influence climate and resource availability, which affect Earth's habitability. **112.37 c 6** Science concepts. The student knows the sources and flow of energy through an environmental system. **112.37 c 8** Science concepts. The student knows that environments change naturally. **112.37 c 9** Science concepts. The student knows the impact of human activities on the environment.
016	Understand characteristics of the solar system and universe.	**Grades 7–8:** **112.19 b 9** Earth and space. The student knows components of our solar system. **112.20 b 7** Earth and space. The student knows the effects resulting from cyclical movements of the Sun, Earth, and Moon. **112.20 b 8** Earth and space. The student knows characteristics of the universe.

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		Grades 9–12: **112.33 c 6** Science concepts. The student knows our place in space. **112.33 c 7** Science concepts. The student knows the role of the Moon in the Sun, Earth, and Moon system. **112.33 c 8** Science concepts. The student knows the reasons for the seasons. **112.33 c 9** Science concepts. The student knows that planets of different size, composition, and surface features orbit around the Sun. **112.33 c 10** Science concepts. The student knows the role of the Sun as the star in our solar system. **112.33 c 11** Science concepts. The student knows the characteristics and life cycle of stars. **112.33 c 12** Science concepts. The student knows the variety and properties of galaxies. **112.36 c 4** Earth in space and time. The student knows how Earth-based and space-based astronomical observations reveal differing theories about the structure, scale, composition, origin, and history of the universe. **112.36 c 5** Earth in space and time. The student understands the solar nebular accretionary disk model. **112.36 c 14** Fluid Earth. The student knows that Earth's global ocean stores solar energy and is a major driving force for weather and climate through complex atmospheric interactions.