

DOMAIN I. SCIENTIFIC INQUIRY AND PROCESSES

Competency 0001	The teacher understands how to collect and manage learning activities to ensure the safety of all students and the correct use and care of organisms, natural resources, materials, equipment, and technologies.	
Skill 1.1	The beginning teacher uses current sources of information about laboratory safety, including safety regulations and guidelines for the use of science facilities.....	1
Skill 1.2	The beginning teacher recognizes potential safety hazards in the laboratory and in the field and knows how to apply procedures, including basic first aid, for responding to accidents	2
Skill 1.3	The beginning teacher employs safe practices in planning and implementing all instructional activities and designs, and implements rules and procedures to maintain a safe learning environment.....	3
Skill 1.4	The beginning teacher understands procedures for selecting, maintaining, and safely using chemicals, tools, technologies, materials, specimens, and equipment, including procedures for the recycling, reuse, and conservation of laboratory resources and for the safe handling and ethical treatment of organisms	6
Skill 1.5	The beginning teacher knows how to use appropriate equipment and technology (e.g., Internet, spreadsheet, calculator) for gathering, organizing, displaying, and communicating data in a variety of ways (e.g., charts, tables, graphs, diagrams, written reports, oral presentations).....	7
Skill 1.6	The beginning teacher understands how to use a variety of tools, techniques, and technology to gather, organize, and analyze data and how to apply appropriate methods of statistical measures and analysis	9

Skill 1.7	The beginning teacher knows how to apply techniques to calibrate measuring devices and understands concepts of precision, accuracy, and error with regard to reading and recording numerical data from scientific instruments	12
Skill 1.8	The beginning teacher uses the International System of Units (i.e., metric system) and performs unit conversions within and across measurement systems	13

Competency 0002 The teacher understands the nature of science, the process of scientific inquiry, and the unifying concepts that are common to all sciences.

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Skill 9.3 The beginning teacher solves problems involving thermal expansion, heat capacity, and the relationship between heat and other forms of energy 80

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DOMAIN III.

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DOMAIN V. HEREDITY AND EVOLUTION OF LIFE

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Skill 25.4	The beginning teacher understands the types, biological significance, and causes of mutations	220
Skill 25.5	The beginning teacher identifies methods and applications of genetic identification and manipulation (e.g., production of recombinant DNA, cloning, PCR)	221
Skill 25.6	The beginning teacher analyzes human karyotypes in order to identify chromosomal disorders and sex	222

Competency 0026 The teacher understands the continuity and variations of traits from one generation to the next.

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Skill 26.2	The beginning teacher compares the processes of meiosis and mitosis (in plants and animals) and describes their roles in sexual and asexual reproduction	229

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Competency 0027 The teacher understands the theory of biological evolution.

Skill 27.1	The beginning teacher understands stability and change in populations (e.g., Hardy-Weinberg equilibrium) and analyzes factors leading to genetic variation and evolution in populations (e.g., mutation, gene flow, genetic drift, recombination, nonrandom mating, natural selection)	233
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Skill 27.5	The beginning teacher analyzes processes that contribute to speciation (e.g., natural selection, founder effect, reproductive isolation)	239
Skill 27.6	The beginning teacher analyzes the development of isolating mechanisms that discourage hybridization between species (e.g., species' recognition marks, behavioral displays, ecological separation, seasonal breeding)	240

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DOMAIN VI. DIVERSITY OF LIFE

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Skill 30.2 The beginning teacher compares how various organisms obtain, transform, transport, release, eliminate, and store energy and matter257

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Skill 39.1	The beginning teacher identifies the components and distribution of hydrologic systems (e.g., rivers, lakes, aquifers, oceans) and compares and contrasts the chemical composition (e.g., salinity, acidity) and physical attributes (e.g., density, turbidity) of fresh, brackish, and salt water.....	345
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Skill 39.3	The beginning teacher identifies the tools and procedures needed to collect and analyze quantitative data (e.g., pH, salinity, temperature, mineral content, nitrogen compounds, turbidity) from hydrologic systems	348
Skill 39.4	The beginning teacher knows how to use principles of fluid statics and dynamics (e.g., Archimedes' principle, turbulence, viscosity, hydrostatic pressure) to analyze hydrologic systems	349
Skill 39.5	The beginning teacher identifies characteristics of a local watershed and the effects of natural events (e.g., floods, droughts) and human activities (e.g., irrigation, industrial use, municipal use) on a local watershed.....	350
Skill 39.6	The beginning teacher analyzes patterns of ocean circulation (e.g., upwelling, surface currents) and factors that influence these patterns (e.g., winds, heating)	353
Skill 39.7	The beginning teacher understands the relationship between ocean depth and temperature, pressure, density, and light penetration.....	355
Skill 39.8	The beginning teacher analyzes the causes and effects of waves, tides, tidal bores, and tsunamis	357
Skill 39.9	The beginning teacher identifies the characteristics of different ocean zones (e.g., coastal, lighted, deep, estuaries, bays).....	358

**Competency 0040 The teacher understands structure and function
of the atmosphere.**

Skill 40.1	The beginning teacher understands the composition of Earth's atmosphere	360
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Skill 40.2	The beginning teacher understands the range of atmospheric conditions that organisms will tolerate (e.g., types of gases, temperature, particulate matter, moisture).....	360
Skill 40.3	The beginning teacher identifies the layers of the atmosphere (e.g., troposphere, ionosphere, mesosphere) and the characteristics of each layer	363
Skill 40.4	The beginning teacher recognizes that the Sun is the ultimate source of energy for the atmosphere.....	364
Skill 40.5	The beginning teacher understands processes of energy transfer (e.g., convection, radiation, conduction, phase changes of water) within the atmosphere and at the boundaries between the atmosphere, landmasses, and oceans	365
Skill 40.6	The beginning teacher knows types, characteristics, and processes of formation of clouds (e.g., cumulus, stratus, cirrus) and precipitation (e.g., rain, snow, hail).....	366
Skill 40.7	The beginning teacher knows the characteristics of air masses (e.g., temperature, moisture) and how air masses form and interact (e.g., fronts).....	369
Skill 40.8	The beginning teacher understands the types (e.g., blizzards, hurricanes, tornadoes), characteristics, and causes of severe weather.....	370
Skill 40.9	The beginning teacher identifies the types, characteristics, and distribution of climates and the factors (e.g., latitude, maritime effect, deforestation) that affect local and global climate	371
Skill 40.10	The beginning teacher identifies the effects of global phenomena (e.g., jet stream, El Niño) on local weather patterns	375
Skill 40.11	The beginning teacher understands weather maps and the principles, procedures, and technology of weather forecasting (e.g., satellite technology, computer models)	376
Skill 40.12	The beginning teacher understands that climate changes over time (e.g., ice ages).....	377

Skill 42.2	The beginning teacher demonstrates an understanding of the Sun's effects (e.g., gravitational, electromagnetic, solar wind, solar flares) on Earth.....	389
Skill 42.3	The beginning teacher understands the effects of Earth's rotation, revolution, and tilt of axis on its environment (e.g., day/night length, seasons).....	391
Skill 42.4	The beginning teacher identifies the effects of the Moon and Sun on tides.....	391
Skill 42.5	The beginning teacher analyzes information about lunar phases and lunar and solar eclipses to model the Earth, Moon, and Sun system.....	393

Competency 0043 The teacher understands the role of the sun in the solar system and the characteristics of planets and other objects that orbit the sun.

Skill 43.1	The beginning teacher knows the approximate size, mass, motion, temperature, structure, and composition of the Sun.....	394
Skill 43.2	The beginning teacher compares and contrasts conditions essential to life on Earth (e.g., temperature, water, mass, gases) to conditions on other planets.....	395
Skill 43.3	The beginning teacher compares and contrasts the planets in terms of orbit, mass, size, composition, rotation, atmosphere, moons, and geologic activity.....	396
Skill 43.4	The beginning teacher identifies objects other than planets that orbit the sun (e.g., asteroids, comets) and analyzes their characteristics (e.g., mass, size, composition, trajectory, origin).....	400
Skill 43.5	The beginning teacher relates gravitational force to the motion and interactions of objects within the solar system (e.g., Sun, planets, moons, comets, meteors).....	401
Skill 43.6	The beginning teacher understands theories of the formation of the solar system.....	402

Competency 0044 The teacher understands composition, history, and properties of the universe.

Skill 44.1	The beginning teacher describes how nuclear fusion produces energy in stars, such as the Sun.....	404
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Skill 44.2	The beginning teacher identifies different types of stars, their characteristics and motions (e.g., temperature, age, relative size, composition, and radial velocity) and understands the use of spectral analysis to determine these characteristics.....	404
Skill 44.3	The beginning teacher describes stages in the life cycle of stars using the Hertzsprung-Russell diagram.....	405
Skill 44.4	The beginning teacher compares and contrasts characteristics of different types of galaxies	408
Skill 44.5	The beginning teacher interprets data to make inferences about the formation of stars and galaxies.....	409
Skill 44.6	The beginning teacher identifies types, characteristics, and significance of other deep-space objects in the universe (e.g., pulsars, nebulae, black holes)	410
Skill 44.7	The beginning teacher interprets empirical data and scientific theories regarding the estimated age, origin, and evolution of the universe (e.g., big bang, inflation)	411
Skill 44.8	The beginning teacher describes the role of supernovas on the chemical composition of the universe (e.g., origin of carbon on Earth).....	412

Competency 0045 The teacher understands the history and methods of astronomy.

Skill 45.1	The beginning teacher recognizes that all of science including current theories of the origin and evolution of the universe are based on the assumption that the fundamental laws of nature do not change over space and time	413
Skill 45.2	The beginning teacher describes the historical origins of the perceived patterns of constellations and their role in navigation	413
Skill 45.3	The beginning teacher describes the historical development and significance of the law of universal gravitation and planetary motion, the big bang theory of the origin of the universe, and the theory of special relativity	414
Skill 45.4	The beginning teacher recognizes and explains the patterns of movement of the Sun, Moon, planets, and stars in the sky	418

Skill 45.5	The beginning teacher demonstrates the use of units of measurement in astronomy (e.g., light year, astronomical units)	419
Skill 45.6	The beginning teacher explains how various technologies (e.g., Earth- and space-based telescopes, deep-space probes, artificial satellites) are used in advancing knowledge about the universe	420
Skill 45.7	The beginning teacher understands how mathematical models, computer simulations, and data collected by the space and other science programs have contributed to scientific knowledge about Earth, the solar system, and the universe	421

DOMAIN X. SCIENCE LEARNING, INSTRUCTION, AND ASSESSMENT

Competency 0046	The teacher understands research based theoretical and practical knowledge about teaching science, how students learn science, and the role of scientific inquiry in science instruction.	
Skill 46.1	The beginning teacher knows research-based theories about how students develop scientific understanding and how developmental characteristics, prior knowledge, experience, and attitudes of students influence science learning.....	423
Skill 46.2	The beginning teacher understands the importance of respecting student diversity by planning activities that are inclusive and selecting and adapting science curricula, content, instructional materials, and activities to meet the interests, knowledge, understanding, abilities, and experiences of all students, including English Language Learners.....	425
Skill 46.3	The beginning teacher knows how to plan and implement strategies to encourage student self-motivation and engagement in their own learning (e.g., linking inquiry-based investigations to students' prior knowledge, focusing inquiry-based instruction on issues relevant to students, developing instructional materials using situations from students' daily lives, fostering collaboration among students)	426
Skill 46.4	The beginning teacher knows how to use a variety of instructional strategies to ensure all students comprehend content-related texts, including how to locate, retrieve, and retain information from a range of texts and technologies.....	427

Skill 46.5	The beginning teacher understands the science teacher's role in developing the total school program by planning and implementing science instruction that incorporates school wide objectives and the statewide curriculum as defined in the Texas Essential Knowledge and Skills (TEKS)	429
Skill 46.6	The beginning teacher knows how to design and manage the learning environment (e.g., individual, small-group, whole-class settings) to focus and support student inquiries and to provide the time, space, and resources for all students to participate in field, laboratory, experimental, and non-experimental scientific investigation	430
Skill 46.7	The beginning teacher understands the rationale for using active learning and inquiry methods in science instruction and how to model scientific attitudes such as curiosity, openness to new ideas, and skepticism.....	431
Skill 46.8	The beginning teacher knows principles and procedures for designing and conducting an inquiry-based scientific investigation (e.g., making observations; generating questions; researching and reviewing current knowledge in light of existing evidence; choosing tools to gather and analyze evidence; proposing answers, explanations, and predictions; communicating and defending results).....	433
Skill 46.9	The beginning teacher knows how to assist students with generating, refining, focusing, and testing scientific questions and hypotheses	435
Skill 46.10	The beginning teacher knows strategies for assisting students in learning to identify, refine, and focus scientific ideas and questions guiding an inquiry-based scientific investigation; to develop, analyze, and evaluate different explanations for a given scientific result; and to identify potential sources of error in an inquiry-based scientific investigation.....	436
Skill 46.11	The beginning teacher understands how to implement inquiry strategies designed to promote the use of higher-level thinking skills, logical reasoning, and scientific problem solving in order to move students from concrete to more abstract understanding.....	437
Skill 46.12	The beginning teacher knows how to sequence learning activities in a way that uncovers common misconceptions, allows students to build upon their prior knowledge, and challenges them to expand their understanding of science.....	438

Competency 0047 The teacher knows how to monitor and assess science learning in laboratory, field, and classroom settings.

Skill 47.1	The beginning teacher knows how to use formal and informal assessments of student performance and products (e.g., projects, laboratory and field journals, rubrics, portfolios, student profiles, checklists) to evaluate student participation in and understanding of inquiry-based scientific investigations.....	440
Skill 47.2	The beginning teacher understands the relationship between assessment and instruction in the science curriculum (e.g., designing assessments to match learning objectives, using assessment results to inform instructional practice)	441
Skill 47.3	The beginning teacher knows the importance of monitoring and assessing students' understanding of science concepts and skills on an ongoing basis by using a variety of appropriate assessment methods (e.g., performance assessment, self-assessment, peer assessment, formal/informal assessment)	441
Skill 47.4	The beginning teacher understands the purposes, characteristics, and uses of various types of assessment in science, including formative and summative assessments, and the importance of limiting the use of an assessment to its intended purpose	441
Skill 47.5	The beginning teacher understands strategies for assessing students' prior knowledge and misconceptions about science and how to use these assessments to develop effective ways to address these misconceptions	443
Skill 47.6	The beginning teacher understands characteristics of assessments, such as reliability, validity, and the absence of bias in order to evaluate assessment instruments and their results	443
Skill 47.7	The beginning teacher understands the role of assessment as a learning experience for students and strategies for engaging students in meaningful self-assessment.....	444
Skill 47.8	The beginning teacher recognizes the importance of selecting assessment instruments and methods that provide all students with adequate opportunities to demonstrate their achievements	445
Skill 47.9	The beginning teacher recognizes the importance of clarifying teacher expectations by sharing evaluation criteria and assessment results with students	447

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