



Preparation Manual

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Preparation Manual

Section 3: Overview and Exam Framework Core Subjects 4–8 (211)

Exam Overview

Exam Name	Core Subjects 4–8
Exam Code	211
Time	5 hours English Language Arts and Reading: 1 hour and 55 minutes Mathematics: 1 hour and 5 minutes Social Studies: 50 minutes Science: 50 minutes
Number of Questions	200 selected-response questions English Language Arts and Reading: 74 selected-response questions Mathematics: 42 selected-response questions Social Studies: 42 selected-response questions Science: 42 selected-response questions
Format	Computer-administered test (CAT)

The TExES Core Subjects 4–8 (211) exam is designed to assess whether an examinee has the requisite knowledge and skills that an entry-level educator in this field in Texas public schools must possess. The 200 selected-response questions are based on the Core Subjects 4–8 exam framework.

The exam may contain questions that do not count toward the score. Your final scaled score will be based only on scored questions.

The exam is structured with four Subject Exams: English Language Arts and Reading, Mathematics, Social Studies, and Science.

If, upon completion of an entire Core Subjects 4–8 (211) exam, you do not pass one or more of the Subject Exams, you are eligible to retake a single Subject Exam if you passed all of the other Subject Exams, or the overall exam if you did not pass two or more Subject Exams. Each testing session counts as an attempt for the Core Subjects 4–8 (211) exam, whether the overall exam or an individual Subject Exam (i.e., 806–809) is attempted.

The timing for the Core Subjects 4–8 (211) exam is by subject exam, rather than the total exam.

The Standards

English Language Arts and Reading Standard I

Oral Language: Teachers of students in grades 4–8 understand the importance of oral language, know the developmental processes of oral language and provide a variety of instructional opportunities for students to develop listening and speaking skills.

**English Language Arts
and Reading Standard II**

Foundations of Reading: Teachers of students in grades 4–8 understand the foundations of reading and early literacy development.

**English Language Arts
and Reading Standard III**

Word Analysis Skills and Reading Fluency: Teachers understand the importance of word analysis skills (including decoding, blending, structural analysis, sight word vocabulary) and reading fluency and provide many opportunities for students to practice and improve their word analysis skills and reading fluency.

**English Language Arts
and Reading Standard
IV**

Reading Comprehension: Teachers understand the importance of reading for understanding, know the components of comprehension and teach students strategies for improving their comprehension.

**English Language Arts
and Reading Standard V**

Written Language: Teachers understand that writing is a developmental process and provide instruction that helps students develop competence in written communication.

**English Language Arts
and Reading Standard
VI**

Study and Inquiry Skills: Teachers understand the importance of study and inquiry skills as tools for learning and promote students' development in applying study and inquiry skills.

**English Language Arts
and Reading Standard
VII**

Viewing and Representing: Teachers understand how to interpret, analyze, evaluate and produce visual images and messages in various media and to provide students with opportunities to develop skills in this area.

**English Language Arts
and Reading Standard
VIII**

Assessment of Developing Literacy: Teachers understand the basic principles of assessment and use a variety of literacy assessment practices to plan and implement instruction.

Mathematics Standard I

Number Concepts: The mathematics teacher understands and uses numbers, number systems and their structure, operations and algorithms, quantitative reasoning and technology appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS]) in order to prepare students to use mathematics.

Mathematics Standard II

Patterns and Algebra: The mathematics teacher understands and uses patterns, relations, functions, algebraic reasoning, analysis and technology appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS]) in order to prepare students to use mathematics.

Mathematics Standard III

Geometry and Measurement: The mathematics teacher understands and uses geometry, spatial reasoning, measurement concepts and principles and technology appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS]) in order to prepare students to use mathematics.

**Mathematics Standard
IV**

Probability and Statistics: The mathematics teacher understands and uses probability and statistics, their applications and technology appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS]) in order to prepare students to use mathematics.

Mathematics Standard V

Mathematical Processes: The mathematics teacher understands and uses mathematical processes to reason mathematically, to solve mathematical problems, to make mathematical connections within and outside of mathematics and to communicate mathematically.

**Mathematics Standard
VI**

Mathematical Perspectives: The mathematics teacher understands the historical development of mathematical ideas, the interrelationship between society and mathematics, the structure of mathematics and the evolving nature of mathematics and mathematical knowledge.

**Mathematics Standard
VII**

Mathematical Learning and Instruction: The mathematics teacher understands how children learn and develop mathematical skills, procedures and concepts; knows typical errors students make; and uses this knowledge to plan, organize and implement instruction to meet curriculum goals and to teach all students to understand and use mathematics.

**Mathematics Standards
VIII**

Mathematical Assessment: The mathematics teacher understands assessment and uses a variety of formal and informal assessment techniques appropriate to the learner on an ongoing basis to monitor and guide instruction and to evaluate and report student progress.

**Social Studies Standard
I**

The social studies teacher has a comprehensive knowledge of the social sciences and recognizes the value of the social sciences.

**Social Studies Standard
II**

The social studies teacher effectively integrates the various social science disciplines.

**Social Studies Standard
III**

The social studies teacher uses knowledge and skills of social studies, as defined by the Texas Essential Knowledge and Skills (TEKS), to plan and implement effective curriculum, instruction, assessment and evaluation.

**Social Studies Standard
IV**

History: The social studies teacher applies knowledge of significant historical events and developments, as well as of multiple historical interpretations and ideas, in order to facilitate student understanding of relationships between the past, the present and the future.

**Social Studies Standard
V**

Geography: The social studies teacher applies knowledge of people, places and environments to facilitate students' understanding of geographic relationships in Texas, the United States and the world.

Social Studies Standard VI	Economics: The social studies teacher knows how people organize economic systems to produce, distribute and consume goods and services and uses this knowledge to enable students to understand economic systems and make informed economic decisions.
Social Studies Standard VII	Government: The social studies teacher knows how governments and structures of power function, provide order and allocate resources and uses this knowledge to facilitate student understanding of how individuals and groups achieve their goals through political systems.
Social Studies Standard VIII	Citizenship: The social studies teacher understands citizenship in the United States and other societies and uses this knowledge to prepare students to participate in our society through an understanding of democratic principles and citizenship practices.
Social Studies Standard IX	Culture: The social studies teacher understands cultures and how they develop and adapt and uses this knowledge to enable students to appreciate and respect cultural diversity in Texas, the United States and the world.
Social Studies Standard X	Science, Technology and Society: The social studies teacher understands developments in science and technology and uses this knowledge to facilitate student understanding of the social and environmental consequences of scientific discovery and technological innovation.
Science Standard I	The science teacher manages classroom, field and laboratory activities to ensure the safety of all students and the ethical care and treatment of organisms and specimens.
Science Standard II	The science teacher understands the correct use of tools, materials, equipment and technologies.
Science Standard III	The science teacher understands the process of scientific inquiry and its role in science instruction.
Science Standard IV	The science teacher has theoretical and practical knowledge about teaching science and about how students learn science.
Science Standard V	The science teacher knows the varied and appropriate assessments and assessment practices to monitor science learning.
Science Standard VI	The science teacher understands the history and nature of science.
Science Standard VII	The science teacher understands how science affects the daily lives of students and how science interacts with and influences personal and societal decisions.

Science Standards VIII

The science teacher knows and understands the science content appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS]) in physical science.

Science Standards IX

The science teacher knows and understands the science content appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS]) in life science.

Science Standards X

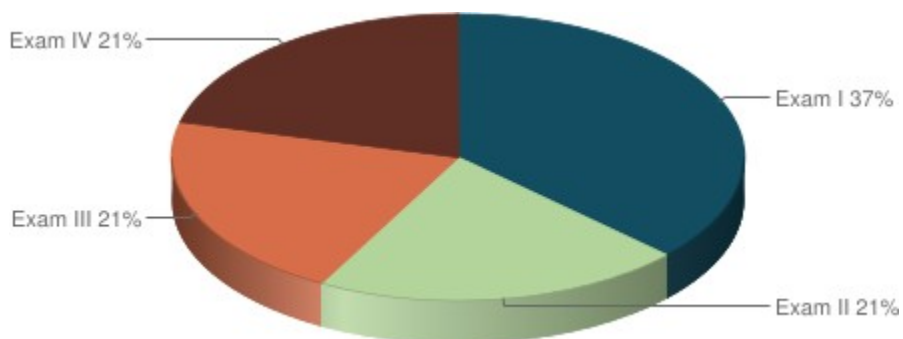
The science teacher knows and understands the science content appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS]) in Earth and space science.

Science Standards XI

The science teacher knows unifying concepts and processes that are common to all sciences.

Subject Exams and Competencies

Subject Exam	Subject Exam Title	Approx. Percentage of Exam	Standards Assessed
I	English Language Arts and Reading (806)	37%	English Language Arts and Reading I–VIII
II	Mathematics (807)	21%	Mathematics I–VIII
III	Social Studies (808)	21%	Social Studies I–X
IV	Science (809)	21%	Science I–XI



The content covered by this exam is organized into broad areas of content called **domains**. Each domain covers one or more of the educator standards for this field. Within each domain, the content is further defined by a set of **competencies**. Each competency is composed of two major parts:

- The **competency statement**, which broadly defines what an entry-level educator in this field in Texas public schools should know and be able to do.

- The **descriptive statements**, which describe in greater detail the knowledge and skills eligible for testing.

Subject Exam I—English Language Arts and Reading (806)

Competency 001—(Oral Language): The teacher understands the importance of oral language, knows the developmental processes of oral language and provides a variety of instructional opportunities for students to develop listening and speaking skills.

The beginning teacher:

- A. Knows basic linguistic concepts (e.g., phonemes, segmentation) and developmental stages in acquiring oral language, including stages in phonology, semantics, syntax and pragmatics, and recognizes that individual variations occur.
- B. Knows characteristics and uses of informal and formal oral language assessments and uses multiple, ongoing assessments to monitor and evaluate students' oral language skills.
- C. Provides language instruction that acknowledges students' current oral language skills and that builds on these skills to increase students' oral language proficiency.
- D. Plans, implements and adapts instruction that is based on informal and formal assessment of students' progress in oral language development and that addresses the needs, strengths and interests of individual students, including English-language learners (ELLs), in accordance with the English Language Proficiency Standards (ELPS).
- E. Recognizes when oral language delays or differences warrant in-depth evaluation and additional help or intervention.
- F. Knows how to provide explicit, systematic oral language instruction and supports students' learning and use of oral language through meaningful and purposeful activities implemented one-to-one and in a group.
- G. Selects and uses instructional materials and strategies that promote students' oral language development; that respond to students' individual strengths, needs and interests; that reflect cultural diversity; and that build on students' cultural, linguistic and home backgrounds to enhance their oral language development.
- H. Understands relationships between the development of oral language and the development of reading and provides instruction that interrelates oral and written language to promote students' reading proficiency and learning (e.g., preview-review, discussion, questioning).
- I. Knows similarities and differences between oral and written language and how to promote students' awareness of these similarities and differences.
- J. Selects and uses instructional strategies, materials, activities and models to strengthen students' oral vocabulary and narrative skills in spoken language and teaches students to connect spoken and printed language.
- K. Selects and uses instructional strategies, materials, activities and models to teach students skills for speaking to different audiences for various purposes and for adapting spoken language for various audiences, purposes and occasions.
- L. Selects and uses instructional strategies, materials, activities and models to teach students listening skills for various purposes (e.g., critical listening to evaluate a speaker's message, listening to enjoy and appreciate spoken language) and provides students with opportunities to engage in active, purposeful listening in a variety of contexts.
- M. Selects and uses instructional strategies, materials, activities and models to teach students to evaluate the content and effectiveness of their own spoken messages and the messages of others.

- N. Knows how to promote students' development of oral communication skills through the use of technology and applications found in smartphones, tablets and e-readers.

Competency 002—(Early Literacy Development): The teacher understands the foundations of early literacy development.

The beginning teacher:

- A. Understands the significance of phonological and phonemic awareness for reading and typical patterns in the development of phonological and phonemic awareness and recognizes that individual variations occur.
- B. Understands elements of the alphabetic principle (e.g., letter names, graphophonemic knowledge, the relationship of the letters in printed words to spoken language) and typical patterns of students' alphabetic skills development, and recognizes that individual variations occur.
- C. Understands that comprehension is an integral part of early literacy.
- D. Understands that not all written languages are alphabetic and that many alphabetic languages are more phonetically regular than English and knows the significance of this for students' literacy development in English.
- E. Understands that literacy acquisition generally develops in a predictable pattern from prereading (emergent literacy) to conventional literacy and recognizes that individual variations occur.
- F. Understands that literacy development occurs in multiple contexts through reading, writing, speaking and using various media.
- G. Knows characteristics of informal and formal literacy assessments (e.g., screening devices, criterion-referenced state tests, curriculum-based reading assessments, informal reading inventories, norm-referenced tests).
- H. Knows how to select, administer and use results from informal and formal assessments of literacy acquisition.
- I. Knows how to use ongoing assessment to determine when a student needs additional help or intervention to bring the student's performance to grade level, based on state content and performance standards for reading in the Texas Essential Knowledge and Skills (TEKS).
- J. Analyzes students' errors in reading and responds to individual students' needs by providing focused instruction to promote literacy acquisition.
- K. Selects and uses instructional materials that build on the current language skills of individual students, including English-language learners (in accordance with the ELPS), to promote development from emergent literacy to conventional literacy.
- L. Knows how to promote students' early literacy development skills through the use of technology and applications found in smartphones, tablets and e-readers.

Competency 003—(Word Identification Skills and Reading Fluency): The teacher understands the importance of word identification skills (including decoding, blending, structural analysis and sight word vocabulary) and reading fluency and provides many opportunities for students to practice and improve word identification skills and reading fluency.

The beginning teacher:

- A. Understands that many students develop word analysis skills and reading fluency in a predictable sequence and recognizes that individual variations occur.
- B. Understands differences in students' development of word identification skills and reading fluency and knows instructional practices for meeting students' individual needs in these areas.
- C. Understands the connection of word identification skills and reading fluency to reading comprehension.

- D. Knows the continuum of word analysis skills in the statewide curriculum and grade-level expectations for attainment of these skills.
- E. Knows how students develop fluency in oral and silent reading.
- F. Understands that fluency involves rate, accuracy and intonation and knows the norms for reading fluency that have been established in the Texas Essential Knowledge and Skills (TEKS) for various age and grade levels.
- G. Knows factors affecting students' word identification skills and reading fluency (e.g., home language, vocabulary development, learning disability).
- H. Understands important phonetic elements and conventions of the English language.
 - I. Knows a variety of informal and formal procedures for assessing students' word identification skills and reading fluency on an ongoing basis and uses appropriate assessments to monitor students' performance in these areas and to plan instruction for individual students, including English-language learners (in accordance with the ELPS).
- J. Analyzes students' errors in word analysis and uses the results of this analysis to develop and adjust future instruction.
- K. Applies norms and expectations for word identification skills and reading fluency, as specified in the Texas Essential Knowledge and Skills (TEKS), to evaluate students' reading performance.
- L. Knows how to use ongoing assessment of word identification skills and reading fluency to determine when a student needs additional help or intervention to bring the student's performance to grade level, based on state content and performance standards for reading in the Texas Essential Knowledge and Skills (TEKS).
- M. Knows strategies for decoding increasingly complex words, including using the alphabetic principle, structural cues (e.g., prefixes, suffixes, roots) and syllables, and for using syntax and semantics to support word identification and confirm word meaning.
- N. Selects and uses instructional strategies, materials, activities and models to teach students to recognize high-frequency irregular words (e.g., by completing analogies, identifying meanings of foreign words commonly used in written English, identifying and explaining idioms and multiple-meaning words) to promote students' ability to decode increasingly complex words and to enhance word identification skills for students reading at different levels.
- O. Selects and uses appropriate instructional strategies, materials, activities and models to improve reading fluency for students reading at different levels (e.g., having students read independent-level texts, engage in repeated reading activities, use self-correction).

Competency 004—(Reading Comprehension and Assessment): The teacher understands the importance of reading for understanding, knows components and processes of reading comprehension and teaches students strategies for improving their comprehension.

The beginning teacher:

- A. Understands reading comprehension as an active process of constructing meaning.
- B. Understands the continuum of reading comprehension skills in the statewide curriculum and grade-level expectations for these skills.
- C. Understands factors affecting students' reading comprehension (e.g., oral language development, word analysis skills, prior knowledge, language background, previous reading experiences, fluency, vocabulary development, ability to monitor understanding, characteristics of specific texts).
- D. Knows characteristics of informal and formal reading comprehension assessments (e.g., criterion-referenced state tests, curriculum-based reading assessments, informal reading inventories, norm-referenced tests).

- E. Selects and uses appropriate informal and formal assessments to monitor and evaluate students' reading comprehension.
- F. Analyzes student errors and provides focused instruction in reading comprehension based on the strengths and needs of individual students, including English-language learners (in accordance with the ELPS).
- G. Knows how to use ongoing assessment to determine when a student needs additional help or intervention to bring the student's performance to grade level, based on state content and performance standards for reading in the Texas Essential Knowledge and Skills (TEKS).
- H. Understands metacognitive skills, including self-evaluation and self-monitoring skills, and teaches students to use these skills to enhance their own reading comprehension.
- I. Knows how to determine students' independent, instructional and frustration reading levels and uses this information to select and adapt reading materials for individual students and to guide their selection of independent reading materials.
- J. Uses various instructional strategies to enhance students' reading comprehension (e.g., linking text content to students' lives and prior knowledge, connecting related ideas across different texts, engaging students in guided and independent reading, guiding students to generate questions and apply knowledge of text topics).
- K. Knows how to provide students with direct, explicit instruction in the use of strategies to improve their reading comprehension (e.g., previewing, self-monitoring, visualizing, retelling, summarizing, paraphrasing, inferring, identifying text structure).
- L. Uses various communication modes (e.g., written, oral) to promote students' reading comprehension.
- M. Understands levels of reading comprehension and how to model and teach literal, inferential and evaluative comprehension skills.
- N. Knows how to provide instruction to help students increase their reading vocabulary.
- O. Understands reading comprehension issues for students with different needs and knows effective reading strategies for those students.
- P. Knows the difference between guided and independent practice in reading and provides students with frequent opportunities for both.
- Q. Knows how to promote students' development of an extensive reading and writing vocabulary by providing them with many opportunities to read and write.

Competency 005—(Reading Applications): The teacher understands reading skills and strategies appropriate for various types of texts and contexts and teaches students to apply these skills and strategies to enhance their reading proficiency.

The beginning teacher:

- A. Understands skills and strategies for understanding, interpreting and evaluating different types of written materials, including narratives, expository texts, persuasive texts, technical writing and content-area textbooks.
- B. Understands different purposes for reading and related reading strategies.
- C. Knows and teaches strategies to facilitate comprehension of different types of text before, during and after reading (e.g., previewing, making predictions, questioning, self-monitoring, rereading, mapping, using reading journals, discussing texts).
- D. Provides instruction in comprehension skills that support students' transition from "learning to read" to "reading to learn" (e.g., matching comprehension strategies to different types of text and different purposes for reading).

- E. Understands the importance of reading as a skill in all content areas.
- F. Understands the value of using dictionaries, glossaries and other sources to determine the meanings, pronunciations and derivations of unfamiliar words and teaches students to use these sources.
- G. Knows how to teach students to interpret information presented in various formats (e.g., maps, tables, graphs) and how to locate, retrieve, and retain information from a range of texts and technologies.
- H. Knows how to help students comprehend abstract content and ideas in written materials (e.g., by using manipulatives, examples, diagrams) and formulate, express and support responses to various types of texts.
- I. Knows literary genres (e.g., historical fiction, poetry, myths, fables, drama) and their characteristics.
- J. Knows literary nonfiction genres (e.g., biographies, memoirs) and their characteristics.
- K. Recognizes a wide range of literature and other texts appropriate for students.
- L. Provides multiple opportunities for students to listen and respond to a wide variety of children's and young people's literature, both fiction and nonfiction, and to recognize characteristics of various types of narrative and expository texts.
- M. Understands and promotes students' development of literary response and analysis (e.g., formulating, expressing, and supporting responses to various types of literary texts) including teaching students elements of literary analysis (e.g., story elements, literary devices, figurative language, characterization, features of different literary genres, influences of historical and cultural contexts, themes and settings) and providing students with opportunities to apply comprehension skills to literature.
- N. Selects and uses a variety of materials to teach students about authors, including the cultural, historical and contemporary contexts, and about different purposes for writing.
- O. Provides students with opportunities to engage in silent reading and extended reading of a wide range of materials, including expository texts and various literary genres.
- P. Engages students in varied reading experiences and encourages students to interact with others about their reading.
- Q. Uses strategies to encourage reading for pleasure and lifelong learning.
- R. Knows how to teach students strategies for selecting their own books for independent reading.
- S. Uses technology to promote students' literacy and teaches students to use technology to access a wide range of appropriate narrative and expository texts.

Competency 006—(Written Language — Writing Conventions): The teacher understands the conventions of writing in English and provides instruction that helps students develop proficiency in applying writing conventions.

The beginning teacher:

- A. Knows predictable stages in the development of writing conventions (including the physical and cognitive processes involved in letter formation, word writing, sentence construction, spelling, punctuation and grammatical expression) and recognizes that individual variations occur.
- B. Knows and applies appropriate instructional strategies and sequences to teach writing conventions and their applications to all students, including English-language learners (in accordance with the ELPS).
- C. Knows informal and formal procedures for assessing students' use of writing conventions and uses multiple ongoing assessments to monitor and evaluate students' development in this area.
- D. Uses ongoing assessment of writing conventions to determine when a student needs additional help or intervention to bring the student's performance to grade level, based on state content and performance standards for writing in the Texas Essential Knowledge and Skills (TEKS).

- E. Analyzes students' errors in applying writing conventions and uses the results of this analysis to develop and adjust future instruction.
- F. Knows writing conventions and appropriate grammar and usage and provides students with direct instruction and guided practice in these areas.
- G. Understands the use of conventional spelling and its importance for success in reading and writing.
- H. Understands stages of spelling development (prephonetic, phonetic, transitional and conventional) and how and when to support students' development from one stage to the next.
- I. Provides systematic spelling instruction and gives students opportunities to use and develop spelling skills in the context of meaningful written expression.

Competency 007—(Written Language — Composition): The teacher understands that writing to communicate is a developmental process and provides instruction that promotes students' competence in written communication.

The beginning teacher:

- A. Knows predictable stages in the development of written language and recognizes that individual variations occur.
- B. Promotes student recognition of the practical uses of writing, creates an environment in which students are motivated to express ideas in writing and models writing as an enjoyable activity and a tool for lifelong learning.
- C. Knows and applies appropriate instructional strategies and sequences to develop students' writing skills (e.g., effective introduction, clearly stated purpose, controlling ideas).
- D. Knows characteristics and uses of informal and formal written language assessments and uses multiple, ongoing assessments to monitor and evaluate students' writing development.
- E. Uses assessment results to plan focused instruction to address the writing strengths, needs and interests of all individuals and groups, including English-language learners (in accordance with the ELPS).
- F. Uses ongoing assessment of written language to determine when a student needs additional help or intervention to bring the student's performance to grade level, based on state content and performance standards for writing in the Texas Essential Knowledge and Skills (TEKS).
- G. Understands the use of self-assessment in writing and provides opportunities for students to self-assess their writings (e.g., for clarity, interest to audience, comprehensiveness) and their development as writers.
- H. Understands differences between first-draft writing and writing for publication, and provides instruction in various stages of writing, including prewriting, drafting, editing and revising.
- I. Understands and teaches writing as a tool for inquiry, research and learning.
- J. Provides instruction about plagiarism, academic honesty and integrity as applied to students' written work and their presentation of information from different sources, including electronic sources.
- K. Teaches students to critically evaluate the sources they use for their writing.
- L. Understands the development of writing in relation to the other language arts and uses instructional strategies that connect these various aspects of language.
- M. Understands similarities and differences between the language (e.g., syntax, vocabulary) used in spoken and written English and helps students use knowledge of these similarities and differences to enhance their own writing.
- N. Understands writing for a variety of audiences, purposes and settings and provides students with opportunities to write for various audiences, purposes and settings.

- O. Knows how to write using voices and styles appropriate for different audiences and purposes, and provides students with opportunities to write using various voices and styles.
- P. Understands the benefits of technology for teaching writing and writing for publication and provides instruction in the use of technology to facilitate written communication.

Competency 008—(Viewing and Representing): The teacher understands skills for interpreting, analyzing, evaluating and producing visual images and messages in various media and provides students with opportunities to develop skills in this area.

The beginning teacher:

- A. Knows grade-level expectations in the Texas Essential Knowledge and Skills (TEKS) and procedures for assessing students' skills in interpreting, analyzing, evaluating and producing visual images, messages and meanings.
- B. Uses ongoing assessment and knowledge of grade-level expectations in the Texas Essential Knowledge and Skills (TEKS) to identify students' needs regarding the interpretation, analysis, evaluation and production of visual images, messages and meanings and to plan instruction.
- C. Understands characteristics and functions of different types of media (e.g., film, print) and knows how different types of media influence and inform.
- D. Compares and contrasts print, visual and electronic media (e.g., films and written stories).
- E. Evaluates how visual image makers (e.g., illustrators, documentary filmmakers, political cartoonists, news photographers) represent messages and meanings and provides students with varied opportunities to interpret and evaluate visual images in various media.
- F. Knows how to teach students to analyze visual image makers' choices (e.g., style, elements, media) and evaluate how these choices help to represent or extend meaning.
- G. Provides students with opportunities to interpret events and ideas based on information from maps, charts, graphics, video segments and technology presentations and to use media to compare ideas and points of view.
- H. Knows steps and procedures for producing visual images, messages and meanings to communicate with others.
- I. Teaches students how to select, organize and produce visuals to complement and extend meanings.
- J. Provides students with opportunities to use technology to produce various types of communications (e.g., digital media, class news-papers, multimedia reports, video reports, movies) and helps students analyze how language, medium and presentation contribute to the message.

Competency 009—(Study and Inquiry Skills): The teacher understands the importance of study and inquiry skills as tools for learning in the content areas and promotes students' development in applying study and inquiry skills.

The beginning teacher:

- A. Understands study and inquiry skills (e.g., using text organizers; taking notes; outlining; drawing conclusions; applying test-taking strategies; previewing; setting purposes for reading; locating, organizing, evaluating, synthesizing and communicating information; summarizing information; using multiple sources of information; correctly recording bibliographic information for notes and sources; interpreting and using graphic sources of information) and knows the significance of these skills for student learning and achievement.
- B. Knows grade-level expectations for study and inquiry skills in the Texas Essential Knowledge and Skills (TEKS) and procedures for assessing students' development and use of these skills.

- C. Knows and applies instructional practices that promote the acquisition and use of study and inquiry skills across the curriculum by all students, including English-language learners (in accordance with the ELPS).
- D. Knows how to provide students with varied and meaningful opportunities to learn and apply study and inquiry skills to enhance their achievement across the curriculum.
- E. Uses ongoing assessment and knowledge of grade-level expectations in the Texas Essential Knowledge and Skills (TEKS) to identify students' needs regarding study and inquiry skills, to determine when a student requires additional help or intervention and to plan instruction.
- F. Responds to students' needs by providing direct, explicit instruction to promote the acquisition and use of study and inquiry skills.

Subject Exam II—Mathematics (807)

Competency 001—The teacher understands the structure of number systems, the development of a sense of quantity and the relationship between quantity and symbolic representations.

The beginning teacher:

- A. Analyzes the structure of numeration systems and the roles of place value and zero in the base ten system.
- B. Understands the relative magnitude of whole numbers, integers, rational numbers, irrational numbers and real numbers.
- C. Demonstrates an understanding of a variety of models for representing numbers (e.g., fraction strips, diagrams, patterns, shaded regions, number lines).
- D. Demonstrates an understanding of equivalency among different representations of rational numbers.
- E. Selects appropriate representations of real numbers (e.g., fractions, decimals, percents, roots, exponents, scientific notation) for particular situations.
- F. Understands the characteristics of the set of whole numbers, integers, rational numbers, real numbers and complex numbers (e.g., commutativity, order, closure, identity elements, inverse elements, density).
- G. Demonstrates an understanding of how some situations that have no solution in one number system (e.g., whole numbers, integers and rational numbers) have solutions in another number system (e.g., real numbers, complex numbers and irrational numbers).
- H. Approximates (mentally and with calculators) the value of numbers.
- I. Represents fractions and decimals to the tenths or hundredths as distances from zero on a number line.

Competency 002—The teacher understands number operations and computational algorithms.

The beginning teacher:

- A. Works proficiently with real and complex numbers and their operations.
- B. Analyzes and describes relationships between number properties, operations and algorithms for the four basic operations involving integers, rational numbers and real numbers.
- C. Uses a variety of concrete and visual representations to demonstrate the connections between operations and algorithms.

- D. Justifies procedures used in algorithms for the four basic operations with integers, rational numbers and real numbers and analyzes error patterns that may occur in their application.
- E. Relates operations and algorithms involving numbers to algebraic procedures (e.g., adding fractions to adding rational expressions, division of integers to division of polynomials).
- F. Extends and generalizes the operations on rationals and integers to include exponents, their properties and their applications to the real numbers.
- G. Compares and orders real numbers with and without a calculator.
- H. Uses models, such as concrete objects, pictorial models and number lines, to add, subtract, multiply and divide integers and connect the real-world problems to algorithms, including equivalent ratios and rates.
- I. Divides whole numbers by unit fractions and unit fractions by whole numbers.

Competency 003—The teacher understands ideas of number theory and uses numbers to model and solve problems within and outside of mathematics.

The beginning teacher:

- A. Demonstrates an understanding of ideas from number theory (e.g., prime factorization, greatest common divisor) as they apply to whole numbers, integers and rational numbers and uses these ideas in problem situations.
- B. Uses integers, rational numbers and real numbers to describe and quantify phenomena such as money, length, area, volume and density.
- C. Applies knowledge of place value and other number properties to develop techniques of mental mathematics and computational estimation.
- D. Applies knowledge of counting techniques such as permutations and combinations to quantify situations and solve problems.
- E. Applies properties of real numbers to solve a variety of theoretical and applied problems.
- F. Makes connections among various representations of a numerical relationship and generates a different representation of data given another representation of data (such as a table, graph, equation or verbal description).

Competency 004—The teacher understands and uses mathematical reasoning to identify, extend and analyze patterns and understands the relationships among variables, expressions, equations, inequalities, relations and functions.

The beginning teacher:

- A. Uses inductive reasoning to identify, extend and create patterns using concrete models, figures, numbers, and algebraic expressions.
- B. Formulates implicit and explicit rules to describe and construct sequences verbally, numerically, graphically and symbolically.
- C. Makes, tests, validates and uses conjectures about patterns and relationships in data presented in tables, sequences or graphs.
- D. Gives appropriate justification of the manipulation of algebraic expressions.
- E. Illustrates the concept of a function using concrete models, tables, graphs and symbolic and verbal representations.
- F. Uses transformations to illustrate properties of functions and relations and to solve problems.
- G. Uses graphs, tables and algebraic representations to make predictions and solve problems.

- H. Uses letters to represent an unknown in an equation.
- I. Formulates problem situations when given a simple equation and formulates an equation when given a problem situation.

Competency 005—The teacher understands and uses linear functions to model and solve problems.

The beginning teacher:

- A. Demonstrates an understanding of the concept of linear function using concrete models, tables, graphs and symbolic and verbal representations.
- B. Demonstrates an understanding of the connections among linear functions, proportions and direct variation.
- C. Determines the linear function that best models a set of data.
- D. Analyzes the relationship between a linear equation and its graph.
- E. Uses linear functions, inequalities and systems to model problems.
- F. Uses a variety of representations and methods (e.g., numerical methods, tables, graphs, algebraic techniques) to solve systems of linear equations and inequalities.
- G. Demonstrates an understanding of the characteristics of linear models and the advantages and disadvantages of using a linear model in a given situation.
- H. Uses multiplication by a given constant factor (including unit rate) to represent and solve problems involving proportional relationships, including conversions between measurement systems, (e.g., ratio, speed, density, price, recipes, student teacher ratio).
- I. Identifies proportional or nonproportional linear relationships in problem situations and solves problems.

Competency 006—The teacher understands and uses nonlinear functions and relations to model and solve problems.

The beginning teacher:

- A. Uses a variety of methods to investigate the roots (real and complex), vertex and symmetry of a quadratic function or relation.
- B. Demonstrates an understanding of the connections among geometric, graphic, numeric and symbolic representations of quadratic functions.
- C. Demonstrates an understanding of the connections among proportions, inverse variation and rational functions.
- D. Understands the effects of transformations such as $f(x \pm c)$ on the graph of a nonlinear function $f(x)$.
- E. Applies properties, graphs and applications of nonlinear functions to analyze, model and solve problems.
- F. Uses a variety of representations and methods (e.g., numerical methods, tables, graphs, algebraic techniques) to solve systems of quadratic equations and inequalities.
- G. Understands how to use properties, graphs and applications of nonlinear relations including polynomial, rational, radical, absolute value, exponential, logarithmic, trigonometric and piecewise functions and relations to analyze, model and solve problems.

Competency 007—The teacher uses and understands the conceptual foundations of calculus related to topics in middle school mathematics.

The beginning teacher:

- A. Relates topics in middle school mathematics to the concept of limit in sequences and series.
- B. Relates the concept of average rate of change to the slope of the line and the concept of instantaneous rate of change as a slope of the line.
- C. Demonstrates an understanding of the use of calculus concepts to answer questions about rates of change, areas, volumes and properties of functions and their graphs.

Competency 008—The teacher understands measurement as a process.

The beginning teacher:

- A. Selects and uses appropriate units of measurement (e.g., temperature, money, mass, weight, area, capacity, density, percents, speed, acceleration) to quantify, compare and communicate information.
- B. Develops, justifies and uses conversions within measurement systems.
- C. Applies dimensional analysis to derive units and formulas in a variety of situations (e.g., rates of change of one variable with respect to another) and to find and evaluate solutions to problems.
- D. Describes the precision of measurement and the effects of error on measurement.
- E. Applies the Pythagorean Theorem, proportional reasoning and right triangle trigonometry to solve measurement problems.

Competency 009—The teacher understands the geometric relationships and axiomatic structure of Euclidian geometry.

The beginning teacher:

- A. Understands concepts and properties of points, lines, planes, angles, lengths and distances.
- B. Analyzes and applies the properties of parallel and perpendicular lines.
- C. Uses the properties of congruent triangles to explore geometric relationships and prove theorems.
- D. Describes and justifies geometric constructions.
- E. Applies knowledge of right angles to identify acute, right and obtuse triangles.
- F. Measures angles correctly using a protractor.

Competency 010—The teacher analyzes the properties of two- and three-dimensional figures.

The beginning teacher:

- A. Uses and understands the development of formulas to find lengths, perimeters, areas and volumes of basic geometric figures.
- B. Applies relationships among similar figures, scale and proportion and analyzes how changes in scale affect area and volume measurements.
- C. Uses a variety of representations (e.g., numeric, verbal, graphic, symbolic) to analyze and solve problems involving two- and three-dimensional figures such as circles, triangles, polygons, cylinders, prisms and spheres.
- D. Analyzes the relationship among three-dimensional figures and related two-dimensional representations (e.g., projections, cross-sections, nets) and uses these representations to solve problems.
- E. Generates formulas involving perimeter, area, circumference, volume and scaling.

- F. Estimates measurements and solves application problems involving length (including perimeter and circumference) and area of polygons and other shapes.
- G. Knows the various types of triangles (e.g., scalene, obtuse, acute) and how to calculate angle degrees.
- H. Uses geometry and spatial reasoning, compares and classifies two- and three-dimensional figures using geometric vocabulary and properties.

Competency 011—The teacher understands algebra and geometry through the Cartesian coordinate system and demonstrates knowledge of transformational geometry.

The beginning teacher:

- A. Describes and justifies geometric constructions made using a reflection device and other appropriate technologies.
- B. Uses translations, reflections, glide-reflections and rotations to demonstrate congruence and to explore the symmetries of figures.
- C. Uses dilations (expansions and contractions) to illustrate similar figures and proportionality.
- D. Uses symmetry to describe tessellations and shows how they can be used to illustrate geometric concepts, properties and relationships.
- E. Applies concepts and properties of slope, midpoint, parallelism and distance in the coordinate plane to explore properties of geometric figures and solve problems.
- F. Applies transformations in the coordinate plane.
- G. Uses geometry to model and describe the physical world.
- H. Identifies, locates and names points on a coordinate plane using ordered pairs of real numbers in all quadrants.
- I. Graphs 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.
- J. Graphs reflections across the horizontal or vertical axis and graphs translations on a coordinate plane.

Competency 012—The teacher understands how to use graphical and numerical techniques to explore data, characterize patterns and describe departures from patterns.

The beginning teacher:

- A. Organizes and displays data in a variety of formats (e.g., tables, frequency distributions, stem-and-leaf plots, box-and-whisker plots, histograms, pie charts).
- B. Applies concepts of center, spread, shape and skewness to describe a data distribution.
- C. Supports arguments, makes predictions and draws conclusions using summary statistics and graphs to analyze and interpret one-variable data.
- D. Demonstrates an understanding of measures of central tendency (e.g., mean, median, mode) and dispersion (e.g., range, interquartile range, variance, standard deviation).
- E. Analyzes connections among concepts of center and spread, data clusters and gaps, data outliers and measures of central tendency and dispersion.
- F. Calculates and interprets percentiles and quartiles.

Competency 013—The teacher understands the theory of probability.

The beginning teacher:

- A. Explores concepts of experimental and theoretical probability through data collection, experiments and simulations.
- B. Uses the concepts and principles of probability to describe the outcome of simple and compound events, including independent and dependent events.
- C. Generates, simulates and uses probability models to represent a situation.
- D. Determines probabilities by constructing sample spaces to model situations.
- E. Solves a variety of probability problems using combinations, permutations and geometric probability (i.e., probability as the ratio of two areas).
- F. Uses the binomial, geometric and normal distributions to solve problems.

Competency 014—The teacher understands the relationship among probability theory, sampling and statistical inference and how statistical inference is used in making and evaluating predictions.

The beginning teacher:

- A. Applies knowledge of designing, conducting, analyzing and interpreting statistical experiments to investigate real-world problems.
- B. Demonstrates an understanding of random samples, sample statistics and the relationship between sample size and confidence intervals.
- C. Applies knowledge of the use of probability to make observations and draw conclusions from single variable data and to describe the level of confidence in the conclusion.
- D. Makes inferences about a population using binomial, normal and geometric distributions.
- E. Demonstrates an understanding of the use of techniques such as scatter plots, regression lines, correlation coefficients and residual analysis to explore bivariate data and to make and evaluate predictions.

Competency 015—The teacher understands mathematical reasoning and problem solving.

The beginning teacher:

- A. Demonstrates an understanding of proof, including indirect proof, in mathematics.
- B. Applies correct mathematical reasoning to derive valid conclusions from a set of premises.
- C. Demonstrates an understanding of the use of inductive reasoning to make conjectures and deductive methods to evaluate the validity of conjectures.
- D. Applies knowledge of the use of formal and informal reasoning to explore, investigate and justify mathematical ideas.
- E. Recognizes that a mathematical problem can be solved in a variety of ways and selects an appropriate strategy for a given problem.
- F. Evaluates the reasonableness of a solution to a given problem.
- G. Applies content knowledge to develop a mathematical model of a real-world situation and analyzes and evaluates how well the model represents the situation.
- H. Demonstrates an understanding of estimation and evaluates its appropriate uses.

Competency 016—The teacher understands mathematical connections within and outside of mathematics and how to communicate mathematical ideas and concepts.

The beginning teacher:

- A. Recognizes and uses multiple representations of a mathematical concept (e.g., a point and its coordinates, the area of circle as a quadratic function in r , probability as the ratio of two areas).
- B. Uses mathematics to model and solve problems in other disciplines, such as art, music, science, social science and business.
- C. Expresses mathematical statements using developmentally appropriate language, Standard English, mathematical language and symbolic mathematics.
- D. Communicates mathematical ideas using a variety of representations (e.g., numeric, verbal, graphic, pictorial, symbolic, concrete).
- E. Demonstrates an understanding of the use of visual media such as graphs, tables, diagrams and animations to communicate mathematical information.
- F. Uses the language of mathematics as a precise means of expressing mathematical ideas.
- G. Understands the structural properties common to the mathematical disciplines.
- H. Explores and applies concepts of financial literacy as it relates to teaching students (e.g., describes the basic purpose of financial institutions, distinguishes the difference between gross income and net income, identifies various savings options, defines different types of taxes, identifies the advantages and disadvantages of different methods of payments).
- I. Applies mathematics to model and solve problems to manage financial resources effectively for lifetime financial security as it relates to teaching students (e.g., distinguish between fixed and variable expenses, calculate profit in a given situation, develop a system for keeping and using financial records, describe actions that might be taken to balance a budget when expenses exceed income and balance a simple budget).

Competency 017—The teacher understands how children learn and develop mathematical skills, procedures and concepts.

The beginning teacher:

- A. Applies theories and principles of learning mathematics to plan appropriate instructional activities for all students.
- B. Understands how students differ in their approaches to learning mathematics with regards to diversity.
- C. Uses students' prior mathematical knowledge to build conceptual links to new knowledge and plans instruction that builds on students' strengths and addresses students' needs.
- D. Understands how learning may be assisted through the use of mathematics manipulatives and technological tools.
- E. Understands how to motivate students and actively engage them in the learning process by using a variety of interesting, challenging and worthwhile mathematical tasks in individual, small-group and large-group settings.
- F. Understands how to provide instruction along a continuum from concrete to abstract.
- G. Recognizes the implications of current trends and research in mathematics and mathematics education.

Competency 018—The teacher understands how to plan, organize and implement instruction using knowledge of students, subject matter and statewide curriculum (Texas Essential Knowledge and Skills [TEKS]) to teach all students to use mathematics.

The beginning teacher:

- A. Demonstrates an understanding of a variety of instructional methods, tools and tasks that promote students' ability to do mathematics described in the TEKS.
- B. Understands planning strategies for developing mathematical instruction as a discipline of interconnected concepts and procedures.
- C. Develops clear learning goals to plan, deliver, assess and reevaluate instruction based on the TEKS.
- D. Understands procedures for developing instruction that establishes transitions between concrete, symbolic and abstract representations of mathematical knowledge.
- E. Applies knowledge of a variety of instructional delivery methods, such as individual, structured small-group and large-group formats.
- F. Understands how to create a learning environment that provides all students, including English-language learners, with opportunities to develop and improve mathematical skills and procedures.
- G. Demonstrates an understanding of a variety of questioning strategies to encourage mathematical discourse and to help students analyze and evaluate their mathematical thinking.
- H. Understands how technological tools and manipulatives can be used appropriately to assist students in developing, comprehending and applying mathematical concepts.
- I. Understands how to relate mathematics to students' lives and a variety of careers and professions.

Competency 019—The teacher understands assessment and uses a variety of formal and informal assessment techniques to monitor and guide mathematics instruction and to evaluate student progress.

The beginning teacher:

- A. Demonstrates an understanding of the purpose, characteristics and uses of various assessments in mathematics, including formative and summative assessments.
- B. Understands how to select and develop assessments that are consistent with what is taught and how it is taught.
- C. Demonstrates an understanding of how to develop a variety of assessments and scoring procedures consisting of worthwhile tasks that assess mathematical understanding, common misconceptions and error patterns.
- D. Understands how to evaluate a variety of assessment methods and materials for reliability, validity, absence of bias, clarity of language and appropriateness of mathematical level.
- E. Understands the relationship between assessment and instruction and knows how to evaluate assessment results to design, monitor and modify instruction to improve mathematical learning for all students, including English-language learners.

Subject Exam III—Social Studies (808)

Competency 001—(History): The teacher understands and applies knowledge of significant historical events and developments, multiple historical interpretations and ideas and relationships between the past, the present and the future, as defined by the Texas Essential Knowledge and Skills (TEKS).

The beginning teacher:

- A Understands traditional historical points of reference in the history of Texas, the United States and the world.
- B Analyzes how individuals, events and issues shaped the history of Texas, the United States and the world.
- C Analyzes the influence of various factors (e.g., geographic contexts, processes of spatial exchange, science and technology) on the development of societies.
- D Demonstrates knowledge of common characteristics of communities, past and present.
- E Applies knowledge of the concept of chronology and its use in understanding history and historical events.
- F Applies different methods of interpreting the past to understand, evaluate and support multiple points of view, frames of reference and the historical context of events and issues.
- G Understands similarities and differences among Native-American groups in Texas, the United States and the Western Hemisphere before European colonization.
- H Understands the causes and effects of European exploration and colonization of the United States and the Western Hemisphere.
- I Understands the impact of individuals, events, and issues on the exploration of Texas (e.g., Cabeza de Vaca, Alonso Álvarez de Pineda, Francisco Coronado, la Salle, the search for gold, conflicting territorial claims between France and Spain).
- J Identify important events, issues and individuals related to European colonization of Texas; Mexico becoming an independent nation, including the establishment of Catholic missions, towns and ranches (e.g., Fray Damián Massanet, José de Escandón, Antonio Margil de Jesús, Francisco Hidalgo, the Mexican Federal Constitution of 1824, and the State Colonization Law of 1825).
- K Understands the foundations of representative government in the United States; significant individuals, events and issues of the revolutionary era; and challenges confronting the U.S. government in the early years of the republic (e.g., Mayflower Compact, Virginia Houses of Burgesses, John Adams, Abigail Adams, George Washington, Crispus Attucks, Battle of Saratoga, winter at Valley Forge, Battle of Yorktown, the arguments of the Federalists and Anti-Federalists, Articles of Confederation, United States Constitution, War of 1812).
- L Demonstrates knowledge of the individuals, events and issues related to the independence of Texas, the founding of the Republic of Texas, and Texas statehood (e.g., Moses Austin, Samuel Houston, Erasmo Seguín, Antonio López de Santa Anna, the Fredonian Rebellion, the Battle of the Alamo, the Battle of San Jacinto, the annexation of Texas, the U.S.-Mexican War).
- M Understands westward expansion and analyzes its effects on the political, economic and social development of the United States and Texas — including its effects on American Indian life (e.g., Louisiana Purchase, Monroe Doctrine, building of U.S. forts, the destruction of the buffalo, Indian Removal Act, Trail of Tears, Red River Indian War).
- N Analyzes ways in which political, economic and social factors led to the growth of sectionalism and the Civil War (e.g., nullification crisis, Compromise of 1850, the roles of John Quincy Adams, John C. Calhoun, Henry Clay and Daniel Webster).
- O Demonstrates knowledge of individuals, issues and events of the Civil War and analyzes the effects of Reconstruction on the political, economic and social life of the nation and Texas (e.g., Abraham Lincoln, Jefferson Davis, John Bell Hood, Vicksburg Campaign, Battle of Gettysburg, Emancipation Proclamation, Battle of Galveston, Battle of Palmito Ranch).

- P. Demonstrates knowledge of major U.S. and Texas reform movements of the nineteenth and twentieth centuries (e.g., abolition movement, women suffrage movement, temperance movement, Civil Rights movement, agrarian groups, labor unions, James L. Farmer Jr., Jane Addams, Hector Pérez García, Oveta Culp Hobby, the League of United Latin American Citizens (LULAC), the evangelical movement).
- Q. Understands important issues, events and individuals of the twentieth and twenty-first centuries that shaped the role of Texas in the United States and the world (e.g., Great Depression, First and Second World Wars, Civil Rights movement, Lyndon B. Johnson, emergence of a two-party system, political and economic controversies, immigration, migration).
- R. Understands and traces the impact of boom-and-bust cycles of leading Texas industries (e.g., railroads, cattle, oil and gas, cotton, real estate, banking, computer technology).
- S. Understands the contributions of people of various racial, ethnic and religious groups in Texas, the United States and the world.
- T. Analyzes ways in which particular contemporary societies reflect historical events (e.g., invasions, conquests, colonizations, immigrations).

Competency 002—(Geography): The teacher understands and applies knowledge of geographic relationships involving people, places and environments in Texas, the United States and the world, as defined by the Texas Essential Knowledge and Skills (TEKS).

The beginning teacher:

- A. Understands and applies the geographic concept of region.
- B. Knows how to create and use geographic tools and translate geographic data into a variety of formats (e.g., grid systems, legends, scales, databases, construction of maps, graphs, charts, models).
- C. Knows the location and the human and physical characteristics of places and regions in Texas, the United States and the world.
- D. Analyzes ways in which humans adapt to, use and modify the physical environment.
- E. Knows how regional physical characteristics and human modifications to the environment affect people's activities, settlement, immigration and migration patterns.
- F. Analyzes ways in which location (absolute and relative) affects people, places and environments.
- G. Demonstrates knowledge of physical processes (e.g., erosion, deposition and weathering; plate tectonics; sediment transfer; the flows and exchanges of energy and matter in the atmosphere that produce weather and climate) and their effects on environmental patterns.
- H. Understands the characteristics, distribution and migration of populations in Texas, the United States and the world.
- I. Understands the physical and environmental characteristics of Texas, the United States and the world, past and present, and how humans have adapted to and positively and negatively modified the environment (e.g., air and water quality, building of dams, use of natural resources, the impact on habitats and wildlife).
- J. Analyzes how geographic factors have influenced settlement patterns, economic and social development, political relationships and policies of societies and regions in Texas, the United States and the world (e.g., the Galveston hurricane of 1900, the Dust Bowl, limited water resources, alternative energy sources).
- K. Analyzes interactions between people and the physical environment and the effects of these interactions on the development of places and regions.
- L. Understands comparisons among various world regions and countries (e.g., aspects of population, disease and economic activities) by analyzing maps, charts, databases and models.

Competency 003—(Economics): The teacher understands and applies knowledge of economic systems and how people organize economic systems to produce, distribute and consume goods and services, as defined by the Texas Essential Knowledge and Skills (TEKS).

The beginning teacher:

- A. Understands that basic human needs are met in many ways.
- B. Understands and applies knowledge of basic economic concepts (e.g., goods and services, free enterprise, interdependence, needs and wants, scarcity, economic system, factors of production).
- C. Demonstrates knowledge of the ways in which people organize economic systems and the similarities and differences among various economic systems around the world.
- D. Understands the value and importance of work and purposes for spending and saving money.
- E. Demonstrates knowledge of occupational patterns and economic activities in Texas, the United States and the world, past and present (e.g., the plantation system, the spread of slavery, industrialization and urbanization, transportation, the American ideals of progress, equality of opportunity).
- F. Understands the characteristics, benefits and development of the free enterprise system in Texas and the United States.
- G. Analyzes the roles of producers and consumers in the production of goods and services.
- H. Understands the effects of government regulation and taxation on economic development.
 - I. Demonstrates knowledge of how businesses operate in the U.S. free-enterprise system and international markets (e.g., government regulation, world competition, the importance of morality and ethics in maintaining a functional enterprise system).
- J. Applies knowledge of the effects of supply and demand on consumers and producers in a free-enterprise system.
- K. Demonstrates knowledge of categories of economic activities and methods used to measure a society's economic level.
- L. Uses economic indicators to describe and measure levels of economic activity.
- M. Understands the causes of major events and trends in economic history (e.g., factors leading societies to change from agrarian to urban, economic reasons for exploration and colonization, economic forces leading to the Industrial Revolution, processes of economic development in world areas, factors leading to the emergence of different patterns in jobs, economic activity in regions of the United States).
- N. Analyzes the interdependence of Texas, United States and world economies.
- O. Understands how geographic factors such as immigration, migration, location, climate and limited resources have influenced the development of economic activities in Texas, the United States, and the world.
- P. Applies knowledge of significant economic events and issues and their effects in Texas, in the United States and the world.

Competency 004—(Government and Citizenship): The teacher understands and applies knowledge of government, democracy and citizenship, including ways in which individuals and groups achieve their goals through political systems, as defined by the Texas Essential Knowledge and Skills (TEKS).

The beginning teacher:

- A. Demonstrates knowledge of the historical origins of democratic forms of government, such as ancient Greece.
- B. Understands the purpose of rules and laws; the relationship between rules, rights and responsibilities; and the individual's role in making and enforcing rules and ensuring the welfare of society.

- C. Knows the basic structure and functions of the U.S. government, the Texas government and local governments (including the roles of public officials) and relationships among national, state and local governments.
- D. Demonstrates knowledge of key principles and ideas in major political documents of Texas and the United States (e.g., Articles of Confederation, Declaration of Independence, U.S. Constitution, Bill of Rights, Texas Constitution) and relationships among political documents.
- E. Understands early United States political issues, including those surrounding Alexander Hamilton, Patrick Henry, James Madison, George Mason; the arguments of the Federalists and Anti-Federalists; states' rights issues; and the nullification crisis.
- F. Knows how American Indian groups and settlers organized governments in precolonial America, and during the early development of Texas and North America.
- G. Demonstrates knowledge of how state and local governments use sources of revenue such as property tax and sales tax, and the funding of Texas public education.
- H. Demonstrates knowledge of types of government (e.g., constitutional, totalitarian), their effectiveness in meeting citizens' needs and the reasons for limiting the power of government.
- I. Knows the formal and informal process of changing the U.S. and Texas constitutions and the impact of constitutional changes on society.
- J. Understands the impact of landmark Supreme Court cases (e.g., *Marbury v. Madison*, *Dred Scott v. Sandford*, *McCulloch v. Maryland*, *Gibbons v. Ogden*).
- K. Understands components of the democratic process (e.g., voting, contacting local and state representatives, voluntary individual participation, effective leadership, expression of different points of view) and their significance in a democratic society.
- L. Demonstrates knowledge of important customs, symbols, landmarks and celebrations that represent American and Texan beliefs and principles and that contribute to national unity (e.g., Uncle Sam, "The Star-Spangled Banner," the San Jacinto Monument, "Texas, our Texas").
- M. Demonstrates knowledge of the importance, accomplishments and leadership qualities of United States and Texas leaders (e.g., presidents Washington, Adams, Jefferson, Madison, Monroe, Lincoln; U.S. senators Calhoun, Webster, Clay; Texas governors and local Texas representatives).
- N. Analyzes the relationship among individual rights, responsibilities and freedoms in democratic societies.
- O. Applies knowledge of the nature, rights and responsibilities of citizens in Texas, the United States, and various societies, past and present.
- P. Understands the contributions and importance of political figures, members of Congress, military leaders and social reformers who modeled active participation in the democratic process in Texas and in the United States (e.g., Frederick Douglass, Susan B. Anthony, Sam Houston, Barbara Jordan, Henry B. González, Kay Bailey Hutchinson, Audie Murphy, William Carneym, Philip Bazaar).

Competency 005—(Culture; Science, Technology and Society): The teacher understands and applies knowledge of cultural development, adaptation and diversity and understands and applies knowledge of interactions among science, technology and society, as defined by the Texas Essential Knowledge and Skills (TEKS).

The beginning teacher:

- A. Understands basic concepts of culture and the processes of cultural adaptation, diffusion and exchange.
- B. Analyzes similarities and differences in the ways various peoples at different times in history have lived and met basic human needs.
- C. Applies knowledge of the role of families in meeting basic human needs and how families and cultures develop and use customs, traditions and beliefs to define themselves.

- D. Demonstrates knowledge of institutions that exist in all societies and how characteristics of these institutions may vary among societies.
- E. Understands how people use oral tradition, stories, real and mythical heroes, music, paintings and sculpture to create and represent culture in communities in Texas, the United States and the world.
- F. Demonstrates knowledge of significant examples of art, music and literature from various periods in U.S. and Texas history (e.g., John James Audubon, Henry David Thoreau, transcendentalism, the painting American Progress, “Yankee Doodle,” “Battle Hymn of the Republic,” Amado Peña, Diane Gonzales Bertrand, Scott Joplin).
- G. Understands the universal themes found in the arts and their relationship with the times and societies in which they are produced, including how contemporary issues influence creative expressions and how the arts can transcend the boundaries of societies (e.g., religion, justice, the passage of time).
- H. Understands the contributions of people of various racial, ethnic and religious groups in Texas, the United States and the world.
 - I. Demonstrates knowledge of relationships among world cultures and relationships between and among people from various groups, including racial, ethnic and religious groups, in the United States and throughout the world.
 - J. Analyzes relationships among religion, philosophy and culture, and the impact of religion on ways of life in the United States and throughout the world.
- K. Understands the concept of diversity within unity.
- L. Analyzes the effects of race, gender, socioeconomic class, status and stratification on ways of life in the United States and throughout the world.
- M. Understands the various roles of men, women, children and families in cultures past and present.
- N. Understands how the self develops and the dynamic relationship between self and social context.
- O. Demonstrates knowledge of the discoveries, technological innovations and accomplishments of notable inventors and individuals in the field of science from the United States, Texas and the world (e.g., Benjamin Franklin, Eli Whitney, Cyrus McCormick, Thomas Alva Edison, Alexander Graham Bell, Michael DeBakey, Millie Hughes-Fulford, Walter Cunningham, Denton Cooley, Michael Dell).
- P. Applies knowledge of the effects of scientific discoveries and technological innovations on political, economic, social and environmental developments and on everyday life in Texas, the United States and the world in the past, present and future.
- Q. Analyzes how science and technology relate to political, economic, social and cultural issues and events.
- R. Demonstrates knowledge of the origins, diffusions and effects of major scientific, mathematical and technological discoveries throughout history.
- S. Knows how developments in science and technology have affected the physical environment; the growth of economies and societies; and definitions of, access to and use of physical and human resources.
- T. Knows how changes in science and technology affect moral and ethical issues.

Competency 006—(Social Studies Foundations and Skills): The teacher understands the foundations of social studies education and applies knowledge of skills used in the social sciences.

The beginning teacher:

- A. Understands the philosophical foundations of the social science disciplines and knows how knowledge generated by the social sciences affects society and people’s lives.
- B. Understands how social science disciplines relate to each other.

- C. Understands practical applications of social studies education.
- D. Relates philosophical assumptions and ideas to issues and trends in the social sciences.
- E. Knows characteristics and uses of various primary and secondary sources (e.g., databases, maps, photographs, media services, the Internet, biographies, interviews, questionnaires, artifacts) and uses information from a variety of sources to acquire social science information and answer social science questions.
- F. Knows how to formulate research questions and use appropriate procedures to reach supportable judgments and conclusions in the social sciences.
- G. Understands social science research and knows how social scientists locate, gather, organize, analyze and report information using standard research methodologies.
- H. Evaluates the validity of social science information from primary and secondary sources regarding bias issues, propaganda, point of view and frame of reference.
- I. Understands and evaluates multiple points of view and frames of reference relating to issues in the social sciences.
- J. Knows how to analyze social science information (e.g., by categorizing, comparing and contrasting, making generalizations and predictions, drawing inferences and conclusions).
- K. Communicates and interprets social science information in written, oral and visual forms and translates information from one medium to another (e.g., written to visual, statistical to written or visual).
- L. Uses standard grammar, spelling, sentence structure, punctuation and proper citation of sources.
- M. Knows how to use problem-solving processes to identify problems, gather information, list and consider options, consider advantages and disadvantages, choose and implement solutions and evaluate the effectiveness of solutions.
- N. Knows how to use decision-making processes to identify situations that require decisions, gather information, identify options, predict consequences and take action to implement decisions.
- O. Knows how to create maps and other graphics to present geographic, political, historical, economic and cultural features, distributions, and relationships.
- P. Analyzes social science data by using basic mathematical and statistical concepts and analytical methods.
- Q. Knows how to apply skills for resolving conflict, including persuasion, compromise, debate and negotiation.
- R. Understands and uses social studies terminology correctly.

Competency 007—(Social Studies Instruction and Assessment): The teacher plans and implements effective instruction and assessment in social studies.

The beginning teacher:

- A. Knows state content and performance standards for social studies that are used in the Texas Essential Knowledge and Skills (TEKS).
- B. Understands the vertical alignment of the social sciences in the Texas Essential Knowledge and Skills (TEKS) from grade level to grade level, including prerequisite knowledge and skills.
- C. Understands the implications of stages of child growth and development for designing and implementing effective learning experiences in the social sciences.
- D. Understands the appropriate use of technology as a tool for learning and communicating social studies concepts.

- E. Selects and uses effective instructional practices, activities, technologies and materials to promote students' knowledge and skills in the social sciences.
- F. Knows how to promote students' use of social science skills, vocabulary and research tools, including technological tools.
- G. Knows how to communicate the value of social studies education to students, parents/caregivers, colleagues and the community.
- H. Knows how to provide instruction that relates skills, concepts and ideas in different social science disciplines.
- I. Provides instruction that makes connections between knowledge and methods in the social sciences and in other content areas.
- J. Demonstrates knowledge of forms of assessment appropriate for evaluating students' progress and needs in the social sciences.
- K. Uses multiple forms of assessment and knowledge of the Texas Essential Knowledge and Skills (TEKS) to determine students' progress and needs and to help plan instruction that addresses the strengths, needs and interests of all students, including English-language learners.

Subject Exam IV—Science (809)

Competency 001—The teacher understands how to manage learning activities to ensure the safety of all students.

The beginning teacher:

- A. Understands safety regulations and guidelines for science facilities and science instruction.
- B. Knows procedures for and sources of information regarding the appropriate handling, use, disposal, care and maintenance of chemicals, materials, specimens and equipment.
- C. Knows procedures for the safe handling and ethical care and treatment of organisms and specimens.

Competency 002—The teacher understands the correct use of tools, materials, equipment and technologies.

The beginning teacher:

- A. Selects and safely uses appropriate tools, technologies, materials and equipment needed for instructional activities.
- B. Understands concepts of precision, accuracy and error with regard to reading and recording numerical data from a scientific instrument.
- C. Understands how to gather, organize, display and communicate data in a variety of ways (e.g., charts, tables, graphs, diagrams, written reports, oral presentations, maps, satellite views).
- D. Understands various units of measure such as the International System of Units (SI or metric system), light years and degrees Celsius, and performs unit conversions within measurement systems (e.g., grams to kilograms, meters to millimeters).

Competency 003—The teacher understands the process of scientific inquiry and the history and nature of science.

The beginning teacher:

- A. Understands the characteristics of various types of scientific investigations (e.g., descriptive studies, comparative data analysis, experiments).
- B. Understands how to design, conduct and communicate the results of a variety of scientific investigations.
- C. Understands the historical development of science (e.g., cell theory, plate tectonics, laws of motion, universal gravity, atomic theory) and the contributions that diverse cultures and individuals of both genders have made to scientific knowledge.
- D. Understands the roles that logical reasoning, verifiable evidence, prediction and peer review play in the process of generating and evaluating scientific knowledge.
- E. Understands principles of scientific ethics (e.g., honest and complete reporting of data, informed consent, legal constraints).
- F. Develops, analyzes and evaluates different explanations for a given scientific result.
- G. Demonstrates an understanding of potential sources of error in an investigation.
- H. Demonstrates an understanding of how to communicate and defend the results of an investigation.
- I. Demonstrates an ability to identify, review and evaluate legitimate sources of scientific information.

Competency 004—The teacher understands how science impacts the daily lives of students and interacts with and influences personal and societal decisions.

The beginning teacher:

- A. Understands that decisions about the use of science are based on factors such as ethical standards, economics and personal and societal needs.
- B. Applies scientific principles and the theory of probability to analyze the advantages of, disadvantages of or alternatives to a given decision or course of action.
- C. Applies scientific principles and processes to analyze factors that influence personal choices concerning fitness and health, including physiological and psychological effects and risks associated with the use of substances and substance abuse.
- D. Understands concepts, characteristics and issues related to changes in populations and human population growth.
- E. Understands the types and uses of natural resources and the effects of human consumption on the renewal and depletion of global resources (e.g., energy, sustainability).
- F. Understands the role science can play in helping resolve personal, societal and global challenges (e.g., water quality, public health, climate change).

Competency 005—The teacher knows and understands the unifying concepts and processes that are common to all sciences.

The beginning teacher:

- A. Understands how the following concepts and processes provide a unifying explanatory framework across the science disciplines: systems, order and organization; evidence, models and explanation; change, constancy and measurements; evolution and equilibrium; and form and function.
- B. Demonstrates an understanding of how patterns in observations and data can be used to make explanations and predictions.
- C. Analyzes interactions and interrelationships between systems and subsystems.
- D. Applies unifying concepts to explore similarities in a variety of natural phenomena.

- E. Understands how properties and patterns of systems can be described in terms of space, time, energy and matter.
- F. Understands how change and constancy occur in systems.
- G. Understands the complementary nature of form and function in a given system.
- H. Understands how models are used to represent the natural world and how to evaluate the strengths and limitations of a variety of scientific models (e.g., physical, conceptual, mathematical).

Competency 006—The teacher understands forces and motion and their relationships.

The beginning teacher:

- A. Demonstrates an understanding of properties of universal forces (e.g., gravitational, electrical, magnetic).
- B. Understands how to measure, graph and describe changes in motion using concepts of displacement, velocity and acceleration.
- C. Understands the vector nature of force.
- D. Identifies the forces acting on an object and applies Newton's laws to describe the motion of an object.
- E. Analyzes the relationship between force and motion in a variety of situations (e.g., simple machines, blood flow, geologic processes).

Competency 007—The teacher understands physical properties of and changes in matter.

The beginning teacher:

- A. Describes the physical properties of substances (e.g., density, boiling point, solubility, thermal and electrical conductivity).
- B. Describes the physical properties and molecular structure of solids, liquids and gases.
- C. Describes the relationship between the molecular structure of materials (e.g., metals, crystals, polymers) and their physical properties.
- D. Relates the physical properties of an element to its placement in the periodic table.
- E. Distinguishes between physical and chemical changes in matter.
- F. Applies knowledge of physical properties of and changes in matter to processes and situations that occur in life science and in Earth/space science (e.g., evaporation, changes in air pressure).

Competency 008—The teacher understands chemical properties of and changes in matter.

The beginning teacher:

- A. Describes the structure and components of the atom.
- B. Distinguishes among elements, mixtures and compounds and describes their properties.
- C. Relates the chemical properties of an element to its placement in the periodic table.
- D. Describes chemical bonds and chemical formulas.
- E. Analyzes chemical reactions and their associated chemical equations.
- F. Explains the importance of a variety of chemical reactions that occur in daily life (e.g., rusting, burning of fossil fuels, photosynthesis, cell respiration, chemical batteries, digestion of food).

- G. Understands applications of chemical properties of matter in physical, life and Earth/space science and technology (e.g., materials science, biochemistry, transportation, medicine, telecommunications).

Competency 009—The teacher understands energy and interactions between matter and energy.

The beginning teacher:

- A. Describes concepts of work, power and potential and kinetic energy.
- B. Understands the concept of heat energy and the difference between heat and temperature.
- C. Understands the principles of electricity and magnetism and their applications (e.g., electric circuits, motors, audio speakers, nerve impulses, lighting).
- D. Applies knowledge of types (longitudinal, transverse), properties (e.g., wavelength and frequency) and behaviors (e.g., reflection, refraction, dispersion) to describe a variety of waves (e.g., water, electromagnetic, sound, seismic waves).
- E. Applies knowledge of properties and behaviors of light to describe the function of optical systems and phenomena (e.g., camera, microscope, rainbow, eye).
- F. Demonstrates an understanding of the properties, production and transmission of sound.

Competency 010—The teacher understands energy transformations and the conservation of matter and energy.

The beginning teacher:

- A. Describes the processes that generate energy in the sun and other stars.
- B. Applies the law of conservation of matter to analyze a variety of situations (e.g., the water cycle, food chains, decomposition, balancing chemical equations).
- C. Describes sources of electrical energy and processes of energy transformation for human uses (e.g., fossil fuels, solar panels, hydroelectric plants).
- D. Understands exothermic and endothermic chemical reactions and their applications (e.g., hot and cold packs, energy content of food).
- E. Applies knowledge of energy concepts in a variety of situations (e.g., the production of heat, light, sound and magnetic effects by electrical energy; the process of photosynthesis; weather processes; food webs; food/energy pyramids).
- F. Applies the law of conservation of energy to analyze a variety of physical phenomena (e.g., specific heat, heat transfer, thermal equilibrium, nuclear reactions, efficiency of simple machines, collisions).
- G. Understands applications of energy transformations and the conservation of matter and energy in life and Earth/space science.

Competency 011—The teacher understands the structure and function of living things.

The beginning teacher:

- A. Describes characteristics of organisms from the major taxonomic groups.
- B. Analyzes how structure complements function in cells.
- C. Analyzes how structure complements function in tissues, organs, organ systems and organisms.
- D. Identifies human body systems and describes their functions.

- E. Describes how organisms obtain and use energy and matter.
- F. Describes the composition, structure and function of the basic chemical components (e.g., proteins, carbohydrates, lipids, nucleic acids) of living things.

Competency 012—The teacher understands reproduction and the mechanisms of heredity.

The beginning teacher:

- A. Compares and contrasts sexual and asexual reproduction.
- B. Understands the organization of hereditary material (e.g., DNA, genes, chromosomes).
- C. Describes how an inherited trait can be determined by one or many genes and how more than one trait can be influenced by a single gene.
- D. Distinguishes between dominant and recessive alleles and predicts the probable outcomes of genetic combinations (i.e., genotypes and phenotypes).
- E. Evaluates the influence of environmental and genetic factors on the traits of an organism.
- F. Describes current applications of genetic research (e.g., related to cloning, reproduction, health, industry, agriculture).

Competency 013—The teacher understands adaptations of organisms and the theory of evolution.

The beginning teacher:

- A. Describes similarities and differences among various taxonomical groups and methods of classifying organisms.
- B. Describes adaptations in a population or species that enhance its survival and reproductive success.
- C. Describes how populations and species may evolve through time.
- D. Applies knowledge of the mechanisms and processes of biological evolution (e.g., diversity, variation, mutation, environmental factors, natural selection).
- E. Describes evidence that supports the theory of evolution of life on Earth.

Competency 014—The teacher understands regulatory mechanisms and behavior.

The beginning teacher:

- A. Describes how organisms respond to internal and external stimuli.
- B. Applies knowledge of structures and physiological processes that maintain stable internal conditions (homeostasis).
- C. Demonstrates an understanding of feedback mechanisms that allow organisms to maintain stable internal conditions.
- D. Understands how evolutionary history of a species affects behavior (e.g., migration, nocturnality, territoriality).

Competency 015—The teacher understands the relationships between organisms and the environment.

The beginning teacher:

- A. Identifies the abiotic and biotic components of an ecosystem.
- B. Analyzes the interrelationships among producers, consumers and decomposers in an ecosystem.
- C. Identifies factors that influence the size of populations in an ecosystem (e.g., limiting factors, growth rate).
- D. Analyzes adaptive characteristics that result in a population's or species' unique niche in an ecosystem.
- E. Describes and analyzes energy flow through various types of ecosystems.
- F. Knows how populations or species modify and affect ecosystems.

Competency 016—The teacher understands the structure and function of Earth systems.

The beginning teacher:

- A. Understands the composition and structure of Earth (mantle, crust and core) and analyzes constructive and destructive processes that produce geologic change (e.g., plate tectonics, weathering, erosion, deposition).
- B. Understands the form and function of surface water and ground water.
- C. Applies knowledge of the composition and structure of the atmosphere and its properties.
- D. Applies knowledge of how human activity and natural processes, both gradual and catastrophic, can alter Earth systems.
- E. Identifies the sources of energy (e.g., solar, geothermal) in Earth systems and describes mechanisms of energy transfer (e.g., convection, radiation).

Competency 017—The teacher understands cycles in Earth systems.

The beginning teacher:

- A. Understands the rock cycle and how rocks, minerals and soils are formed.
- B. Understands the water cycle and its relationship to weather processes.
- C. Understands biogeochemical cycles (e.g., carbon, nitrogen, oxygen) and their relationship to Earth systems.
- D. Understands the relationships and interactions that occur among the various cycles in the biosphere, geosphere, hydrosphere and atmosphere.

Competency 018—The teacher understands the role of energy in weather and climate.

The beginning teacher:

- A. Understands the elements of weather (e.g., humidity, wind speed, pressure, temperature) and how they are measured.
- B. Compares and contrasts weather and climate.
- C. Analyzes weather charts and data to make weather predictions (e.g. fronts, pressure systems).
- D. Applies knowledge of how transfers of energy among Earth systems affect weather and climate.
- E. Analyzes how Earth's position, orientation and surface features affect weather and climate (e.g., latitude, altitude, proximity to bodies of water).

Competency 019—The teacher understands the characteristics of the solar system and the universe.

The beginning teacher:

- A. Applies knowledge of the Earth-Moon-Sun system and resulting phenomena (e.g., seasons, tides, lunar phases, eclipses).
- B. Identifies properties of the components of the solar system.
- C. Recognizes characteristics of stars, nebulae, comets, asteroids and galaxies and knows their distribution in the universe.
- D. Demonstrates an understanding of evidence for the scientific theories of the origin of the universe.

Competency 020—The teacher understands the history of the Earth system.

The beginning teacher:

- A. Understands dating methods and the geologic time scale as it relates to geologic processes.
- B. Demonstrates an understanding of theories about the Earth's origin and geologic history.
- C. Demonstrates an understanding of how tectonic forces have shaped landforms over time.
- D. Understands the formation of fossils and the importance of the fossil record in explaining the Earth's history.

Competency 021—The teacher has theoretical and practical knowledge about teaching science and about how students learn science.

The beginning teacher:

- A. Understands how the developmental characteristics, prior knowledge and experience and attitudes of students influence science learning.
- B. Selects and adapts science curricula, content, instructional materials, vocabulary and activities to meet the interests, knowledge, understanding, abilities, experiences and needs of all students, including English-language learners.
- C. Understands how to use situations from students' daily lives to develop instructional materials that investigate how science can be used to make informed decisions.
- D. Understands effective ways to address common misconceptions in science.
- E. Understands the use of active learning including the appropriate use of inquiry processes for students and other instructional models (e.g., collaborative learning groups).
- F. Understands questioning strategies designed to elicit higher-level thinking and how to use them to move students from concrete to more abstract understanding.
- G. Understands the importance of planning activities that are inclusive and accommodate the needs of all students.
- H. Understands how to sequence learning activities in a way that allows students to build upon their prior knowledge and challenges them to expand their understanding of science.

Competency 022—The teacher understands the process of scientific inquiry and its role in science instruction.

The beginning teacher:

- A. Plans and implements instruction that provides opportunities for all students to engage in investigations.

- B. Focuses inquiry-based instruction on questions and issues relevant to students and uses strategies to assist students with generating, refining and focusing scientific questions and hypotheses.
- C. Instructs students in the safe and proper use of a variety of grade-appropriate tools, equipment, resources, technology and techniques to access, gather, store, retrieve, organize and analyze data.
- D. Knows how to guide students in making systematic observations and measurements, including repeating investigations to increase reliability.
- E. Knows how to promote the use of critical-thinking skills, logical reasoning and scientific problem solving to reach conclusions based on evidence.
- F. Knows how to teach students to develop, analyze and evaluate different explanations for a given scientific result.
- G. Knows how to teach students to demonstrate an understanding of potential sources of error in inquiry-based investigation.
- H. Knows how to teach students to demonstrate an understanding of how to communicate and defend the results of an inquiry-based investigation.

Competency 023—The teacher knows the varied and appropriate assessments and assessment practices to monitor science learning in laboratory, field and classroom settings.

The beginning teacher:

- A. Understands the relationships among science curriculum, assessment and instruction and bases instruction on information gathered through assessment of students' strengths and needs.
- B. Understands the importance of monitoring and assessing students' understanding of science concepts and skills on an ongoing basis.
- C. Understands the importance of carefully selecting or designing formative and summative assessments for the specific decisions they are intended to inform.
- D. Selects or designs and administers a variety of appropriate assessment methods (e.g., performance assessment, self-assessment, formal/informal, formative/summative) to monitor student understanding and progress.
- E. Uses formal and informal assessments of student performance and products (e.g., projects, lab journals, rubrics, portfolios, student profiles, checklists) to evaluate student participation in and understanding of the inquiry process.
- F. Understands the importance of sharing evaluation criteria and assessment results with students.

Preparation Manual

Section 4: Sample Selected-Response Questions Core Subjects 4–8 Subject Exam I—English Language Arts and Reading Subtest (806)

This section presents some sample exam questions for you to review as part of your preparation for the Subject Exam. To demonstrate how each competency may be assessed, sample questions are accompanied by the competency that they measure. While studying, you may wish to read the competency before and after you consider each sample question. Please note that the competency statements do not appear on the actual Subject Exam.

For each sample exam question, there is a correct answer and a rationale for each answer option. The sample questions are included to illustrate the formats and types of questions you will see on the Subject Exam; however, your performance on the sample questions should not be viewed as a predictor of your performance on the actual exam.

Subject Exam I Sample Questions

Competency 001—(Oral Language): The teacher understands the importance of oral language, knows the developmental processes of oral language and provides a variety of instructional opportunities for students to develop listening and speaking skills.

1. Which of the following activities best helps develop oral language proficiency for English-language learners speaking at an intermediate level of English-language proficiency?
- A. Having conversations with the teacher
 - B. Answering comprehension questions in class
 - C. Writing narrative stories in English
 - D. Viewing dramatic television shows

Answer _____

2. Middle school students are using a speech-recognition tool to record notes on a tablet computer while conducting research. To best ensure that the tool is effective, the teacher should emphasize the importance of which of the following?
- A. Using clear articulation
 - B. Giving sequential instructions
 - C. Maintaining a consistent speaking rate
 - D. Connecting ideas effectively

Answer _____

Competency 002—(Early Literacy Development): The teacher understands the foundations of early literacy development.

3. Which of the following words should be paired with the word “enough” to model the strategy of using analogy-based phonics to decode unfamiliar words?

- A. Off
- B. Rough
- C. Plenty
- D. Cough

Answer _____

Competency 003—(Word Identification Skills and Reading Fluency): The teacher understands the importance of word identification skills (including decoding, blending, structural analysis and sight word vocabulary) and reading fluency and provides many opportunities for students to practice and improve word identification skills and reading fluency.

4. A teacher has students take turns pulling pieces of paper with affixes and roots written on them out of a container. Students must create a word with the root or affix and construct a sentence using that word correctly. The activity will best help students develop an understanding of word meanings based on which of the following?

- A. Structure
- B. Context clues
- C. Syntax
- D. Pragmatics

Answer _____

Competency 004—(Reading Comprehension and Assessment): The teacher understands the importance of reading for understanding, knows components and processes of reading comprehension and teaches students strategies for improving their comprehension.

5. A student demonstrates success with fluency during oral reading circles but has difficulty relating to the text. Because of this difficulty, the student will most likely struggle with which of the following?

- A. Writing about the text
- B. Reading the text out loud
- C. Listening to the text read aloud
- D. Decoding words within the text

Answer _____

6. Which of the following is an appropriate guideline to give students for analyzing a poem?

- A. A poem's figurative meaning is usually understood before its literal meaning.
- B. There is usually one correct way to interpret the meaning of a poem.
- C. A strong interpretation of a poem usually includes evidence from the text.
- D. A poem's rhyme scheme usually guides the literal understanding of a poem.

Answer _____

7. Which of the following is a research-based best practice for teaching vocabulary?

- A. Asking students to explain vocabulary words in their own words to promote meaningful use of the new terms
- B. Exposing students to vocabulary words once before moving on to new words to ensure that students remain motivated to learn a variety of new terms
- C. Explaining the definitions of vocabulary words using formal language to promote higher-level understanding
- D. Focusing on written vocabulary words rather than representative images to ensure that students focus on language rather than on pictures

Answer _____

Competency 005—(Reading Applications): The teacher understands reading skills and strategies appropriate for various types of texts and contexts and teaches students to apply these skills and strategies to enhance their reading proficiency.

8. Using a KWL chart when reading an expository text best helps students with which of the following skills?

- A. Setting a purpose for reading by eliciting prior knowledge
- B. Comparing and contrasting elements of the text by sorting information
- C. Incorporating evidence to support claims by returning to the text
- D. Distinguishing factual claims from opinions by evaluating language in the text

Answer _____

9. A teacher points out the following sentence from a text the class is reading.

After getting stuck behind a school bus, it took an eternity for us to get to school.

The sentence provides an effective model for using which of the following types of figurative language?

- A. Extended metaphor
- B. Dramatic irony
- C. Onomatopoeia
- D. Hyperbole

Answer _____

Questions 10–11 refer to the following information.

An English teacher has students read and analyze the following stanza from William Blake's poem "A Poison Tree."

I was angry with a friend:
I told my wrath, my wrath did end.
I was angry with a foe:
I told it not, my wrath did grow.

10. To best help students understand the underlying meaning of the stanza, on which of the following should teacher focus first?

- A. Opposing elements
- B. Shifts in point of view
- C. Descriptive imagery
- D. Line length

Answer _____

11. Which of the following is the most accurate paraphrase of the stanza?

- A. I was upset with my pal, but he apologized, so my anger went away. I was upset with my enemy, and he also apologized, but I was still mad.
- B. I was upset with my pal, and I let him know, and my anger went away. I was upset with my enemy, but I did not tell him, so my anger became worse.
- C. I was upset with my pal, and I let him know, but my anger remained. I was upset with my enemy, and I did not let him know, so my anger became worse.
- D. I was upset with my pal, but I kept it from him, and my anger remained. I was upset with my enemy, and I did not tell him, so I was still mad.

Answer _____

12. After reading a short story, a teacher asks students to answer the following question.

What is the author trying to communicate when he says, “The finish line was visible but seemed farther than ever”?

The question primarily requires students to use which of the following skills?

- A. Making a prediction
- B. Inferring meaning
- C. Making a connection
- D. Critiquing writing

Answer _____

Competency 006—(Written Language — Writing Conventions): The teacher understands the conventions of writing in English and provides instruction that helps students develop proficiency in applying writing conventions.

13. A teacher reads the following two sentences from a book report written by an eighth-grade student.

The Outsiders describes teenage boys growing up on the wrong side of the tracks, and having to compete with rich kids. They encounter lots of trouble along the way, but learn in the end that everyone sees the same sunset.

The teacher should first help the student correct the errors in

- A. comma usage.
- B. run-on sentences.

- C. subject-verb agreement.
- D. verb tense.

Answer _____

14. A student writes the following two sentences.

The campground was now a lonely ghost town. I left the place without a fish in my cooler.

The student then revises the two sentences into the sentence that follows.

I left the campground, a lonely ghost town, without a fish in my cooler.

In the revision, the student has combined the two sentences using which of the following?

- A. A compound sentence
- B. A participial phrase
- C. An appositive phrase
- D. A complex sentence

Answer _____

15. Which of the following is the most effective way for a teacher to help students understand the decision-making process involved in writing with grammatical correctness?

- A. Providing daily opportunities for students to write for authentic purposes
- B. Pointing out students' grammatical errors during individual writing conferences
- C. Highlighting incorrect grammar usage on students' writing assignments
- D. Modeling the appropriate use of writing conventions using think-alouds

Answer _____

Competency 007—(Written Language — Composition): The teacher understands that writing to communicate is a developmental process and provides instruction that promotes students' competence in written communication.

16. A teacher wants students to conduct a self-assessment of their writing over an extended period of time. Which of the following activities best meets the objective?

- A. Applying color-coding strategies to rough drafts of essays as a typical revision activity during the year
- B. Scoring sample essays written by other students using appropriate research-based rubrics as a weekly activity
- C. Using a variety of writing topics as journal starters over the course of the year
- D. Selecting several examples of their writing that demonstrate their ability to meet objectives they studied throughout a semester

Answer _____

17. Which of the following activities is most appropriate to have students complete during the prewriting phase of the writing process?

- A. Using a thesaurus to replace repeated words
- B. Listening to peers read their introductory paragraphs out loud
- C. Creating clusters of ideas related to the topic in a graphic organizer
- D. Determining a variety of ways to begin sentences

Answer _____

18. Which of the following practices best develops sentence fluency in writing?

- A. Expanding each idea with a variety of supporting examples and explanations
- B. Beginning sentences in a variety of ways
- C. Creating simple sentences to replace fragments and run-on sentences
- D. Ending each paragraph with a sentence that restates the main idea

Answer _____

Competency 008—(Viewing and Representing): The teacher understands skills for interpreting, analyzing, evaluating and producing visual images and messages in various media and provides students with opportunities to develop skills in this area.

19. Which of the following is an example of a cinematographer influencing the audience's perception of a subject by controlling the light in the shot?

- A. Using a close-up shot of an actor's face to highlight the character's happy expression
- B. Using a set that includes many horizontal lines behind the main action
- C. Showing an actor in the shadows to suggest the character's evil intentions
- D. Showing two people walking toward the camera using a long shot

Answer _____

20. A reading teacher is teaching students how to view television commercials critically. When leading them to analyze how the target audience affects the choices made by the producers of the commercial, which of the following questions should the teacher guide students to ask first?

- A. What propaganda strategies were used in the commercial?
- B. How much did it cost to broadcast the commercial?
- C. During what program did the commercial air?
- D. What artistic techniques were used to create the commercial?

Answer _____

Competency 009—(Study and Inquiry Skills): The teacher understands the importance of study and inquiry skills as tools for learning in the content areas and promotes students' development in applying study and inquiry skills.

21. A student has created note cards containing facts and information to answer specific research questions about a self-selected topic. Which of the following steps should the student take next to complete the research paper?

- A. Discussing the research with a small group of peers for feedback and guidance
- B. Completing a summary of the ideas, incorporating one note card per paragraph
- C. Sorting the cards by the questions that are answered to identify any gaps in the research
- D. Writing a rough draft of the research paper that incorporates the facts from the note cards

Answer _____

22. Which of the following can best be achieved by using multiple sources when completing a research project?

- A. Streamlining the steps of the research process
- B. Accessing a range of information on the topic
- C. Eliminating plagiarism within the research paper
- D. Ensuring unity of ideas about the topic

Answer _____

Preparation Manual

Section 4: Sample Selected-Response Answers and Rationales Core Subjects 4–8 Subject Exam I—English Language Arts and Reading Subtest (806)

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Subject Exam I Sample Questions

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1. Which of the following activities best helps develop oral language proficiency for English-language learners speaking at an intermediate level of English-language proficiency?
- A. Having conversations with the teacher
 - B. Answering comprehension questions in class
 - C. Writing narrative stories in English
 - D. Viewing dramatic television shows

Answer

Option A is correct because social interactions in standard English are critical to oral language development in English-language learners (ELLs). **Option B is incorrect** because answering simple comprehension questions does not give the ELL the opportunity to practice conversational proficiency. **Option C is incorrect** because writing skills do not necessarily translate to oral proficiency, nor does writing allow the student to practice oral language in a meaningful way. **Option D is incorrect** because watching television gives the student an opportunity to listen to English but not to practice speaking it.

2. Middle school students are using a speech-recognition tool to record notes on a tablet computer while conducting research. To best ensure that the tool is effective, the teacher should emphasize the importance of which of the following?
- A. Using clear articulation
 - B. Giving sequential instructions
 - C. Maintaining a consistent speaking rate
 - D. Connecting ideas effectively

Answer

Option A is correct because students must clearly articulate, or enunciate, words for the speech-recognition application to accurately recognize and record students' notes. **Option B is incorrect** because although students are speaking to the application, they are recording notes instead of providing a set of sequential instructions. **Option C is incorrect** because maintaining a constant speaking rate is not as important for the speech-recognition application as clear articulation. **Option D is incorrect** because the speech-recognition application directly records what students say, regardless of the content. It will not recognize whether the ideas are connected effectively.

Competency 002—(Early Literacy Development): The teacher understands the foundations of early literacy development.

3. Which of the following words should be paired with the word “enough” to model the strategy of using analogy-based phonics to decode unfamiliar words?

- A. Off
- B. Rough
- C. Plenty
- D. Cough

Answer

Option B is correct because analogy-based phonics allows students to decode unfamiliar words, like “enough,” using the sound of known words with similar spellings, like “rough.” **Option A is incorrect** because although “off” has the same ending sound as “enough,” its spelling is different and therefore not useful for decoding by analogy. **Option C is incorrect** because although “plenty” has a similar meaning to “enough,” the words are not phonetically similar. **Option D is incorrect** because although “cough” has a similar spelling to “enough,” it has a different vowel digraph sound.

Competency 003—(Word Identification Skills and Reading Fluency): The teacher understands the importance of word identification skills (including decoding, blending, structural analysis and sight word vocabulary) and reading fluency and provides many opportunities for students to practice and improve word identification skills and reading fluency.

4. A teacher has students take turns pulling pieces of paper with affixes and roots written on them out of a container. Students must create a word with the root or affix and construct a sentence using that word correctly. The activity will best help students develop an understanding of word meanings based on which of the following?

- A. Structure
- B. Context clues
- C. Syntax
- D. Pragmatics

Answer

Option A is correct because in the activity, students demonstrate understanding of the meaning of words by using their knowledge of familiar roots and affixes that form words. **Option B is incorrect** because students must create the word and sentence; therefore, context clues are not available. **Option C is incorrect** because students are not presented with a sentence that uses the word, which would be needed to infer meaning through evaluating the sentence syntax. **Option D is incorrect** because the students are provided with only a root or an affix. There are no clues provided to students about the how the context contributes to meaning in a particular situation.

Competency 004—(Reading Comprehension and Assessment): The teacher understands the importance of reading for understanding, knows components and processes of reading comprehension and teaches students strategies for improving their comprehension.

5. A student demonstrates success with fluency during oral reading circles but has difficulty relating to the text. Because of this difficulty, the student will most likely struggle with which of the following?

- A. Writing about the text
- B. Reading the text out loud
- C. Listening to the text read aloud
- D. Decoding words within the text

Answer

Option A is correct because students must be able to relate to the meaning of the text to write about it in any context. **Option B is incorrect** because the student's success with fluency means that the student will not have difficulty reading the text aloud. **Option C is incorrect** because the student's success in oral reading circles demonstrates success at listening. **Option D is incorrect** because decoding skills are necessary for the student to achieve the stated success in fluency.

6. Which of the following is an appropriate guideline to give students for analyzing a poem?

- A. A poem's figurative meaning is usually understood before its literal meaning.
- B. There is usually one correct way to interpret the meaning of a poem.
- C. A strong interpretation of a poem usually includes evidence from the text.
- D. A poem's rhyme scheme usually guides the literal understanding of a poem.

Answer

Option C is correct because the use of textual evidence from the poem is a vital part of any explication or interpretation of the meaning of the poem. **Option A is incorrect** because although understanding the figurative meaning is important, most readers first achieve a literal understanding of poetry before progressing to understanding the figurative meaning, as figurative meaning requires a higher level of thinking and comprehension. **Option B is incorrect** because poetry lends itself to multiple interpretations rather than just a single, correct interpretation. **Option D is incorrect** because while understanding rhyme scheme may help a student appreciate the craft of poetry, an understanding of the rhyme scheme alone does not support comprehension and analysis of the poem's meaning.

7. Which of the following is a research-based best practice for teaching vocabulary?

- A. Asking students to explain vocabulary words in their own words to promote meaningful use of the new terms
- B. Exposing students to vocabulary words once before moving on to new words to ensure that students remain motivated to learn a variety of new terms
- C. Explaining the definitions of vocabulary words using formal language to promote higher-level understanding
- D. Focusing on written vocabulary words rather than representative images to ensure that students focus on language rather than on pictures

Answer

Option A is correct because research shows that encouraging the meaningful use of vocabulary through student-developed definitions promotes deeper understanding of vocabulary words. **Option B is incorrect** because research supports repeated engagement with the same words to improve vocabulary development. **Option C is incorrect** because research shows that students retain new vocabulary best when it is introduced using student-friendly language. **Option D is incorrect** because research supports the use of pictures to help students construct meaning for new vocabulary.

Competency 005—(Reading Applications): The teacher understands reading skills and strategies appropriate for various types of texts and contexts and teaches students to apply these skills and strategies to enhance their reading proficiency.

8. Using a KWL chart when reading an expository text best helps students with which of the following skills?
- A. Setting a purpose for reading by eliciting prior knowledge
 - B. Comparing and contrasting elements of the text by sorting information
 - C. Incorporating evidence to support claims by returning to the text
 - D. Distinguishing factual claims from opinions by evaluating language in the text

Answer

Option A is correct because a KWL chart incorporates prior knowledge of a topic by requiring students to list what they already know about the topic. It also helps students set a purpose for reading by requiring them to list what they want to know about the topic. **Options B, C and D are incorrect** because a KWL chart has students activate prior knowledge in the “What I know” column, set a purpose for learning in the “What I want to know” column, and make meta-cognitive reflections in the “What I learned” column. It does not require students to sort or compare information, incorporate evidence to support claims or distinguish between fact and opinion. Those tasks would be better completed using different types of graphic organizers.

9. A teacher points out the following sentence from a text the class is reading.

After getting stuck behind a school bus, it took an eternity for us to get to school.

The sentence provides an effective model for using which of the following types of figurative language?

- A. Extended metaphor
- B. Dramatic irony
- C. Onomatopoeia
- D. Hyperbole

Answer

Option D is correct because “it took an eternity” is an example of exaggeration, or hyperbole, about the amount of time it took the speaker to get to school. **Option A is incorrect** because “it took an eternity” does not make the direct comparison required for creating a metaphor. **Option B is incorrect** because the sentence contains no words or phrases that convey dramatic irony, which occurs when the readers or audience know something that the characters in a text do not know. **Option C is incorrect** because the sentence contains no words that mimic natural sounds, or onomatopoeia.

Questions 10–11 refer to the following information.

An English teacher has students read and analyze the following stanza from William Blake’s poem “A Poison Tree.”

I was angry with a friend:
I told my wrath, my wrath did end.
I was angry with a foe:
I told it not, my wrath did grow.

10. To best help students understand the underlying meaning of the stanza, on which of the following should teacher focus first?

- A. Opposing elements
- B. Shifts in point of view
- C. Descriptive imagery
- D. Line length

Answer

Option A is correct because the stanza presents two opposing ideas: how the speaker treats anger toward a friend and how he addresses anger he feels for a foe. **Option B is incorrect** because although the first-person perspective is important, there is no shift to a different point of view. **Option C is incorrect** because the stanza lacks vivid images and does not rely on visual imagery to convey the primary message about the impact of anger. **Option D is incorrect** because the line length, which similar in all four lines, does little, if anything, to communicate meaning in the poem.

11. Which of the following is the most accurate paraphrase of the stanza?

- A. I was upset with my pal, but he apologized, so my anger went away. I was upset with my enemy, and he also apologized, but I was still mad.
- B. I was upset with my pal, and I let him know, and my anger went away. I was upset with my enemy, but I did not tell him, so my anger became worse.
- C. I was upset with my pal, and I let him know, but my anger remained. I was upset with my enemy, and I did not let him know, so my anger became worse.
- D. I was upset with my pal, but I kept it from him, and my anger remained. I was upset with my enemy, and I did not tell him, so I was still mad.

Answer

Option B is correct because the paraphrase accurately states that the speaker tells his friend of his anger, thereby releasing it, and that because he does not tell his enemy of his anger, the speaker holds on to that anger. **Options A, C and D are incorrect** because they present misreadings of the poem.

12. After reading a short story, a teacher asks students to answer the following question.

What is the author trying to communicate when he says, “The finish line was visible but seemed farther than ever”?

The question primarily requires students to use which of the following skills?

- A. Making a prediction
- B. Inferring meaning
- C. Making a connection
- D. Critiquing writing

Answer

Option B is correct because determining the author’s purpose in figurative language requires the student to make an inference from the information provided in the story. **Option A is incorrect** because predicting requires the student to identify what the story is most likely about, which occurs before reading. **Option C is incorrect** because connecting requires the student to draw parallels between the story and other stories or themselves. **Option D is incorrect** because critiquing an author’s writing requires the student to critically evaluate the subject and craftsmanship of the entire story rather than examining a single sentence.

Competency 006—(Written Language — Writing Conventions): The teacher understands the conventions of writing in English and provides instruction that helps students develop proficiency in applying writing conventions.

13. A teacher reads the following two sentences from a book report written by an eighth-grade student.

The Outsiders describes teenage boys growing up on the wrong side of the tracks, and having to compete with rich kids. They encounter lots of trouble along the way, but learn in the end that everyone sees the same sunset.

The teacher should first help the student correct the errors in

- A. comma usage.
- B. run-on sentences.
- C. subject-verb agreement.
- D. verb tense.

Answer

Option A is correct because the student uses unnecessary commas to separate compound predicates in the sentences. Commas should be used with coordinating conjunctions to join independent clauses; therefore, the student would benefit from direct instruction in comma usage. **Option B is incorrect** because each sentence contains conjunctions between the independent clauses, so there is no run-on. **Option C is incorrect** because the verbs in each sentence agree with the subjects. **Option D is incorrect** because the student uses the literary present tense consistently in both sentences.

14. A student writes the following two sentences.

The campground was now a lonely ghost town. I left the place without a fish in my cooler.

The student then revises the two sentences into the sentence that follows.

I left the campground, a lonely ghost town, without a fish in my cooler.

In the revision, the student has combined the two sentences using which of the following?

- A. A compound sentence
- B. A participial phrase
- C. An appositive phrase
- D. A complex sentence

Answer

Option C is correct because the student combined the sentences by correctly inserting an appositive phrase describing the campground into the first sentence. **Option A is incorrect** because the new sentence does not contain two separate, independent clauses. **Option B is incorrect** because although the revision includes a phrase used to modify a noun, that phrase does not contain a present or past participle. **Option D is incorrect** because the revision does not contain the independent and dependent clause necessary for a complex sentence.

15. Which of the following is the most effective way for a teacher to help students understand the decision-making process involved in writing with grammatical correctness?

- A. Providing daily opportunities for students to write for authentic purposes
- B. Pointing out students' grammatical errors during individual writing conferences
- C. Highlighting incorrect grammar usage on students' writing assignments
- D. Modeling the appropriate use of writing conventions using think-alouds

Answer

Option D is correct because watching a teacher model the thought processes involved in the application of writing conventions will show students how to make those decisions and encourage them to practice such decision making in their own writing. **Option A is incorrect** because even though providing students authentic purposes for writing is a good practice, the practice does not necessarily direct them to the decision making involved in grammatical correctness. **Options B and C are incorrect** because while pointing out errors in student writing, either verbally or on paper, may be a catalyst for a student to focus on particular conventions, these strategies do not highlight the decision making involved in using grammatical correctness.

Competency 007—(Written Language — Composition): The teacher understands that writing to communicate is a developmental process and provides instruction that promotes students' competence in written communication.

16. A teacher wants students to conduct a self-assessment of their writing over an extended period of time. Which of the following activities best meets the objective?

- A. Applying color-coding strategies to rough drafts of essays as a typical revision activity during the year
- B. Scoring sample essays written by other students using appropriate research-based rubrics as a weekly activity
- C. Using a variety of writing topics as journal starters over the course of the year
- D. Selecting several examples of their writing that demonstrate their ability to meet objectives they studied throughout a semester

Answer

Option D is correct because compiling examples of their writing over an extended period, commonly known as a writing portfolio, will facilitate students' ability to see their progress in writing over time. **Option A is incorrect** because although having students apply color coding as a revision strategy will require them to practice revision skills, such strategies are not directly related to self-assessment. **Option B is incorrect** because scoring sample essays with a specific rubric does not help students focus on their own writing. **Option C is incorrect** because while journal starters are an excellent tool for informal writing, they do not demonstrate students' progress in meeting objectives throughout the year, as the writing portfolio will.

17. Which of the following activities is most appropriate to have students complete during the prewriting phase of the writing process?

- A. Using a thesaurus to replace repeated words
- B. Listening to peers read their introductory paragraphs out loud
- C. Creating clusters of ideas related to the topic in a graphic organizer
- D. Determining a variety of ways to begin sentences

Answer

Option C is correct because making graphic organizers, such as mind maps, is a strategy that is most effective for the planning or prewriting stage. **Option A is incorrect** because using a thesaurus is more appropriate for the revising and editing stage. **Option B is incorrect** because analyzing other students' writing is more appropriate during the revising and editing stage. **Option D is incorrect** because varying sentences is more appropriate for either the drafting or the revising stage.

18. Which of the following practices best develops sentence fluency in writing?

- A. Expanding each idea with a variety of supporting examples and explanations
- B. Beginning sentences in a variety of ways
- C. Creating simple sentences to replace fragments and run-on sentences
- D. Ending each paragraph with a sentence that restates the main idea

Answer

Option B is correct because beginning sentences in different ways helps to create rhythm and fluency within a composition. **Option A is incorrect** because expanding each idea with a variety of examples and explanations primarily develops the traits of ideas and organization in writing. **Option C is incorrect** because even though simple sentences are grammatically correct, overusing them is likely to create writing that is choppy, not fluent. **Option D is incorrect** because while ending each paragraph with a restatement of the main idea may help develop organization and ideas, it will not promote sentence fluency.

Competency 008—(Viewing and Representing): The teacher understands skills for interpreting, analyzing, evaluating and producing visual images and messages in various media and provides students with opportunities to develop skills in this area.

19. Which of the following is an example of a cinematographer influencing the audience's perception of a subject by controlling the light in the shot?

- A. Using a close-up shot of an actor's face to highlight the character's happy expression

- B. Using a set that includes many horizontal lines behind the main action
- C. Showing an actor in the shadows to suggest the character's evil intentions
- D. Showing two people walking toward the camera using a long shot

Answer

Option C is correct because shadows suggest literal and figurative darkness, and by purposely using shadows in the film, the cinematographer suggests figurative darkness and evil intentions. **Option A is incorrect** because a close-up shot may or may not incorporate light as a tool. Although such shots allow the viewer to focus on a single object, they do not necessarily influence the audience's perception of that object. **Option B is incorrect** because the use of lines is not directly related to manipulation of the intensity of light. **Option D is incorrect** because a long shot of people walking toward a camera does not necessarily incorporate light as a strategic influence.

20. A reading teacher is teaching students how to view television commercials critically. When leading them to analyze how the target audience affects the choices made by the producers of the commercial, which of the following questions should the teacher guide students to ask first?

- A. What propaganda strategies were used in the commercial?
- B. How much did it cost to broadcast the commercial?
- C. During what program did the commercial air?
- D. What artistic techniques were used to create the commercial?

Answer

Option C is correct because understanding the programming of the television show during which the commercial aired will help students understand the target audience. **Option A is incorrect** because even though propaganda strategies are important for understanding commercials on a critical level, knowing the target audience first will better lead students to focus on how those strategies will influence the target audience. **Option B is incorrect** because the cost of the commercial has nothing to do with its target audience. **Option D is incorrect** because while analyzing the artistic techniques will help students understand the message, such techniques are not the element to target first when analyzing the audience.

Competency 009—(Study and Inquiry Skills): The teacher understands the importance of study and inquiry skills as tools for learning in the content areas and promotes students' development in applying study and inquiry skills.

21. A student has created note cards containing facts and information to answer specific research questions about a self-selected topic. Which of the following steps should the student take next to complete the research paper?

- A. Discussing the research with a small group of peers for feedback and guidance
- B. Completing a summary of the ideas, incorporating one note card per paragraph
- C. Sorting the cards by the questions that are answered to identify any gaps in the research
- D. Writing a rough draft of the research paper that incorporates the facts from the note cards

Answer

Option C is correct because sorting the cards by the research questions will allow the student to evaluate and organize the research before moving on to the drafting stage of writing the research paper. **Option A is incorrect** because peers may be unfamiliar with the topic and research, as it was self-selected by the student, making their feedback somewhat unreliable. **Option B is incorrect** because the note cards may not be organized by topic, and writing a summary with one note card per paragraph will likely result in a lengthy summary that does not help the

student organize the main ideas. **Option D is incorrect** because the student is not prepared to draft the paper without first organizing or sorting the research gathered.


22. Which of the following can best be achieved by using multiple sources when completing a research project?

- A. Streamlining the steps of the research process
- B. Accessing a range of information on the topic
- C. Eliminating plagiarism within the research paper
- D. Ensuring unity of ideas about the topic

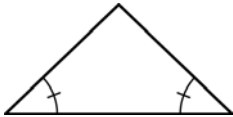

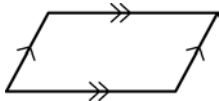
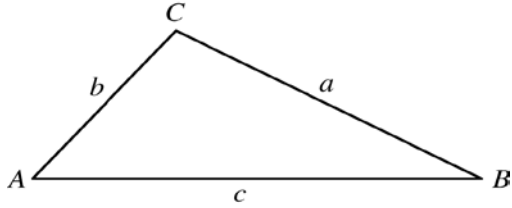
Answer

Option B is correct because accessing multiple sources will likely provide a range of information about the topic. **Option A is incorrect** because using multiple sources does not usually streamline research; rather, it often complicates the process. **Option C is incorrect** because students must provide documentation for all sources, and using multiple sources does not necessarily prevent students from plagiarizing material from those sources. **Option D is incorrect** because consulting multiple sources often results in finding conflicting opinions rather than agreement.

This reference material will also be available to you during the exam. To access it, click on the

 **Reference Materials** icon located in the lower-left corner of the screen.

Definitions and Formulas

<p style="text-align: center;">CALCULUS</p> <p>First Derivative: $f'(x) = \frac{dy}{dx}$</p> <p>Second Derivative: $f''(x) = \frac{d^2y}{dx^2}$</p> <p style="text-align: center;">PROBABILITY</p> <p>$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$</p> <p>$P(A \text{ and } B) = P(A)P(B A) = P(B)P(A B)$</p>	<p style="text-align: center;">ALGEBRA</p> <p>$i^2 = -1$</p> <p>A^{-1} inverse of matrix A</p> <p>$A = P\left(1 + \frac{r}{n}\right)^{nt}$ Compound interest, where A is the final value P is the principal r is the interest rate t is the term n is the number of divisions within the term</p> <p>$[x] = n$ Greatest integer function, where n is the integer such that $n \leq x < n + 1$</p>
<p style="text-align: center;">GEOMETRY</p> <p style="text-align: center;">Congruent Angles</p>  <p style="text-align: center;">Congruent Sides</p>  <p style="text-align: center;">Parallel Sides</p>  <p style="text-align: center;">Circumference of a Circle</p> <p style="text-align: center;">$C = 2\pi r$</p>	<p style="text-align: center;">VOLUME</p> <p>Cylinder: (area of base) \times height</p> <p>Cone: $\frac{1}{3}$ (area of base) \times height</p> <p>Sphere: $\frac{4}{3}\pi r^3$</p> <p>Prism: (area of base) \times height</p> <p style="text-align: center;">AREA</p> <p>Triangle: $\frac{1}{2}$ (base \times height)</p> <p>Rhombus: $\frac{1}{2}$ (diagonal₁ \times diagonal₂)</p> <p>Trapezoid: $\frac{1}{2}$ height (base₁ + base₂)</p> <p>Sphere: $4\pi r^2$</p> <p>Circle: πr^2</p> <p>Lateral surface area of cylinder: $2\pi rh$</p>
<p style="text-align: center;">TRIGONOMETRY</p> <p>Law of Sines: $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$</p> <p>$c^2 = a^2 + b^2 - 2ab \cos C$</p> <p>Law of Cosines: $b^2 = a^2 + c^2 - 2ac \cos B$</p> <p>$a^2 = b^2 + c^2 - 2bc \cos A$</p>	

End of Definitions and Formulas

Preparation Manual

Section 5: Sample Selected-Response Questions Core Subjects 4–8 Subject Exam II—Mathematics Subtest (807)

This section presents some sample exam questions for you to review as part of your preparation for the Subject Exam. To demonstrate how each competency may be assessed, sample questions are accompanied by the competency that they measure. While studying, you may wish to read the competency before and after you consider each sample question. Please note that the competency statements do not appear on the actual exam.

For each sample exam question, there is a correct answer and a rationale for each answer option. The sample questions are included to illustrate the formats and types of questions you will see on the Subject Exam; however, your performance on the sample questions should not be viewed as a predictor of your performance on the actual exam.

The following reference materials will be available to you during the exam:

- Definitions and Formulas (see page 53)

Subject Exam II Sample Questions

Competency 001—The teacher understands the structure of number systems, the development of a sense of quantity and the relationship between quantity and symbolic representations.

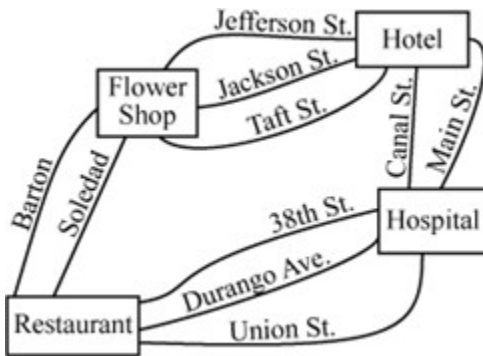
1. Indicate whether the following numbers are rational or irrational by checking the appropriate boxes.

Number	Rational	Irrational
$\sqrt{2}$		
$\sqrt{4}$		
$(\sqrt{2})(\sqrt{4})$		
$\sqrt{2} + \sqrt{4}$		

Answer _____

Competency 003—The teacher understands ideas of number theory and uses numbers to model and solve problems within and outside of mathematics.

Use the figure below to answer the question that follows.



2. Jennifer is a delivery person for a flower shop. Using the map above, how many different routes are there for Jennifer to choose from if she travels from the flower shop to the hotel, then to the hospital, then to the restaurant, and then back to the flower shop?

- A. 6
- B. 10
- C. 18
- D. 36

Answer _____

Competency 004—The teacher understands and uses mathematical reasoning to identify, extend and analyze patterns and understands the relationships among variables, expressions, equations, inequalities, relations and functions.

Use the table below to answer the question that follows.

x	y
6	19
9	28
12	37
15	46

3. Which of the following lines in the xy -plane includes the points in the table shown?

- A. $y = x + 3$
- B. $y = x + 13$
- C. $y = 3x + 1$
- D. $y = 3x + 13$

Answer _____

4. Jeb pays \$18 per night for a campsite every time he takes a trip to Palmetto State Park. Last year he camped 4 nights in Palmetto State Park each month. This year he purchased a state park pass for \$70. With his park pass, he receives 50% off 24 nights of camping for the entire year. Let x be the number of nights he will get to camp this year for the amount he spent last year. Which of the following equations could be used to find x ?

- A. $0.5(18x) + 70 = 864$
- B. $18x - 0.5(24x) + 70 = 864$
- C. $18x + 0.5(18)(24) + 70 = 864$
- D. $18x - 0.5(18)(24) + 70 = 864$

Answer _____

Competency 006—The teacher understands and uses nonlinear functions and relations to model and solve problems.

Use the functions below to answer the question that follows.

$$g(x) = 3(x - 2)^2 + 5$$

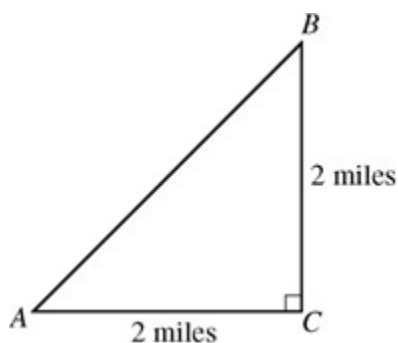
$$h(x) = 3(x - 2)^2 + 9$$

5. How is the graph of h in the xy -plane related to the graph of g ?
- A. The graph of h is the graph of g shifted 4 units to the right.
 - B. The graph of h is the graph of g shifted 4 units to the left.
 - C. The graph of h is the graph of g shifted 4 units upward.
 - D. The graph of h is the graph of g shifted 4 units downward.

Answer _____

Competency 008—The teacher understands measurement as a process.

Use the figure below to answer the question that follows.



6. Town C is 2 miles east of Town A and 2 miles south of Town B, as in the figure above. Which of the following is the best estimate of the shortest distance from Town A to Town B?

- A. 2 miles
- B. 2.8 miles
- C. 3.4 miles
- D. 4 miles

Answer _____

Competency 009—The teacher understands the geometric relationships and axiomatic structure of Euclidian geometry.

7. Let $y = \frac{2}{3}x - 5$ be the equation of line ℓ in the xy -plane. Which of the following is perpendicular to ℓ ?

- A. $2x - 3y = 5$
- B. $3x + 2y = 5$
- C. $3x - 2y = 0$
- D. $2x + 3y = 15$

Answer _____

8. Triangle ABC is an obtuse triangle. Which of the following are possible measurements of angles in the triangle ABC ?

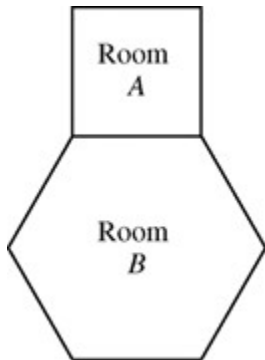
Select all that apply.

- A. $m\angle A = 122^\circ, m\angle B = 43^\circ, m\angle C = 25^\circ$
- B. $m\angle A = 108^\circ, m\angle B = 36^\circ, m\angle C = 36^\circ$
- C. $m\angle A = 90^\circ, m\angle B = 28^\circ, m\angle C = 62^\circ$
- D. $m\angle A = 90^\circ, m\angle B = 45^\circ, m\angle C = 45^\circ$
- E. $m\angle A = 80^\circ, m\angle B = 53^\circ, m\angle C = 47^\circ$
- F. $m\angle A = 54^\circ, m\angle B = 92^\circ, m\angle C = 34^\circ$

Answer _____

Competency 010—The teacher analyzes the properties of two- and three-dimensional figures.

Use the figure below to answer the question that follows.



9. Michael is designing a new home for a customer. The floor of Room B is in the shape of a regular hexagon and will have a perimeter of 72 feet. The floor of Room A is in the shape of a square and will be sharing a wall with Room B as shown. How many square feet of carpet will Michael need to cover the floor of Room A ?

- A. 48 square feet
- B. 120 square feet

- C. 144 square feet
- D. 864 square feet

Answer _____

Competency 012—The teacher understands how to use graphical and numerical techniques to explore data, characterize patterns and describe departures from patterns.

Use the table below to answer the question that follows.

College Graduate	Annual Salary
A	\$36,000
B	\$35,250
C	\$71,555
D	\$34,750
E	\$35,575

10. The table shows five college graduates and the annual salaries they earned during their first year in the workforce. Based on the data given in the table, which of the following statements is true?

- A. The mean is less than the range of the data.
- B. The mean is less than the median of the data.
- C. The range is less than the mean of the data.
- D. The range is less than the median of the data.

Answer _____

Competency 013—The teacher understands the theory of probability.

11. Each face of a number cube is numbered 1, 2, 3, 4, 5 or 6. When the cube is tossed, each number is equally likely to appear face up. The number cube is tossed twice, and the numbers that land face up are recorded. What is the probability that the sum of the two recorded numbers is a prime number?

- A. $\frac{1}{2}$
- B. $\frac{8}{21}$
- C. $\frac{5}{36}$
- D. $\frac{15}{36}$

Answer _____

Competency 016—The teacher understands mathematical connections within and outside of mathematics and how to communicate mathematical ideas and concepts.

12. Students in a mathematics class are using graphing calculators to find the maximum and minimum values of the graph of $f(x) = 2\sin 3x$ on the domain $[0, 2\pi]$. One student reports to the teacher that the calculator is only displaying a straight line. The teacher verifies that the equation has been entered correctly and that the graphing window is correct. Which of the following is the best suggestion for the student in order to see the periodic behavior of the graph of the function over the domain?

- A. Use the Zoom-In function
- B. Check if the calculator is in degree mode or in radian mode
- C. Check if the calculator is in function mode or in polar mode
- D. Check if a StatPlot is on

Answer _____

13. Tammy is applying for a loan to purchase her first home. Her annual salary is \$58,356.00, but the loan officer is asking for her monthly gross income and her monthly net income. If 15 percent of her total income is paid in taxes each month, what are her monthly gross income and her monthly net income? (Gross income is income before taxes. Net income is income after taxes).

- A. Her monthly gross income is \$729.45, and her monthly net income is \$4863.00.
- B. Her monthly gross income is \$4863.00, and her monthly net income is \$729.45.
- C. Her monthly gross income is \$4863.00, and her monthly net income is \$4133.55.
- D. Her monthly gross income is \$4133.55, and her monthly net income is \$4863.00.

Answer _____

Competency 018—The teacher understands how to plan, organize and implement instruction using knowledge of students, subject matter and statewide curriculum (Texas Essential Knowledge and Skills [TEKS]) to teach all students to use mathematics.

14. A teacher provides students with a square sheet of paper for an in-class activity. The teacher asks the students to fold the paper in half, unfold the paper, and color one of the sections created by the fold, and determine what fraction of the paper they colored. The students then refold the paper on the same fold and fold it in half once more. Before unfolding the paper, the teacher asks the class how many sections the paper now has, and how many of those sections will be colored. Which skill is the teacher introducing to the students with the activity?

- A. Modeling fractional quantities greater than 1 using concrete objects and pictorial models
- B. Estimating measurements, including circumference, and evaluating reasonableness of results
- C. Using concrete objects and pictorial models to generate equivalent fractions
- D. Using models to relate decimals to fractions that name tenths, hundredths and thousandths

Answer _____

Preparation Manual

Section 5: Sample Selected-Response Answers and Rationales

Core Subjects 4–8 Subject Exam II—Mathematics Subtest (807)

This section presents some sample exam questions for you to review as part of your preparation for the Subject Exam. To demonstrate how each competency may be assessed, sample questions are accompanied by the competency that they measure. While studying, you may wish to read the competency before and after you consider each sample question. Please note that the competency statements do not appear on the actual exam.

For each sample exam question, there is a correct answer and a rationale for each answer option. The sample questions are included to illustrate the formats and types of questions you will see on the Subject Exam; however, your performance on the sample questions should not be viewed as a predictor of your performance on the actual exam.

The following reference materials will be available to you during the exam:

- Definitions and Formulas (see page 53)

Subject Exam II Sample Questions

Competency 001—The teacher understands the structure of number systems, the development of a sense of quantity and the relationship between quantity and symbolic representations.

1. Indicate whether the following numbers are rational or irrational by checking the appropriate boxes.

Number	Rational	Irrational
$\sqrt{2}$		
$\sqrt{4}$		
$(\sqrt{2})(\sqrt{4})$		
$\sqrt{2} + \sqrt{4}$		

Answer

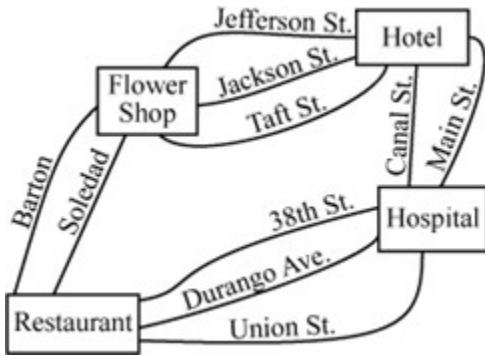
The checked options are correct because $\sqrt{2}$ is irrational, $\sqrt{4} = 2$ is rational, $(\sqrt{2})(\sqrt{4}) = 2\sqrt{2}$ is irrational and $\sqrt{2} + \sqrt{4}$ is irrational.

Number	Rational	Irrational
$\sqrt{2}$		✓
$\sqrt{4}$	✓	
$(\sqrt{2})(\sqrt{4})$		✓
$\sqrt{2} + \sqrt{4}$		✓

The options that are not checked are incorrect.

Competency 003—The teacher understands ideas of number theory and uses numbers to model and solve problems within and outside of mathematics.

Use the figure below to answer the question that follows.



2. Jennifer is a delivery person for a flower shop. Using the map above, how many different routes are there for Jennifer to choose from if she travels from the flower shop to the hotel, then to the hospital, then to the restaurant, and then back to the flower shop?

- A. 6
- B. 10
- C. 18
- D. 36

Answer

Option D is correct because there are three ways to travel from the flower shop to the hotel, two ways to travel from the hotel to the hospital, three ways to travel from the hospital to the restaurant, and two ways to travel from the restaurant back to the flower shop. So by the multiplication rule of counting, $3 \times 2 \times 3 \times 2 = 36$ routes.

Options A, B and C are incorrect because the numbers 3, 2, 3 and 2 are all multiplied to get the number of routes. These numbers are not added together nor are they a subset of the numbers multiplied together.

Competency 004—The teacher understands and uses mathematical reasoning to identify, extend and analyze patterns and understands the relationships among variables, expressions, equations, inequalities, relations and functions.

Use the table below to answer the question that follows.

x	y
6	19
9	28
12	37
15	46

3. Which of the following lines in the xy -plane includes the points in the table shown?

- A. $y = x + 3$
- B. $y = x + 13$
- C. $y = 3x + 1$

D. $y = 3x + 13$

Answer

Option C is correct because the slope of the line described by the information in the table can be found to be $\frac{28 - 19}{9 - 6} = \frac{9}{3} = 3$. The slope-intercept form of the line is $y = 3x + b$, where b is the y -intercept. The value of b can

be found by substituting one of the (x, y) values from the table as follows.

$$19 = 3(6) + b$$

$$19 = 18 + b$$

$$1 = b$$

Substituting the value of b in the equation gives $y = 3x + 1$. **Option A is incorrect** because if $x = 6$ then $y = 9$, which is not in the table. **Option B is incorrect** because if $x = 19$ then $y = 32$, which is not in the table. **Option D is incorrect** because if $x = 6$ then $y = 31$, which is not in the table.

4. Jeb pays \$18 per night for a campsite every time he takes a trip to Palmetto State Park. Last year he camped 4 nights in Palmetto State Park each month. This year he purchased a state park pass for \$70. With his park pass, he receives 50% off 24 nights of camping for the entire year. Let x be the number of nights he will get to camp this year for the amount he spent last year. Which of the following equations could be used to find x ?

A. $0.5(18x) + 70 = 864$

B. $18x - 0.5(24x) + 70 = 864$

C. $18x + 0.5(18)(24) + 70 = 864$

D. $18x - 0.5(18)(24) + 70 = 864$

Answer

Option D is correct because last year Jeb paid \$18 a night for 4 nights a month for all 12 months, which totals \$864. He wants to spend the same amount this year and go camping for x nights at the same rate of \$18 a night. He also pays an additional \$70 for the 24 discounted nights. So his cost is $18x + 70$ dollars minus his discount of $(0.5)(24)(18)$ dollars. **Option A is incorrect** because the discount is only for 24 nights of camping, not for the charge per night. **Option B is incorrect** because the discount is only for 24 nights, and is not dependent on the value of x . **Option C is incorrect** because the application of a discount is obtained by subtraction, not addition.

Competency 006—The teacher understands and uses nonlinear functions and relations to model and solve problems.

Use the functions below to answer the question that follows.

$$g(x) = 3(x - 2)^2 + 5$$

$$h(x) = 3(x - 2)^2 + 9$$

5. How is the graph of h in the xy -plane related to the graph of g ?

A. The graph of h is the graph of g shifted 4 units to the right.

B. The graph of h is the graph of g shifted 4 units to the left.

C. The graph of h is the graph of g shifted 4 units upward.

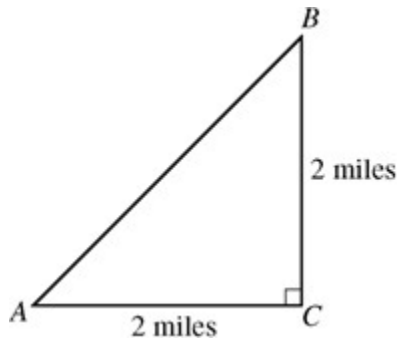
D. The graph of h is the graph of g shifted 4 units downward.

Answer

Option C is correct because functions are shifted upward or downward when constants are added to or subtracted from the original function, respectively. In this case $h(x) = g(x) + 4$ so the graph shifts 4 units upward. **Options A, B and D are incorrect** because $h(x) = g(x) + 4$ and the shift of the graph of g is vertically up, not horizontally left or right or vertically down.

Competency 008—The teacher understands measurement as a process.

Use the figure below to answer the question that follows.



6. Town C is 2 miles east of Town A and 2 miles south of Town B, as in the figure above. Which of the following is the best estimate of the shortest distance from Town A to Town B?

- A. 2 miles
- B. 2.8 miles
- C. 3.4 miles
- D. 4 miles

Answer

Option B is correct because Towns A, B and C create a right triangle with legs of length 2 and 2. The length of the hypotenuse, x , is the distance between A and B, x . By the Pythagorean theorem,

$$x^2 = 2^2 + 2^2$$

$$x^2 = 8$$

$$x = \sqrt{8} \approx 2.8.$$

Another way to obtain the solution is to note that the triangle shown is a 45° – 45° – 90° triangle. The rule of isosceles right triangles is that the hypotenuse has a length of one of the legs times a factor of $\sqrt{2}$, then $2\sqrt{2} \approx 2.8$. **Options A, C and D are incorrect** because the shortest distance between two points in the plane is given by the Pythagorean theorem, the distance of 2 miles is too short, and the distances of 3.4 and 4 miles are longer than the shortest distance between Towns A and B.

Competency 009—The teacher understands the geometric relationships and axiomatic structure of Euclidian geometry.

7. Let $y = \frac{2}{3}x - 5$ be the equation of line ℓ in the xy -plane. Which of the following is perpendicular to ℓ ?

- A. $2x - 3y = 5$
- B. $3x + 2y = 5$
- C. $3x - 2y = 0$
- D. $2x + 3y = 15$

Answer

Option B is correct because the slope of line ℓ is $\frac{2}{3}$ and the slope of a line perpendicular to line ℓ is the opposite of the reciprocal, i.e., $-\frac{3}{2}$. The slope-intercept form of a line perpendicular to line ℓ will be $y = -\frac{3}{2}x + b$, where b is any real number. The only equation, when solved for y , that fits this form is $3x + 2y = 5$. **Option A is incorrect** because the line $2x - 3y = 5$ has slope $\frac{2}{3}$ and is parallel to ℓ . **Option C is incorrect** because the line $3x - 2y = 0$ has slope $\frac{3}{2}$ and is not perpendicular to ℓ . **Option D is incorrect** because the line $2x + 3y = 15$ has slope $-\frac{2}{3}$ and is not perpendicular to ℓ .

8. Triangle ABC is an obtuse triangle. Which of the following are possible measurements of angles in the triangle ABC ?

Select all that apply.

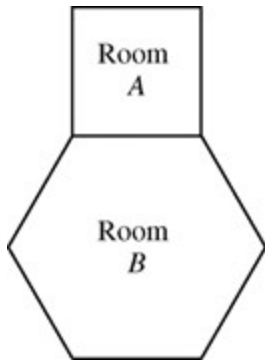
- A. $m\angle A = 122^\circ, m\angle B = 43^\circ, m\angle C = 25^\circ$
- B. $m\angle A = 108^\circ, m\angle B = 36^\circ, m\angle C = 36^\circ$
- C. $m\angle A = 90^\circ, m\angle B = 28^\circ, m\angle C = 62^\circ$
- D. $m\angle A = 90^\circ, m\angle B = 45^\circ, m\angle C = 45^\circ$
- E. $m\angle A = 80^\circ, m\angle B = 53^\circ, m\angle C = 47^\circ$
- F. $m\angle A = 54^\circ, m\angle B = 92^\circ, m\angle C = 34^\circ$

Answer

Options B and F are correct because obtuse triangles contain one angle whose measure is greater than 90 degrees. **Options C, D and E are incorrect** because no angles have measures greater than 90 degrees. **Option A is incorrect** because the sum of the angles is 190 degrees instead of 180 degrees.

Competency 010—The teacher analyzes the properties of two- and three-dimensional figures.

Use the figure below to answer the question that follows.



9. Michael is designing a new home for a customer. The floor of Room *B* is in the shape of a regular hexagon and will have a perimeter of 72 feet. The floor of Room *A* is in the shape of a square and will be sharing a wall with Room *B* as shown. How many square feet of carpet will Michael need to cover the floor of Room *A* ?

- A. 48 square feet
- B. 120 square feet
- C. 144 square feet
- D. 864 square feet

Answer

Option C is correct because Room *B* is a regular hexagon, which means each of the six sides are congruent, and the perimeter is 72 feet. This means that each wall of Room *B* is $\frac{72}{6} = 12$ feet. Because Room *A* is a square and shares a wall with Room *B*, all of the walls in Room *A* are also 12 feet. Then $12^2 = 144$ square feet of carpet will be needed to cover Room *A*'s floor. **Option A is incorrect** because 48 feet is the perimeter, not the area of Room *A*. **Option B is incorrect** because 120 square feet is less than the correct area. **Option D is incorrect** because 864 square feet results from multiplying the two perimeters together (72×12).

Competency 012—The teacher understands how to use graphical and numerical techniques to explore data, characterize patterns and describe departures from patterns.

Use the table below to answer the question that follows.

College Graduate	Annual Salary
A	\$36,000
B	\$35,250
C	\$71,555
D	\$34,750
E	\$35,575

10. The table shows five college graduates and the annual salaries they earned during their first year in the workforce. Based on the data given in the table, which of the following statements is true?

- A. The mean is less than the range of the data.

- B. The mean is less than the median of the data.
- C. The range is less than the mean of the data.
- D. The range is less than the median of the data.

Answer

Option C is correct because the mean is \$42,626, the median is \$35,575 and the range is \$36,805, so the range is less than the mean. **Option A is incorrect** because the mean is greater than the range. **Option B is incorrect** because the mean is greater than the median. **Option D is incorrect** because the range is greater than the median.

Competency 013—The teacher understands the theory of probability.

11. Each face of a number cube is numbered 1, 2, 3, 4, 5 or 6. When the cube is tossed, each number is equally likely to appear face up. The number cube is tossed twice, and the numbers that land face up are recorded. What is the probability that the sum of the two recorded numbers is a prime number?

- A. $\frac{1}{2}$
- B. $\frac{8}{21}$
- C. $\frac{5}{36}$
- D. $\frac{15}{36}$

Answer

Option D is correct because there are five prime numbers between 1 and 12: 2, 3, 5, 7 and 11. There are 36 total outcomes of the two tosses, and in 15 of the tosses the sum of the two recorded numbers will be a prime number.

$$\begin{aligned}
 1 + 1 &= 2 & 2 + 3 &= 5 & 4 + 3 &= 7 \\
 1 + 2 &= 3 & 2 + 5 &= 7 & 5 + 2 &= 7 \\
 1 + 4 &= 5 & 3 + 2 &= 5 & 5 + 6 &= 11 \\
 1 + 6 &= 7 & 3 + 4 &= 7 & 6 + 1 &= 7 \\
 2 + 1 &= 3 & 4 + 1 &= 5 & 6 + 5 &= 11
 \end{aligned}$$

Option A is incorrect because $\frac{1}{2}$ is the probability that the sum of the two recorded numbers is odd, and not every odd number is prime. **Option B is incorrect** because the denominator should be the number of total possible outcomes, which is 36. A denominator of 21 represents the number of outcomes if the order of outcomes is not accounted for as different outcomes (e.g., if a roll of a 4 and then a 3, or a 3 and then a 4 is counted as one outcome instead of two). Eight is the amount of times the sum is prime if only these 21

outcomes are considered. **Option C is incorrect** because even though there are five prime numbers between 1 and 12, there is more than one way to generate a prime as the sum of the two recorded numbers.

Competency 016—The teacher understands mathematical connections within and outside of mathematics and how to communicate mathematical ideas and concepts.

12. Students in a mathematics class are using graphing calculators to find the maximum and minimum values of the graph of $f(x) = 2\sin 3x$ on the domain $[0, 2\pi]$. One student reports to the teacher that the calculator is only displaying a straight line. The teacher verifies that the equation has been entered correctly and that the graphing window is correct. Which of the following is the best suggestion for the student in order to see the periodic behavior of the graph of the function over the domain?

- A. Use the Zoom-In function
- B. Check if the calculator is in degree mode or in radian mode
- C. Check if the calculator is in function mode or in polar mode
- D. Check if a StatPlot is on

Answer

Option B is correct because viewing the function $f(x) = 2\sin 3x$ in degrees mode would stretch one period of the function to 120 degrees. Restricting the domain to $[0, 2\pi]$ limits the graphing window to display a part of the graph that resembles a linear function. If the mode is changed to radians, the period of the function will be $\frac{2\pi}{3}$, and the window will display 3 full periods of the curve. **Option A is incorrect** because zooming in on the graph will not allow the student to see the required features of the graph. **Option C is incorrect** because the teacher has already checked that the equation has been entered correctly in function mode. **Option D is incorrect** because a StatPlot being on might result in an error when trying to graph simultaneously with a function, but this will not change the view of the function being graphed.

13. Tammy is applying for a loan to purchase her first home. Her annual salary is \$58,356.00, but the loan officer is asking for her monthly gross income and her monthly net income. If 15 percent of her total income is paid in taxes each month, what are her monthly gross income and her monthly net income? (Gross income is income before taxes. Net income is income after taxes).

- A. Her monthly gross income is \$729.45, and her monthly net income is \$4863.00.
- B. Her monthly gross income is \$4863.00, and her monthly net income is \$729.45.
- C. Her monthly gross income is \$4863.00, and her monthly net income is \$4133.55.
- D. Her monthly gross income is \$4133.55, and her monthly net income is \$4863.00.

Answer

Option C is correct because Tammy's monthly gross income equals her annual salary divided by 12, which is \$4863. Because her taxes are 15 percent of her income, her monthly net income equals the remaining 85 percent, which is \$4133.55. **Option A is incorrect** because \$729.45 is the amount of Tammy's taxes each month and \$4863 is her monthly gross income. **Option B is incorrect** because \$729.45 is the amount of Tammy's taxes each month, not her monthly net income. **Option D is incorrect** because the values for the monthly gross and monthly net incomes are switched.

Competency 018—The teacher understands how to plan, organize and implement instruction using knowledge of students, subject matter and statewide curriculum (Texas Essential Knowledge and Skills [TEKS]) to teach all students to use mathematics.

14. A teacher provides students with a square sheet of paper for an in-class activity. The teacher asks the students to fold the paper in half, unfold the paper, and color one of the sections created by the fold, and determine what fraction of the paper they colored. The students then refold the paper on the same fold and fold it in half once more. Before unfolding the paper, the teacher asks the class how many sections the paper now has, and how many of those sections will be colored. Which skill is the teacher introducing to the students with the activity?

- A. Modeling fractional quantities greater than 1 using concrete objects and pictorial models
- B. Estimating measurements, including circumference, and evaluating reasonableness of results
- C. Using concrete objects and pictorial models to generate equivalent fractions
- D. Using models to relate decimals to fractions that name tenths, hundredths and thousandths

Answer

Option C is correct because when the original coloring of the paper is done, $\frac{1}{2}$ of the paper is colored. Then

after the next fold, $\frac{2}{4}$ of the paper is colored, but no additional coloring was added or removed. This

demonstrates that $\frac{1}{2} = \frac{2}{4}$. **Option A is incorrect** because in the activity, the subdivisions of one unit are

created, not quantities greater than one. **Option B is incorrect** because the activity models fractions not

measurements or circumference. **Option D is incorrect** because the fractions modeled are halves and fourths, not tenths, hundredths or thousandths.

Preparation Manual

Section 6: Sample Selected-Response Questions Core Subjects 4–8 Subject Exam III—Social Studies Subtest (808)

This section presents some sample exam questions for you to review as part of your preparation for the Subject Exam. To demonstrate how each competency may be assessed, sample questions are accompanied by the competency that they measure. While studying, you may wish to read the competency before and after you consider each sample question. Please note that the competency statements do not appear on the actual exam.

For each sample exam question, there is a correct answer and a rationale for each answer option. The sample questions are included to illustrate the formats and types of questions you will see on the Subject Exam; however, your performance on the sample questions should not be viewed as a predictor of your performance on the actual exam.

Subject Exam III Sample Questions

Competency 001—(History): The teacher understands and applies knowledge of significant historical events and developments, multiple historical interpretations and ideas and relationships between the past, the present and the future, as defined by the Texas Essential Knowledge and Skills (TEKS).

1. Sam Houston was removed from office as governor of Texas for which of the following reasons?
- A He opposed the secession of Texas from the Union.
 - B He was in office during a severe financial crisis that crippled the Texas economy.
 - C He disagreed completely with Radical Republicans over the abolition of slavery in Texas.
 - D He obtained a military commission to command a group of Texas Rangers during the U.S.-Mexican War.

Answer _____

2. In the 1790s, Spain discouraged the illegal immigration of Anglo Americans to Texas because Spain was concerned that they would
- A take jobs on farms and ranches from the Spanish settlers.
 - B disrupt the relationship between Spanish settlers and American Indians in the region.
 - C provoke the Spanish settlers to revolt and declare their independence from Spain.
 - D deplete, pollute or destroy the natural resources of Texas.

Answer _____

3. Which of the following was the main objection of the Anti-Federalists to the United States Constitution?
- A Under the proposed Constitution, Congress would not have enough power to control the states.
 - B The proposed Constitution did not contain a bill of rights.
 - C The proposed Constitution contained no mention of religious observances.

- D. Under the proposed Constitution, the Supreme Court would not be able to overturn state laws as unconstitutional.

Answer _____

4. In addition to being a leader in the Civil Rights movement, Barbara Jordan of Houston, Texas, is widely known for which of the following?

Select all that apply.

- A. Becoming the first African American to serve as lieutenant governor of Texas
- B. Being the first woman elected to represent Texas in the United States House of Representatives
- C. Being nominated as a presidential candidate at the 1976 Democratic National Convention
- D. Becoming the first African American to serve in the Texas state senate since 1883

Answer _____

5. Southern states attempted to limit the voting power of African Americans during the 1870s in which of the following ways?

- A. They mandated poll taxes and literacy requirements for voting privileges.
- B. They required citizens to own property to vote in elections.
- C. They dramatically reduced the number of polling places.
- D. They revoked the citizenship of many African Americans.

Answer _____

Competency 002—(Geography): The teacher understands and applies knowledge of geographic relationships involving people, places and environments in Texas, the United States and the world, as defined by the Texas Essential Knowledge and Skills (TEKS).

6. A primary contributing factor in the development of major urban centers in Houston, the Dallas–Fort Worth area, and New Orleans was

- A. the location of each city along major transportation routes.
- B. the temperate climates of the areas throughout the year.
- C. the fertility of the soil in the areas.
- D. each city's origin as a military outpost.

Answer _____

7. The emergence of early agricultural civilizations along river valleys suggests that

- A. the success of democratic societies gave rise to market-based civilizations.
- B. the development of complex civilizations was based on peaceful interactions.
- C. understanding the environment was a primary factor in the survival of early civilizations.
- D. preserving valuable resources was a primary factor in the success of farming societies.

Answer _____

Competency 003—(Economics): The teacher understands and applies knowledge of economic systems and how people organize economic systems to produce, distribute and consume goods and services, as defined by the Texas Essential Knowledge and Skills (TEKS).

8. Which of the following hypothetical situations best illustrates for students in grades 5 and 6 the core economic principle that people respond to incentives in predictable ways?

- A Bud must pay the library fine before his borrowing privileges are restored.
- B Suzie donates some of her birthday money to help build an Afghan school.
- C Charlie can buy a DVD or download a book using his allowance, but he cannot do both.
- D Grace willingly takes on more responsibilities at home when her allowance is increased.

Answer _____

Competency 004—(Government and Citizenship): The teacher understands and applies knowledge of government, democracy and citizenship, including ways in which individuals and groups achieve their goals through political systems, as defined by the Texas Essential Knowledge and Skills (TEKS).

9. From which of the following sources do independent school districts in Texas get most of their funding?

- A Local property taxes
- B State sales taxes
- C Federal funds
- D State income taxes

Answer _____

10. Which of the following best describes the form of government of the Roman Republic?

- A Legislative representatives were elected by the citizens and subject to term limits in order to prevent corruption.
- B Citizens who had completed military service voted directly on pending legislation.
- C Governmental power was highly centralized in coequal legislative, executive and judicial branches.
- D The appointed members of the senate met frequently to pass advisory decrees to more powerful local magistrates.

Answer _____

11. Which of the following philosophical positions is most commonly associated with the Declaration of Independence?

- A Locke's argument that governments should protect individual rights
- B Rousseau's argument that social contracts are the basis of a government's legitimacy
- C Hobbes's argument that strong central governments are necessary to prevent violence
- D Montesquieu's argument for separating the powers of government into different branches

Answer _____

Competency 005—(Culture; Science, Technology and Society): The teacher understands and applies knowledge of cultural development, adaptation and diversity and understands and applies knowledge of interactions among science, technology and society, as defined by the Texas Essential Knowledge and Skills (TEKS).

Read the paragraph and answer the following question.

During the late 1800s, a group of education reformers began a movement to educate Native Americans. They built boarding schools in which Native American children were taught English and various aspects of American social behavior. The children were forbidden to speak their native languages or wear their native clothing. The intention of these schools was to educate Native American children so that they could integrate into the dominant American culture and economy.

12. The placement of American Indian children in boarding schools best illustrates an attempt at
- A relocation diffusion.
 - B cultural pluralism.
 - C cultural assimilation.
 - D cultural diffusion.

Answer _____

13. Oil discoveries, such as the one at Spindletop in 1901, affected the development of Texas in which of the following ways?
- A The number of large corporations began to increase as petroleum-based products became popular.
 - B The average employment wage began to fall because of the high demand for oil workers.
 - C The federal funding for school systems and public services was reduced because of oil profits.
 - D The size of the workforce began to decrease as migrant workers sought jobs outside the state.

Answer _____

Competency 006—(Social Studies Foundations and Skills): The teacher understands the foundations of social studies education and applies knowledge of skills used in the social sciences.

14. An engraving made by Paul Revere depicts British soldiers attacking unarmed colonists during the Boston Massacre. Which of the following best explains why some viewers might consider the engraving to be biased?
- A The engraving does not reflect other events of the American Revolution.
 - B The event illustrated in the engraving reflects only one side of the story.
 - C King George III reacted apologetically to the events depicted in the engraving.
 - D Most colonists believed that the British troops had a right to protect themselves.

Answer _____

Preparation Manual

Section 6: Sample Selected-Response Answers and Rationales

Core Subjects 4–8 Subject Exam III—Social Studies Subtest (808)

This section presents some sample exam questions for you to review as part of your preparation for the Subject Exam. To demonstrate how each competency may be assessed, sample questions are accompanied by the competency that they measure. While studying, you may wish to read the competency before and after you consider each sample question. Please note that the competency statements do not appear on the actual exam.

For each sample exam question, there is a correct answer and a rationale for each answer option. The sample questions are included to illustrate the formats and types of questions you will see on the Subject Exam; however, your performance on the sample questions should not be viewed as a predictor of your performance on the actual exam.

Subject Exam III Sample Questions

Competency 001—(History): The teacher understands and applies knowledge of significant historical events and developments, multiple historical interpretations and ideas and relationships between the past, the present and the future, as defined by the Texas Essential Knowledge and Skills (TEKS).

1. Sam Houston was removed from office as governor of Texas for which of the following reasons?
 - A He opposed the secession of Texas from the Union.
 - B He was in office during a severe financial crisis that crippled the Texas economy.
 - C He disagreed completely with Radical Republicans over the abolition of slavery in Texas.
 - D He obtained a military commission to command a group of Texas Rangers during the U.S.-Mexican War.

Answer

Option A is correct because Sam Houston was a Unionist who became unpopular among his constituents who supported Texas annexation. The Secession Convention of 1861 convened and began a series of actions that withdrew Texas from the Union. When Houston refused to take the oath of loyalty to the newly formed Confederate States of America, the Texas Secession Convention removed him from office on March 16 and two days later replaced him with Lieutenant Governor Edward Clark. **Option B is incorrect** because this was true of Mirabeau Lamar, president of the Republic of Texas (Lamar was not, however, asked to leave office). **Option C is incorrect** because although Houston was not a supporter of the institution of slavery, he himself owned slaves. **Option D is incorrect** because it is true of the first governor of Texas, James Pinckney Henderson, who left office for a brief period during the war but was not asked to relinquish his power.

2. In the 1790s, Spain discouraged the illegal immigration of Anglo Americans to Texas because Spain was concerned that they would
 - A take jobs on farms and ranches from the Spanish settlers.
 - B disrupt the relationship between Spanish settlers and American Indians in the region.

- C. provoke the Spanish settlers to revolt and declare their independence from Spain.
- D. deplete, pollute or destroy the natural resources of Texas.

Answer

Option B is correct because during the 1790s, the Spanish began to discourage the illegal immigration of Anglo settlers to Texas; attempts at peaceful relations made by Spanish missionaries and American Indians were often disrupted by American settlers seeking land. **Option A is incorrect** because American settlers did not often take farmland away from Spanish settlers. **Option C is incorrect** because American settlers did not cause the Mexican Revolution. **Option D is incorrect** because the depletion of natural resources was not documented during the eighteenth century and it is very unlikely that such an observation would be made.

3. Which of the following was the main objection of the Anti-Federalists to the United States Constitution?

- A. Under the proposed Constitution, Congress would not have enough power to control the states.
- B. The proposed Constitution did not contain a bill of rights.
- C. The proposed Constitution contained no mention of religious observances.
- D. Under the proposed Constitution, the Supreme Court would not be able to overturn state laws as unconstitutional.

Answer

Option B is correct because Anti-Federalists feared that the United States Constitution granted the federal government too much power and that a bill of rights was needed to protect individual citizens. **Option A is incorrect** because this was not the major argument against the Constitution, as the Constitution accorded less power to the states than did the Articles of Confederation. **Option C is incorrect** because although freedom of religion is an individual right, it was not the Anti-Federalists' main objection to the Constitution. **Option D is incorrect** because the Supreme Court had this power under the Constitution.

4. In addition to being a leader in the Civil Rights movement, Barbara Jordan of Houston, Texas, is widely known for which of the following?

Select all that apply.

- A. Becoming the first African American to serve as lieutenant governor of Texas
- B. Being the first woman elected to represent Texas in the United States House of Representatives
- C. Being nominated as a presidential candidate at the 1976 Democratic National Convention
- D. Becoming the first African American to serve in the Texas state senate since 1883

Answer

Options B and D are correct because Barbara Jordan served as the first female representative in Congress from 1973 to 1979. Jordan was also the first twentieth-century African American to serve in the Texas state senate from 1967 to 1973. **Option A is incorrect** because Barbara Jordan did not serve as lieutenant governor in Texas. **Option C is incorrect** because she was not nominated as a presidential candidate but was considered as a possible running mate to Jimmy Carter in 1976.

5. Southern states attempted to limit the voting power of African Americans during the 1870s in which of the following ways?

- A They mandated poll taxes and literacy requirements for voting privileges.
- B They required citizens to own property to vote in elections.
- C They dramatically reduced the number of polling places.
- D They revoked the citizenship of many African Americans.

Answer

Option A is correct because, as a reaction to the Reconstruction era, many former Confederate states mandated literacy tests and poll taxes in an attempt to prevent African Americans from voting in elections.

Option B is incorrect because land ownership mandates had been mostly eradicated during the Jacksonian era. Additionally, many White voters did not own property. **Option C is incorrect** because, while states may have in several ways made it difficult for African Americans to vote, they did not drastically reduce the number of polling places. **Option D is incorrect** because citizenship was not revoked based on the basis of race or ethnicity.

Competency 002—(Geography): The teacher understands and applies knowledge of geographic relationships involving people, places and environments in Texas, the United States and the world, as defined by the Texas Essential Knowledge and Skills (TEKS).

6. A primary contributing factor in the development of major urban centers in Houston, the Dallas–Fort Worth area, and New Orleans was

- A the location of each city along major transportation routes.
- B the temperate climates of the areas throughout the year.
- C the fertility of the soil in the areas.
- D each city's origin as a military outpost.

Answer

Option A is correct because the primary contributing factor in the development of these cities was that they were located along major transportation routes. The introduction of railroads and other transport innovations increased the numbers of people and products and the amount of capital entering the areas, which supported their development. **Option B is incorrect** because although climate can be an important factor in the settlement of regions, the development of urban centers is not as closely dependent on temperate climates. **Option C is incorrect** because major urban development is not dependent on the quality of soil. **Option D is incorrect** because not all of these cities were originally military locations.

7. The emergence of early agricultural civilizations along river valleys suggests that

- A the success of democratic societies gave rise to market-based civilizations.
- B the development of complex civilizations was based on peaceful interactions.
- C understanding the environment was a primary factor in the survival of early civilizations.
- D preserving valuable resources was a primary factor in the success of farming societies.

Answer

Option C is correct because the earliest civilizations depended on detailed knowledge of their environments for survival and growth. **Option A is incorrect** because early river-valley civilizations are not believed to have had democratic forms of government. **Option B is incorrect** because in many cases the development of civilizations coincided with periods of warfare and unrest. **Option D is incorrect** because the preservation of natural resources is a modern concept that is not likely to have been held by early river-valley civilizations.

Competency 003—(Economics): The teacher understands and applies knowledge of economic systems and how people organize economic systems to produce, distribute and consume goods and services, as defined by the Texas Essential Knowledge and Skills (TEKS).

8. Which of the following hypothetical situations best illustrates for students in grades 5 and 6 the core economic principle that people respond to incentives in predictable ways?

- A. Bud must pay the library fine before his borrowing privileges are restored.
- B. Suzie donates some of her birthday money to help build an Afghan school.
- C. Charlie can buy a DVD or download a book using his allowance, but he cannot do both.
- D. Grace willingly takes on more responsibilities at home when her allowance is increased.

Answer

Option D is correct because, in this situation, Grace responds positively to the prospect of being rewarded for extra work. The incentive is that her work will earn her more money. **Option A is incorrect** because forcing Bud to pay a library fee before he can borrow another book is not an economic incentive for him to continue visiting the library. **Option B is incorrect** because Suzie is not rewarded for her good deed economically. While Suzie donates money for a good cause, there is no economic incentive for this action. **Option C is incorrect** because this situation displays opportunity cost and no economic incentives. The opportunity cost of Charlie buying a DVD is that he will then not be able to afford the book.

Competency 004—(Government and Citizenship): The teacher understands and applies knowledge of government, democracy and citizenship, including ways in which individuals and groups achieve their goals through political systems, as defined by the Texas Essential Knowledge and Skills (TEKS).

9. From which of the following sources do independent school districts in Texas get most of their funding?

- A. Local property taxes
- B. State sales taxes
- C. Federal funds
- D. State income taxes

Answer

Option A is correct because local property tax revenue is the largest source of funding for independent school districts in the state of Texas. **Option B is incorrect** because state sales taxes do not contribute to school funding in Texas. **Option C is incorrect** because, while federal funds do contribute to public school funding, the

majority of the funding is sourced by property taxes on the local level. **Option D is incorrect** because there is no Texas state income tax in effect.

10. Which of the following best describes the form of government of the Roman Republic?

- A. Legislative representatives were elected by the citizens and subject to term limits in order to prevent corruption.
- B. Citizens who had completed military service voted directly on pending legislation.
- C. Governmental power was highly centralized in coequal legislative, executive and judicial branches.
- D. The appointed members of the senate met frequently to pass advisory decrees to more powerful local magistrates.

Answer

Option D is correct because, under the Roman constitution, de facto power was exercised largely by senators who instructed magistrates and other officials on policy. **Option A is incorrect** because legislative representatives such as senators were not elected by the people. **Option B is incorrect** because, while citizens did need to fulfill certain duties to achieve such status, they did not vote directly on pending legislation. **Option C is incorrect** because the powers of government were not divided in this fashion in the Roman Republic.

11. Which of the following philosophical positions is most commonly associated with the Declaration of Independence?

- A. Locke's argument that governments should protect individual rights
- B. Rousseau's argument that social contracts are the basis of a government's legitimacy
- C. Hobbes's argument that strong central governments are necessary to prevent violence
- D. Montesquieu's argument for separating the powers of government into different branches

Answer

Option A is correct because John Locke's argument published in *Two Treatises of Government* served as an influential basis for the Declaration of Independence; many passages in the declaration draw heavily upon Locke's work. **Option B is incorrect**, as Rousseau's theory of the social contract was not directly related to the Declaration of Independence. **Option C is incorrect** because Hobbes's argument for strong central governments is contradictory to the message of the Declaration of Independence. **Option D is incorrect** because Montesquieu's argument for the separation of government powers was a major influence on the United States Constitution, not the Declaration of Independence.

Competency 005—(Culture; Science, Technology and Society): The teacher understands and applies knowledge of cultural development, adaptation and diversity and understands and applies knowledge of interactions among science, technology and society, as defined by the Texas Essential Knowledge and Skills (TEKS).

Read the paragraph and answer the following question.

During the late 1800s, a group of education reformers began a movement to educate Native Americans. They built boarding schools in which Native American children were taught English and various aspects of American social behavior. The children were forbidden to speak their native languages or wear their

native clothing. The intention of these schools was to educate Native American children so that they could integrate into the dominant American culture and economy.

12. The placement of American Indian children in boarding schools best illustrates an attempt at
- A relocation diffusion.
 - B cultural pluralism.
 - C cultural assimilation.
 - D cultural diffusion.

Answer

Option C is correct because the placement of American Indian children in boarding schools is an example of cultural assimilation, which is the adaptation of an individual or group to new cultural surroundings. **Option A is incorrect** because “relocation diffusion” refers to the spread of culture through the physical movement or migration of a people from one location to another. **Option B is incorrect** because the American Indian children are being taught to assimilate to American culture. They are not being allowed to simultaneously maintain their culture within the context of a new society. **Option D is incorrect** because “cultural diffusion” refers to the spread of culture among populations. The example of the Native American children in the boarding schools does not suggest that the two cultures are intermingling.

13. Oil discoveries, such as the one at Spindletop in 1901, affected the development of Texas in which of the following ways?
- A The number of large corporations began to increase as petroleum-based products became popular.
 - B The average employment wage began to fall because of the high demand for oil workers.
 - C The federal funding for school systems and public services was reduced because of oil profits.
 - D The size of the workforce began to decrease as migrant workers sought jobs outside the state.

Answer

Option A is correct because with the discovery of oil at Spindletop in 1901, the Texas economy began to develop at an increasing rate. Companies began to search for more oil deposits, refineries began to process the crude oil and new petroleum-based products were developed by manufacturers. This led to the success of major corporations in Texas that are still in existence today. **Option B is incorrect** because the demand for oil workers did not have a significant effect on the wage of oil workers. **Option C is incorrect** because the funding of public school systems was not dependent on the oil profits made by private companies. **Option D is incorrect** because migrant workers more likely sought jobs within Texas because of the high demand for labor.

Competency 006—(Social Studies Foundations and Skills): The teacher understands the foundations of social studies education and applies knowledge of skills used in the social sciences.


14. An engraving made by Paul Revere depicts British soldiers attacking unarmed colonists during the Boston Massacre. Which of the following best explains why some viewers might consider the engraving to be biased?
- A The engraving does not reflect other events of the American Revolution.
 - B The event illustrated in the engraving reflects only one side of the story.

- C. King George III reacted apologetically to the events depicted in the engraving.
- D. Most colonists believed that the British troops had a right to protect themselves.

Answer

Option B is correct because Paul Revere's engraving of the Boston Massacre depicts only one view of the event: the exact moment when British soldiers fired upon American colonists. The engraving was specifically tailored to promote the cause of achieving greater independence from colonial rule. **Option A is incorrect** because, although the engraving only depicts one event, this would not necessarily suggest bias. **Option C is incorrect** because King George III did not react apologetically. **Option D is incorrect** because there was not a popular belief that British troops had the right to protect themselves.

This reference material will also be available to you during the exam. To access it, click on the

 icon located in the lower-left corner of the screen.

PERIODIC TABLE OF THE ELEMENTS

1 1A												18 8A					
1 H 1.01	2 2A											13 3A	14 4A	15 5A	16 6A	17 7A	2 He 4.00
3 Li 6.94	4 Be 9.01											5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18
11 Na 23.0	12 Mg 24.3	3 3B	4 4B	5 5B	6 6B	7 7B	8 8B	9 8B	10 8B	11 1B	12 2B	13 Al 27.0	14 Si 28.1	15 P 31.0	16 S 32.1	17 Cl 35.5	18 Ar 39.9
19 K 39.1	20 Ca 40.1	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.7	29 Cu 63.5	30 Zn 65.4	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.9	36 Kr 83.8
37 Rb 85.5	38 Sr 87.6	39 Y 88.9	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc (98.9)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3
55 Cs 132.9	56 Ba 137.3	57–71	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra (226)	89–103	104 Rf (261)	105 Db (262)	106 Sg (266)	107 Bh (264)	108 Hs (277)	109 Mt (268)	110 Ds (271)	111 Rg (282)	112 Cn (285)	113 Nh (286)	114 Fl (289)	115 Mc (289)	116 Lv (293)	117 Ts (294)	118 Og (294)

Lanthanide Series	57 La 138.9	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (145)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0
Actinide Series	89 Ac (227)	90 Th 232.0	91 Pa 231.0	92 U 238.0	93 Np (237)	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (258)	102 No (259)	103 Lr (262)

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Section 7: Sample Selected-Response Questions Core Subjects 4–8 Subject Exam IV—Science Subtest (809)

This section presents some sample exam questions for you to review as part of your preparation for the Subject Exam. To demonstrate how each competency may be assessed, sample questions are accompanied by the competency that they measure. While studying, you may wish to read the competency before and after you consider each sample question. Please note that the competency statements do not appear on the actual exam.

For each sample exam question, there is a correct answer and a rationale for each answer option. The sample questions are included to illustrate the formats and types of questions you will see on the Subject Exam; however, your performance on the sample questions should not be viewed as a predictor of your performance on the actual exam.

The following reference materials will be available to you during the exam:

- Periodic Table (see page 80)

Subject Exam IV Sample Questions

Competency 002—The teacher understands the correct use of tools, materials, equipment and technologies.

1. Which of the following is a unit of energy?

- A. Degree Celsius
- B. Joule
- C. Light-year
- D. Newton

Answer _____

Competency 003—The teacher understands the process of scientific inquiry and the history and nature of science.

2. Of the following, which is an example of a hypothesis that may be tested in the classroom?

- A. Nearly all elements are solids at room temperature.
- B. Solid is a state of matter.
- C. The particles in a solid substance are tightly packed and vibrate in place.
- D. The rate of dissolving of a solid substance in a liquid is faster for a powdered form of the solid than for solid chunks.

Answer _____

Competency 004—The teacher understands how science impacts the daily lives of students and interacts with and influences personal and societal decisions.

3. Which of the following are generally considered nonrenewable energy resources?

Select all that apply.

- A. Coal
- B. Petroleum
- C. Wind
- D. Natural gas

Answer _____

Competency 006—The teacher understands forces and motion and their relationships.

4. A cyclist is riding at a constant velocity of 20 km/h. Assuming air resistance and friction are a total of 20 N and are the only forces acting in the backward direction, the forward force produced by the pedaling of the cyclist is

- A. zero.
- B. less than 20 N but greater than zero.
- C. equal to 20 N.
- D. greater than 20 N.

Answer _____

Competency 008—The teacher understands chemical properties of and changes in matter.

5. A bond that results from the attraction between positively and negatively charged ions is called

- A. a covalent bond.
- B. a hydrogen bond.
- C. an ionic bond.
- D. a metallic bond.

Answer _____

Competency 009—The teacher understands energy and interactions between matter and energy.

6. As the beam from a flashlight enters a swimming pool, the beam of light bends. The phenomenon is an example of

- A. absorption.
- B. polarization.
- C. refraction.
- D. reflection.

Answer _____

Competency 011—The teacher understands the structure and function of living things.

7. Which of the following correctly pairs the organic molecules with their building blocks?

- A. Proteins—amino acids
- B. Fats—nucleotides
- C. Carbohydrates—fatty acids
- D. DNA—simple sugars

Answer _____

Competency 012—The teacher understands reproduction and the mechanisms of heredity.

8. Which of the following is a sexual form of reproduction?

- A. Production of spores
- B. Binary fission
- C. Budding
- D. Fertilization

Answer _____

Competency 013—The teacher understands adaptations of organisms and the theory of evolution.

9. Which of the following is an adaptation that enabled animals to move from living in the ocean to living on land?

- A. A heart with two chambers
- B. A covering of scales
- C. Cartilage for support
- D. An egg with a hard shell and an amniotic sac

Answer _____

Competency 014—The teacher understands regulatory mechanisms and behavior.

10. Of the following, which is the most likely human response to a decrease in environmental temperature?

- A. Leaching of calcium from long bones
- B. Decreased metabolic heat production
- C. Decreased blood flow to the extremities
- D. Increased rate of perspiration

Answer _____

Competency 017—The teacher understands cycles in Earth systems.

11. Which of the following parts of the water cycle is most involved in cloud formation?

- A. Infiltration
- B. Condensation
- C. Transpiration
- D. Sublimation

Answer _____

Competency 018—The teacher understands the role of energy in weather and climate.

12. More solar energy reaches Earth's equatorial regions than Earth's polar regions because the equatorial regions

- A. have more vegetation to absorb sunlight.
- B. have a greater percentage of surface covered by land.
- C. have days with more hours of light.
- D. receive the Sun's rays that are closest to vertical.

Answer _____

Competency 022—The teacher understands the process of scientific inquiry and its role in science instruction.

13. Which of the following is an example of how a teacher can incorporate inquiry-based instruction into a science lesson on the environment?

- A. The teacher has students watch a video on ecosystems and write down key vocabulary terms.
- B. The teacher has student groups build a diorama of different ecosystems and label the biotic and abiotic components of that ecosystem.
- C. The teacher has students perform an activity where they simulate an oil spill in a container and use various methods and materials to clean it up and determine the effectiveness of each.
- D. The teacher has students write a persuasive essay on the importance of water conservation.

Answer _____

Competency 023—The teacher knows the varied and appropriate assessments and assessment practices to monitor science learning in laboratory, field and classroom settings.

14. Of the following, which is the most useful way to assess student misconceptions about density prior to a unit on density?

- A. Giving students a quiz on how to calculate densities
- B. Having an activity during which students weigh several objects
- C. Holding a class discussion about density
- D. Asking each student to predict the relative densities of several objects

Answer _____

Preparation Manual

Section 7: Sample Selected-Response Answers and Rationales

Core Subjects 4–8 Subject Exam IV—Science Subtest (809)

This section presents some sample exam questions for you to review as part of your preparation for the Subject Exam. To demonstrate how each competency may be assessed, sample questions are accompanied by the competency that they measure. While studying, you may wish to read the competency before and after you consider each sample question. Please note that the competency statements do not appear on the actual exam.

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The following reference materials will be available to you during the exam:

- Periodic Table (see page 80)

Subject Exam IV Sample Questions

Competency 002—The teacher understands the correct use of tools, materials, equipment and technologies.

1. Which of the following is a unit of energy?

- A. Degree Celsius
- B. Joule
- C. Light-year
- D. Newton

Answer

Option B is correct because a joule is a derived unit of energy equivalent to $\text{kg}\cdot\text{m}^2/\text{s}^2$. **Option A is incorrect** because a degree Celsius is a unit of measurement for temperature. **Option C is incorrect** because a light-year is an astronomical unit of length equal to the distance light travels in a vacuum in one year. **Option D is incorrect** because a newton is a derived unit of force equivalent to $\text{kg}\cdot\text{m}/\text{s}^2$.

Competency 003—The teacher understands the process of scientific inquiry and the history and nature of science.

2. Of the following, which is an example of a hypothesis that may be tested in the classroom?

- A. Nearly all elements are solids at room temperature.
- B. Solid is a state of matter.
- C. The particles in a solid substance are tightly packed and vibrate in place.
- D. The rate of dissolving of a solid substance in a liquid is faster for a powdered form of the solid than for solid chunks.

Answer

Option D is correct because it is a hypothesis that may be tested in the classroom. Appropriate solid substances are available in different forms and the rate of dissolving is easily measurable in a classroom setting. **Option A is incorrect** because the statement is an observation. **Option B is incorrect** because it is a classification of matter. **Option C is incorrect** because although it is a hypothesis, it would be difficult to test the hypothesis in the classroom.

Competency 004—The teacher understands how science impacts the daily lives of students and interacts with and influences personal and societal decisions.

3. Which of the following are generally considered nonrenewable energy resources?

Select all that apply.

- A. Coal
- B. Petroleum
- C. Wind
- D. Natural gas

Answer

Options A, B and D are correct because coal, petroleum and natural gas are finite resources that are depleted at a much faster rate than the rate at which they are formed. Coal is a carbon-rich rock formed by the slow conversion of plant materials under high pressure and high temperature over a very long period of time. Petroleum is formed from the conversion of large quantities of plankton under high pressure and high temperature over a very long period of time. Natural gas is a product of the conversion of deposits of organic materials that form coal or petroleum over a very long period of time. **Option C is incorrect** because wind is a renewable energy resource that cannot be depleted. Modern wind turbines convert the mechanical energy from the wind to electrical energy using an electric generator.

Competency 006—The teacher understands forces and motion and their relationships.

4. A cyclist is riding at a constant velocity of 20 km/h. Assuming air resistance and friction are a total of 20 N and are the only forces acting in the backward direction, the forward force produced by the pedaling of the cyclist is

- A. zero.
- B. less than 20 N but greater than zero.
- C. equal to 20 N.
- D. greater than 20 N.

Answer

Option C is correct because the cyclist is riding at a constant velocity, so the net force on the cyclist must be zero. Therefore, the magnitude of the forward force produced by the cyclist is equal to the magnitude of the backward forces of air resistance and friction, which is 20 N. **Option A is incorrect** because if the forward force is zero and the backward forces are 20 N, the cyclist would be slowing down and the velocity would not be constant. **Option B is incorrect** because if the forward force is less than 20 N but greater than zero and the

backward forces are 20 N, the cyclist would be slowing down and the velocity would not be constant. **Option D is incorrect** because if the forward force is greater than 20 N and the backward forces are 20 N, the cyclist would be speeding up and the velocity would not be constant.

Competency 008—The teacher understands chemical properties of and changes in matter.

5. A bond that results from the attraction between positively and negatively charged ions is called
- A. a covalent bond.
 - B. a hydrogen bond.
 - C. an ionic bond.
 - D. a metallic bond.

Answer

Option C is correct because an ionic bond is a bond formed by the electrostatic attraction between positively and negatively charged ions. **Options A, B and D are incorrect** because none of these bonds involve attractions between positively and negatively charged ions.

Competency 009—The teacher understands energy and interactions between matter and energy.

6. As the beam from a flashlight enters a swimming pool, the beam of light bends. The phenomenon is an example of
- A. absorption.
 - B. polarization.
 - C. refraction.
 - D. reflection.

Answer

Option C is correct because refraction is the change in the direction of a wave, in this case light waves, as the wave passes through the boundary of two materials — for example, air and water. **Option A is incorrect** because absorption occurs when the energy of light is transferred to a material. **Option B is incorrect** because polarization is the process of restricting light waves only to those that possess certain properties. **Option D is incorrect** because reflection is the change in the direction of a wave at the boundary of two materials such that the wave does not pass through the boundary.

Competency 011—The teacher understands the structure and function of living things.

7. Which of the following correctly pairs the organic molecules with their building blocks?
- A. Proteins—amino acids
 - B. Fats—nucleotides
 - C. Carbohydrates—fatty acids

- D. DNA—simple sugars

Answer

Option A is correct because the building blocks of proteins are amino acids. **Option B is incorrect** because the building blocks of fats are fatty acids. **Option C is incorrect** because the building blocks of carbohydrates are simple sugars. **Option D is incorrect** because the building blocks of DNA are nucleotides.

Competency 012—The teacher understands reproduction and the mechanisms of heredity.

8. Which of the following is a sexual form of reproduction?

- A. Production of spores
- B. Binary fission
- C. Budding
- D. Fertilization

Answer

Option D is correct because fertilization is a form of sexual reproduction. **Option A is incorrect** because the production of spores is a form of asexual reproduction. **Option B is incorrect** because binary fission is a form of asexual reproduction. **Option C is incorrect** because budding is a form of asexual reproduction.

Competency 013—The teacher understands adaptations of organisms and the theory of evolution.

9. Which of the following is an adaptation that enabled animals to move from living in the ocean to living on land?

- A. A heart with two chambers
- B. A covering of scales
- C. Cartilage for support
- D. An egg with a hard shell and an amniotic sac

Answer

Option D is correct because an egg with a hard shell protects an embryo and minimizes water loss on dry land, and the amniotic sac is filled with fluid which cushions an embryo. **Option A is incorrect** because the development of a two-chambered heart was not needed for animals to move from living in the ocean to living on land. **Option B is incorrect** because the development of scales was not needed for animals to move from living in the ocean to living on land. **Option C is incorrect** because the development of cartilage was not needed for animals to move from living in the ocean to living on land.

Competency 014—The teacher understands regulatory mechanisms and behavior.

10. Of the following, which is the most likely human response to a decrease in environmental temperature?

- A. Leaching of calcium from long bones
- B. Decreased metabolic heat production
- C. Decreased blood flow to the extremities
- D. Increased rate of perspiration

Answer

Option C is correct because decreased blood flow to the extremities is a response that minimizes the cooling of blood as environmental temperature decreases. **Option A is incorrect** because leaching of calcium from bones is not a human response to a decreased environmental temperature. **Option B is incorrect** because metabolic heat production increases rather than decreases in response to a decrease in environmental temperature. **Option D is incorrect** because increased perspiration is a human response to an increase rather than a decrease in environmental temperature.

Competency 017—The teacher understands cycles in Earth systems.

11. Which of the following parts of the water cycle is most involved in cloud formation?

- A. Infiltration
- B. Condensation
- C. Transpiration
- D. Sublimation

Answer

Option B is correct because condensation is the process by which water vapor in the air is changed into liquid water. Condensation is crucial to the water cycle because the process is responsible for the formation of clouds. Water vapor molecules condense onto a microscopic solid particle, such as dust, ash, smoke or ice, to create a cloud droplet. **Option A is incorrect** because infiltration happens during and after precipitation, as water soaks into the soil or surface material. **Option C is incorrect** because transpiration is the evaporation of water from plant leaves. **Option D is incorrect** because sublimation is the process of a solid, such as ice, changing directly into a gas, such as water vapor.

Competency 018—The teacher understands the role of energy in weather and climate.

12. More solar energy reaches Earth's equatorial regions than Earth's polar regions because the equatorial regions

- A. have more vegetation to absorb sunlight.
- B. have a greater percentage of surface covered by land.
- C. have days with more hours of light.
- D. receive the Sun's rays that are closest to vertical.

Answer

Option D is correct because at the Equator, rays from the Sun are close to vertical and more concentrated. This allows equatorial regions to have higher temperatures. At polar regions, sunlight is received at a more oblique angle and is less concentrated, which results in the colder temperatures year-round. **Option A is incorrect** because having a higher density of vegetation does not mean that an area receives a greater amount of energy from the Sun. **Option B is incorrect** because the amount of solar energy received on Earth's surface does not depend on the material on the surface. **Option C is incorrect** because in polar regions, there are several months when the Sun does not set and there are 24 hours of daylight. However, temperatures on average remain below freezing because a given amount of sunlight is spread out over a large area.

Competency 022—The teacher understands the process of scientific inquiry and its role in science instruction.

13. Which of the following is an example of how a teacher can incorporate inquiry-based instruction into a science lesson on the environment?

- A. The teacher has students watch a video on ecosystems and write down key vocabulary terms.
- B. The teacher has student groups build a diorama of different ecosystems and label the biotic and abiotic components of that ecosystem.
- C. The teacher has students perform an activity where they simulate an oil spill in a container and use various methods and materials to clean it up and determine the effectiveness of each.
- D. The teacher has students write a persuasive essay on the importance of water conservation.

Answer

Option C is correct because students are engaged in an activity in which they are learning and experimenting on their own. They are analyzing and evaluating the effectiveness of different materials to correct an environmental problem; thus, they are engaged in discovery learning, which is at the highest level of learning and skills, based on Bloom's taxonomy. **Option A is incorrect** because students are engaged in watching a video, but they are only writing down key terms and not performing a hands-on activity. **Option B is incorrect** because the construction of a diorama is not an experiment that involves hypothesizing, data collection and analysis. **Option D is incorrect** because a persuasive essay incorporates writing, but it does not involve performing a laboratory experiment that utilizes scientific processes.

Competency 023—The teacher knows the varied and appropriate assessments and assessment practices to monitor science learning in laboratory, field and classroom settings.

14. Of the following, which is the most useful way to assess student misconceptions about density prior to a unit on density?

- A. Giving students a quiz on how to calculate densities
- B. Having an activity during which students weigh several objects
- C. Holding a class discussion about density
- D. Asking each student to predict the relative densities of several objects

Answer

Option D is correct because asking each student to predict the relative densities of several objects is most useful in assessing if any of the students have misconceptions. **Option A is incorrect** because a quiz on how to calculate densities would be more useful to assess mathematical ability and is more appropriate after the unit is completed. **Option B is incorrect** because an activity during which students weigh several objects is appropriate to assess a student's measurement skills. **Option C is incorrect** because a class discussion may or may not reveal the misconceptions held by all of the students.