

# MICHIGAN TEST FOR TEACHER CERTIFICATION (MTTC)

## TEST OBJECTIVES FIELD 103: ELEMENTARY EDUCATION

<b>Subarea</b>	<b>Range of Objectives</b>	<b>Approximate Test Weighting</b>
I. English Language Arts and World Languages	001–007	24%
II. Social Studies	008–012	16%
III. Visual and Performing Arts	013–014	10%
IV. Mathematics	015–021	22%
V. Science	022–026	18%
VI. Health Education and Physical Education	027–028	10%

**Effective after October 1, 2013**

Copyright © 2013 Pearson Education, Inc. or its affiliate(s). All rights reserved.  
Evaluation Systems, Pearson, P.O. Box 226, Amherst, MA 01004

Pearson and its logo are trademarks, in the U.S. and/or other countries, of Pearson Education, Inc. or its affiliate(s).

This document may not be reproduced for commercial use but may be copied for educational purposes.

# MICHIGAN TEST FOR TEACHER CERTIFICATION

## TEST OBJECTIVES FIELD 103: ELEMENTARY EDUCATION

### I. ENGLISH LANGUAGE ARTS AND WORLD LANGUAGES

#### **001 Understand the major concepts, principles, and instructional practices in the acquisition and learning of languages to create opportunities for communication in a multilingual global society.**

Includes:

- knowledge of language as a dynamic system, and strategies for helping students acquire and use language in listening, speaking, reading, and writing for social and academic purposes
- basic concepts related to the phonological, morphological, semantic, syntactic, and pragmatic structures of English as applied to listening, speaking, reading, and writing
- recognition of the integrated nature of reading, writing, listening, speaking, viewing, and visually representing, and the importance of integrating the use of these modes of communication in all content areas
- concepts and processes related to first- and second-language acquisition, factors (e.g., physical, social, cognitive, and emotional differences; developmental; cultural; environmental) that can affect language acquisition and literacy development, and the implications of these processes and factors for instruction
- knowledge of the relationships between language and culture; the interconnections among cultural perspectives, practices, and products; and strategies for integrating language and culture in instruction to encourage students to make cultural connections and comparisons
- knowledge of effective strategies and resources for creating a supportive, respectful classroom environment that provides opportunities for meaningful interaction and negotiation of meaning, which facilitate language acquisition and student achievement

**Effective after October 1, 2013**

Copyright © 2013 Pearson Education, Inc. or its affiliate(s). All rights reserved.  
Evaluation Systems, Pearson, P.O. Box 226, Amherst, MA 01004

This document may not be reproduced for commercial use but may be copied for educational purposes.

**TEST OBJECTIVES**  
**FIELD 103: ELEMENTARY EDUCATION**

**002 Understand the foundations of emergent literacy, including the development of phonological and phonemic awareness skills.**

Includes:

- the role of oral language development in emergent literacy, and strategies for promoting oral language development to enhance emergent literacy
- knowledge of phonological awareness, including phonemic awareness, and its significance in emergent literacy development; and research-based strategies for developing phonological and phonemic awareness skills
- knowledge of strategies for promoting development of concepts of print, letter recognition, and letter formation
- knowledge of strategies for promoting understanding of the alphabetic principle, including the use of reading and writing activities for teaching sound-symbol correspondence
- knowledge of processes by which emergent readers construct meaning and factors that influence their construction of meaning

**003 Understand the development of accurate, automatic word recognition, spelling, and fluency.**

Includes:

- characteristics of and relationships between stages of reading development and writing development
- the development of phonics knowledge and skills at beginning stages of reading development to promote accurate, automatic decoding and accurate spelling of regular single-syllable words
- the use of grade-level-appropriate sight words, common inflectional morphemes, and orthographic patterns and guidelines in combination with differentiated phonics instruction to promote accurate, automatic word recognition and spelling
- the use of syllable patterns and structural analysis to promote accurate, automatic decoding and spelling of multisyllable words at more advanced stages of literacy development
- knowledge of indicators of fluency (i.e., accuracy, rate, and prosody), factors that can disrupt fluency, the role of fluency in reading comprehension, and strategies for promoting fluency at various stages of reading development
- knowledge of developmentally appropriate materials and effective, research-based reading and writing activities to promote word recognition, spelling, and fluency at various stages of literacy development; and appropriate methods for assessing word recognition, spelling, and fluency

**Effective after October 1, 2013**

Copyright © 2013 Pearson Education, Inc. or its affiliate(s). All rights reserved.  
Evaluation Systems, Pearson, P.O. Box 226, Amherst, MA 01004

This document may not be reproduced for commercial use but may be copied for educational purposes.

**TEST OBJECTIVES**  
**FIELD 103: ELEMENTARY EDUCATION**

**004 Understand the development of vocabulary and reading comprehension.**

Includes:

- the relationship between oral and written vocabulary development and reading comprehension, elements of effective vocabulary instruction (e.g., explicitly teaching words, providing meaningful opportunities to use new vocabulary), and strategies for selecting vocabulary for instruction
- knowledge of research-based strategies for explicit instruction of words and their meanings, independent strategies for building vocabulary, and independent strategies for verifying the meanings and pronunciations of unfamiliar words or words with multiple meanings (e.g., structural analysis, reference materials, semantic and syntactic cues)
- application of knowledge of different levels of reading comprehension (e.g., literal, inferential, evaluative, critical) and factors that affect reading comprehension and a reader's construction of meaning (e.g., automaticity of word recognition, vocabulary knowledge, background knowledge, linguistic and organizational complexity of the text, context of the written situation)
- knowledge of effective comprehension strategies for different texts and purposes for reading
- knowledge of developmentally appropriate materials and effective, research-based oral language, reading, and writing activities to promote the development of vocabulary and comprehension at different stages of reading development; and appropriate methods for assessing vocabulary and reading comprehension

**Effective after October 1, 2013**

Copyright © 2013 Pearson Education, Inc. or its affiliate(s). All rights reserved.  
Evaluation Systems, Pearson, P.O. Box 226, Amherst, MA 01004

This document may not be reproduced for commercial use but may be copied for educational purposes.

**TEST OBJECTIVES**  
**FIELD 103: ELEMENTARY EDUCATION**

**005 Understand the characteristics of narrative and expository texts in written, oral, performance, and media forms.**

Includes:

- major works, authors, and genres of classical, contemporary, and multicultural children's and adolescent literature; key characteristics and elements of narrative texts (e.g., story grammar, stylistic elements); and strategies for promoting students' comprehension and literary response and analysis skills
- types of expository texts, key characteristics and features of expository texts (e.g., organization, graphic features), and strategies for promoting students' comprehension and analysis of expository texts
- appropriate use of children's and adolescent narrative and expository texts to promote reading growth, engage readers in the active construction of meaning, foster appreciation for the written word, and stimulate interest and motivation to read and write widely and independently for various purposes
- characteristics and features of different forms of oral, performance, and media texts (e.g., poetry, plays, screenplays, advertisements, music videos); and strategies for promoting students' comprehension, response, and analysis skills related to these forms

**006 Understand the writing process using standard conventions of English in the United States.**

Includes:

- steps in the writing process (i.e., pre-writing, drafting, revising, editing, publishing) and strategies used at each step in the process
- structures and key elements of various formal (e.g., research report) and informal (e.g., personal letter) genres of written communication
- application of the standard conventions of English in the United States, including correct spelling (e.g., "color" versus "colour"), capitalization, punctuation (e.g., possessive "its" versus contraction "it's"), grammar, and word usage (e.g., "already" versus "all ready")
- differences between descriptive and prescriptive conventions of usage, and the ways in which conventions of usage are adapted to different situations
- the use of main ideas, introductions, transitions, conclusions, and other organizational features in writing
- the use of references and tools in the writing process (e.g., dictionary, thesaurus, spell-checker, grammar checker, word processing program)

**Effective after October 1, 2013**

Copyright © 2013 Pearson Education, Inc. or its affiliate(s). All rights reserved.  
Evaluation Systems, Pearson, P.O. Box 226, Amherst, MA 01004

This document may not be reproduced for commercial use but may be copied for educational purposes.

**TEST OBJECTIVES**  
**FIELD 103: ELEMENTARY EDUCATION**

**007 Understand the generation and expression of ideas and information through written, oral, visual, and nonverbal communication.**

Includes:

- reasons for identifying an audience and purpose for communication; and procedures and methods for organizing, presenting, and conveying ideas and information
- knowledge of various strategies for using style, voice, and language choices in written, oral, and multiple-media texts; and the appropriateness of various choices in different contexts
- rhetorical techniques and devices used to respond to, create, and revise texts in a variety of genres
- structures of oral and visual presentations (e.g., sequence, transitions), including the integration of spoken, textual, visual, and multiple-media elements
- principles of active listening and viewing, and factors that can affect listening and viewing (e.g., overly technical language, cultural differences, production values)
- knowledge of effective strategies and resources for promoting written, oral, visual, and nonverbal communication skills; and appropriate methods for assessing communication skills
- knowledge of effective strategies and resources for inquiry and its processes; application of critical and creative thinking; and conveying literary information through writing, speaking, visually representing, performing, and using multiple technologies
- ethical considerations associated with researching, producing, and presenting written, oral, and multiple-media communications in English language arts

**Effective after October 1, 2013**

Copyright © 2013 Pearson Education, Inc. or its affiliate(s). All rights reserved.  
Evaluation Systems, Pearson, P.O. Box 226, Amherst, MA 01004

This document may not be reproduced for commercial use but may be copied for educational purposes.

**TEST OBJECTIVES**  
**FIELD 103: ELEMENTARY EDUCATION**

**II. SOCIAL STUDIES**

**008 Apply historical thinking to understand the past in the local community, Michigan, and the United States.**

Includes:

- significant eras, themes, cultures, individuals, and chronological relationships of events in U.S. history from precolonial times to 1900 and in Michigan history from precolonial times to the present
- the significance and lasting influence of events, issues, people, and developments in Michigan and U.S. history
- interdependence of historical events at the community, state, national, and international levels
- recognition of how geographic, political, social, economic, and cultural factors have shaped historic patterns of human populations
- analysis of various perspectives and interpretations of history, including distinguishing between historical facts and historical interpretations
- characteristics of primary and secondary sources in historical inquiry and their ethical use
- methods for conducting historical research about a local community, and application of historical thinking to understand a community's past
- knowledge of effective strategies and resources for developing and assessing knowledge and skills related to history

**Effective after October 1, 2013**

Copyright © 2013 Pearson Education, Inc. or its affiliate(s). All rights reserved.  
Evaluation Systems, Pearson, P.O. Box 226, Amherst, MA 01004

This document may not be reproduced for commercial use but may be copied for educational purposes.

**TEST OBJECTIVES**  
**FIELD 103: ELEMENTARY EDUCATION**

**009 Understand the fundamental principles and concepts of geography.**

Includes:

- use of geographic representations and tools (e.g., maps, Internet, global positioning systems, geographic information systems) to acquire, process, and report information from a spatial perspective
- knowledge of features of geographic regions and how regions are defined by common physical and human characteristics
- knowledge of the interdependence of and interactions among geographic regions around the world (e.g., trade in natural resources, environmental impacts)
- analysis of how human activities (e.g., agriculture, manufacturing) help shape the earth's surface and how the earth's surface affects human activities (e.g., migration, settlement patterns)
- analysis of interactions between humans and the environment (e.g., urbanization, industrial development)
- recognition of how historical, political, social, economic, and cultural factors have shaped geographic patterns and processes
- knowledge of effective strategies and resources for developing and assessing knowledge and skills related to geography

**010 Understand the fundamental principles and concepts of civics and government.**

Includes:

- the reasons people create governments, and common forms of government
- the origins, core democratic values, and principles of constitutional democracy in the United States
- the structure and functions of government in the United States, including the interrelationships among national, state, and local governments, and between branches of government
- knowledge of important rights and responsibilities of individual citizens and citizen groups in the United States, and the ways individual citizens and citizen groups participate in government
- how the U.S. government relates to and interacts with other nations
- recognition of how historical, geographic, social, economic, and cultural factors have shaped governments and political systems
- knowledge of effective strategies and resources for developing and assessing knowledge and skills related to civics and government

**Effective after October 1, 2013**

Copyright © 2013 Pearson Education, Inc. or its affiliate(s). All rights reserved.  
Evaluation Systems, Pearson, P.O. Box 226, Amherst, MA 01004

This document may not be reproduced for commercial use but may be copied for educational purposes.

**TEST OBJECTIVES**  
**FIELD 103: ELEMENTARY EDUCATION**

**011 Understand the fundamental principles and concepts of economics.**

Includes:

- principles and strategies of personal and family resource management (e.g., decision-making model, making financial choices)
- characteristics of and activities in a market economy, including: individual, business, and government choices; the relationships between prices, supply, and demand; and scarcity and opportunity cost
- knowledge of economic activity in the United States, including national markets and the role of government in the U.S. economy
- characteristics of the global economy, such as trade and the causes and consequences of global economic interdependence
- recognition of how historical, geographic, political, social, and cultural factors have shaped economic systems and activities
- knowledge of effective strategies and resources for developing and assessing knowledge and skills related to economics

**Effective after October 1, 2013**

Copyright © 2013 Pearson Education, Inc. or its affiliate(s). All rights reserved.  
Evaluation Systems, Pearson, P.O. Box 226, Amherst, MA 01004

This document may not be reproduced for commercial use but may be copied for educational purposes.

**TEST OBJECTIVES**  
**FIELD 103: ELEMENTARY EDUCATION**

**012 Understand inquiry processes in social studies, and concepts and skills associated with public discourse, decision making, and citizen involvement.**

Includes:

- characteristics of various sources of and tools for obtaining social studies information and their ethical use
- methods for formulating research questions and for gathering, analyzing, interpreting, and communicating information related to social studies, including ethical considerations
- the role and importance of public discourse, decision-making processes, and citizen involvement related to public-policy issues
- knowledge of strategies and skills for engaging in public discourse and decision making (i.e., state a problem as a public-policy issue, analyze various perspectives, evaluate possible alternative resolutions, and use communication skills for expressing and justifying a position on a public-policy issue)
- principles of citizen involvement, and opportunities and approaches for becoming involved as a citizen of a culturally diverse, democratic society and interdependent world
- knowledge of effective strategies and materials for developing and assessing skills related to social studies inquiry, public discourse, decision making, and citizen involvement
- recognition of connections among social studies disciplines and between social studies and other content areas and everyday life
- types and characteristics of sources of information used in social studies (e.g., maps, primary sources, textbooks, Internet); and effective strategies for helping students construct meaning from these sources, apply critical and creative thinking, and convey social studies information through writing, speaking, and visual representation

**Effective after October 1, 2013**

Copyright © 2013 Pearson Education, Inc. or its affiliate(s). All rights reserved.  
Evaluation Systems, Pearson, P.O. Box 226, Amherst, MA 01004

This document may not be reproduced for commercial use but may be copied for educational purposes.

**TEST OBJECTIVES**  
**FIELD 103: ELEMENTARY EDUCATION**

**III. VISUAL AND PERFORMING ARTS**

**013 Understand the functions, elements, principles, and styles of the arts, and artistic and creative processes and products.**

Includes:

- knowledge of basic elements, concepts, and terms associated with dance, music, theatre, and the visual arts
- the basic techniques, processes, tools, and materials for creating and performing works in dance, music, theatre, and the visual arts
- types and characteristics of products (e.g., paintings, sculptures, performances) created in the various arts disciplines
- how artists can use the elements and organizing principles of each art's discipline to express ideas, themes, or emotions
- the role and function of the arts in various cultures in contemporary and historical contexts
- application of steps in the artistic and creative processes (e.g., create, perform, respond) across all content areas

**Effective after October 1, 2013**

Copyright © 2013 Pearson Education, Inc. or its affiliate(s). All rights reserved.  
Evaluation Systems, Pearson, P.O. Box 226, Amherst, MA 01004

This document may not be reproduced for commercial use but may be copied for educational purposes.

**TEST OBJECTIVES**  
**FIELD 103: ELEMENTARY EDUCATION**

**014 Understand communication about and through the arts, and developmentally appropriate arts instruction.**

Includes:

- ways of communicating effectively about and through the arts, including promoting communication that is open to a variety of viewpoints and encourages continued exploration in the arts
- recognition of connections among the arts and between the arts and other content areas and everyday life
- developmentally appropriate arts instruction, including providing opportunities to participate actively in all four arts disciplines and using the motivational force of the arts to engage students as both participants and audience members
- knowledge of strategies for collaborating with arts teachers and identifying and using local artists and arts resources
- knowledge of effective strategies for assessing learning in and through the arts
- knowledge of effective strategies and resources for applying visual and performing arts processes and skills in all content areas
- types and characteristics of sources of information used in the visual and performing arts (e.g., live performances, audio and video recordings, scripts, texts with illustrations, paintings); and effective strategies for helping students construct meaning from these sources, apply critical and creative thinking, and convey information about the visual and performing arts through writing, speaking, and the visual and performing arts themselves
- ethical considerations associated with researching, producing, and presenting written, oral, and multiple-media communications in the visual and performing arts

**Effective after October 1, 2013**

Copyright © 2013 Pearson Education, Inc. or its affiliate(s). All rights reserved.  
Evaluation Systems, Pearson, P.O. Box 226, Amherst, MA 01004

This document may not be reproduced for commercial use but may be copied for educational purposes.

**TEST OBJECTIVES**  
**FIELD 103: ELEMENTARY EDUCATION**

**IV. MATHEMATICS**

**015 Understand mathematical reasoning, representation, and problem solving; and the historical development of mathematics.**

Includes:

- knowledge of the use of axiomatic systems, justifications, and proofs in different branches of mathematics, such as number theory, algebra, and geometry
- strategies and procedures (e.g., modeling, working backwards, simplifying) used to solve real-world problems
- knowledge of a variety of diagrams, models, charts, manipulatives, and other tools used to represent mathematical concepts and real-world situations
- evaluation of problem-solving strategies, procedures, and calculations to verify the accuracy of results
- knowledge of the historical development and significance of important mathematical ideas, and how diverse cultures and individuals have influenced and contributed to developments in mathematics
- knowledge of effective strategies and resources for developing historical perspectives of mathematics and for developing and assessing knowledge and skills related to mathematical reasoning, representation, and problem solving
- recognition of connections among the fields of mathematics and between mathematics and other content areas and everyday life
- types and characteristics of sources of information used in mathematics (e.g., textbooks, computer programs, manipulatives); and effective strategies for helping students construct meaning from these sources, apply critical and creative thinking, and convey mathematics information through writing, speaking, and visual representation
- ethical considerations associated with researching, producing, and presenting written, oral, and multiple-media communications in mathematics

**Effective after October 1, 2013**

Copyright © 2013 Pearson Education, Inc. or its affiliate(s). All rights reserved.  
Evaluation Systems, Pearson, P.O. Box 226, Amherst, MA 01004

This document may not be reproduced for commercial use but may be copied for educational purposes.

**TEST OBJECTIVES**  
**FIELD 103: ELEMENTARY EDUCATION**

**016 Understand number sense and concepts of number, number theory, and number systems.**

Includes:

- knowledge of the characteristics of the subsets of real numbers (e.g., integer, rational, irrational)
- application of the concepts of numbers to compare, sort, order, and round
- equivalent representations of numbers (e.g., integers, fractions, decimals, scientific notation), and conversions between graphic, numeric, and symbolic representations of numbers
- application of place-value concepts (e.g., expanded form of a number, regrouping, base systems)
- application of concepts related to prime and composite numbers, multiples, factors, and divisibility rules
- application of a variety of strategies to estimate quantities
- knowledge of the development of number sense and effective strategies and resources for promoting the development of and assessing number sense

**017 Understand numerical computation and operations on numbers.**

Includes:

- knowledge of the use of the four basic operations and of the relationships between the operations
- knowledge of various representations (e.g., graphic, symbolic, verbal) of number operations
- application of the order of operations
- the modeling, explanation, development, and justification of computational algorithms, including the application of arithmetic properties (e.g., commutative, associative, distributive)
- application of computation strategies to problems involving integers, rational numbers, fractions, decimals, ratios, proportions, percentages, and exponents
- application of estimation strategies to determine the reasonableness of a calculation
- knowledge of effective strategies and resources for promoting fluency with operations and the ability to use various computational methods (e.g., mental math, paper and pencil, calculators), and for assessing computational fluency and skills

**Effective after October 1, 2013**

Copyright © 2013 Pearson Education, Inc. or its affiliate(s). All rights reserved.  
Evaluation Systems, Pearson, P.O. Box 226, Amherst, MA 01004

This document may not be reproduced for commercial use but may be copied for educational purposes.

**TEST OBJECTIVES**  
**FIELD 103: ELEMENTARY EDUCATION**

**018 Understand concepts and procedures of direct and indirect measurement.**

Includes:

- use of standard and nonstandard measurement units and the customary and metric systems, including unit conversions within a system
- selection of appropriate measurement techniques, units, and tools in various situations
- application of appropriate formulas for determining the length, perimeter, area, volume, and surface area of two- and three-dimensional objects
- solution of problems involving linear measurements, weight, temperature, time, angles, and rates
- application of estimation strategies to measurement
- knowledge of effective strategies and resources for promoting and assessing knowledge and skills related to measurement

**019 Understand concepts of Euclidean geometry.**

Includes:

- knowledge and application of properties of lines, angles, and two- and three-dimensional shapes
- relationships between three-dimensional figures and two-dimensional representations
- application of concepts of symmetry, similarity, congruence, and geometric transformation
- recognition of connections between geometry and algebra (e.g., use of coordinate systems, the Pythagorean theorem)
- use of geometric models, properties of figures, and coordinate systems to solve problems
- knowledge of effective strategies and resources for promoting and assessing spatial reasoning and knowledge and skills related to geometry

**Effective after October 1, 2013**

Copyright © 2013 Pearson Education, Inc. or its affiliate(s). All rights reserved.  
Evaluation Systems, Pearson, P.O. Box 226, Amherst, MA 01004

This document may not be reproduced for commercial use but may be copied for educational purposes.

**TEST OBJECTIVES**  
**FIELD 103: ELEMENTARY EDUCATION**

**020 Understand concepts of algebra.**

Includes:

- recognition and extension of patterns using a variety of representations (e.g., numeric, pictorial, algebraic)
- knowledge of the algebraic concepts and various representations of functions and relationships
- application of the concepts of variable, function, and equality to model relationships algebraically
- solution of linear equations and inequalities
- use of algebraic symbols to represent and analyze mathematical situations and structures, and use of various representations to model and solve contextualized problems
- use of algebraic functions to plot points on a coordinate plane, describe graphs, and determine slope
- knowledge of effective strategies and resources for promoting the development of and assessing knowledge and skills related to algebra

**021 Understand concepts of data analysis and probability.**

Includes:

- question formation, collection, organization, and display (e.g., tables, graphs, scatterplots, frequency distributions, percentiles) of data
- selection and use of appropriate statistical methods (i.e., descriptive, inferential) to analyze data, make predictions, and make decisions
- knowledge of basic concepts of probability (e.g., simple and compound events, independent and dependent events)
- the modeling and comparison of experimental probabilities with mathematical (theoretical) expectations
- interpretation of data and probability in real-world situations and use of data representations and probability to make predictions
- knowledge of effective strategies and resources for promoting the development of and assessing knowledge and skills related to data analysis and probability

**Effective after October 1, 2013**

Copyright © 2013 Pearson Education, Inc. or its affiliate(s). All rights reserved.  
Evaluation Systems, Pearson, P.O. Box 226, Amherst, MA 01004

This document may not be reproduced for commercial use but may be copied for educational purposes.

**TEST OBJECTIVES**  
**FIELD 103: ELEMENTARY EDUCATION**

**V. SCIENCE**

**022 Understand how new scientific knowledge is constructed, including the role of inquiry.**

Includes:

- principles and processes of making observations about the natural world, including designing and conducting scientific investigations using appropriate methodology and technology
- strategies for collecting, organizing, analyzing, and communicating scientific data
- application of appropriate measurement methods and mathematical techniques (e.g., calculating the mean) in collecting and analyzing data
- application of safe science practices, including the ethical and appropriate use and care of living organisms, the proper use and care of scientific equipment, and the safe storage, use, and disposal of chemicals
- knowledge of effective strategies and resources for promoting and assessing the use of inquiry processes to develop scientific knowledge and conduct investigations using safe science practices
- types and characteristics of sources of information used in science (e.g., experiments, tables, graphics, trade books); and effective strategies for helping students construct meaning from these sources, apply critical and creative thinking, and convey science information through writing, speaking, and visual representation
- ethical considerations associated with researching, producing, and representing written, oral, and multiple-media communications in science

**Effective after October 1, 2013**

Copyright © 2013 Pearson Education, Inc. or its affiliate(s). All rights reserved.  
Evaluation Systems, Pearson, P.O. Box 226, Amherst, MA 01004

This document may not be reproduced for commercial use but may be copied for educational purposes.

**TEST OBJECTIVES**  
**FIELD 103: ELEMENTARY EDUCATION**

**023 Understand the nature of scientific knowledge and the application of analysis and reflection in science.**

Includes:

- characteristics of scientific knowledge (e.g., reliance on verifiable evidence) and how it is similar to and differs from other ways of learning about and understanding the world
- knowledge of the interconnectedness of the various scientific disciplines, including the major unifying themes of science (e.g., conservation of energy, classification, relationship between form and function)
- analysis of the ways in which science, technology, and society interact and the effects of these interactions
- knowledge of the historical development of important scientific ideas and how diverse cultures and individuals have influenced and contributed to developments in science
- knowledge of effective strategies and resources for promoting scientific literacy through the use of analysis and reflection
- recognition of connections among the sciences and between the sciences and other content areas and everyday life

**024 Understand the fundamental concepts of life science.**

Includes:

- knowledge of the structures and functions of living organisms, including single-celled and multicellular organisms, and how organisms obtain and use energy
- use of classification systems of living organisms, and knowledge of distinguishing characteristics of major groups of organisms (e.g., bacteria, plants, animals)
- differences in life cycles of organisms and how various types of organisms reproduce, grow, and develop
- basic principles of heredity, and sources of variation and new traits in a species
- knowledge of ways in which various organisms adapt to survive and reproduce in their environments, and of theories and evidence about how organisms evolve over time
- characteristics and components (both biotic and abiotic) of ecosystems and how organisms, including humans, interact with one another and their environments
- knowledge of effective strategies and resources for promoting the development of and assessing knowledge and skills related to life science

**Effective after October 1, 2013**

Copyright © 2013 Pearson Education, Inc. or its affiliate(s). All rights reserved.  
Evaluation Systems, Pearson, P.O. Box 226, Amherst, MA 01004

This document may not be reproduced for commercial use but may be copied for educational purposes.

**TEST OBJECTIVES**  
**FIELD 103: ELEMENTARY EDUCATION**

**025 Understand the fundamental concepts of earth/space science.**

Includes:

- characteristics of objects in the solar system, how they interact, and the effects of the relative positions of the earth, sun, and moon (e.g., eclipses, seasons)
- characteristics of the earth's surface and processes that change the earth's features over time (e.g., volcanism, erosion, plate tectonics)
- distribution, characteristics, and movement of water on the earth
- characteristics and processes of the atmosphere, causes of different kinds of weather (e.g., lake-effect snow, thunderstorms), and methods for studying and predicting weather
- interactions between the geosphere, atmosphere, hydrosphere, and biosphere, and the role of solar energy in various earth processes (e.g., water cycle, wind)
- analysis of interactions between humans and the hydrosphere, atmosphere, and geosphere, including the use of natural resources
- knowledge of effective strategies and resources for promoting the development of and assessing knowledge and skills related to earth/space science

**026 Understand the fundamental concepts of physical science.**

Includes:

- the composition and properties of matter (e.g., atoms, molecules, melting point, reactivity), and characteristics of physical, chemical, and nuclear changes in matter
- knowledge of forms of energy, transformations between one form of energy and another, processes of energy transfer (e.g., conduction), and interactions between energy and matter
- ways in which living organisms and human technology change matter and transport energy
- basic principles of electricity and magnetism, including the properties of magnets
- analysis of the motions of objects (e.g., speed), the effects of various types of forces (e.g., gravity, friction) on objects, and how the principles of motion are applied to control the movements of objects
- characteristics of light and sound, including how light and sound waves transfer energy
- knowledge of effective strategies and resources for promoting the development of and assessing knowledge and skills related to physical science

**Effective after October 1, 2013**

Copyright © 2013 Pearson Education, Inc. or its affiliate(s). All rights reserved.  
Evaluation Systems, Pearson, P.O. Box 226, Amherst, MA 01004

This document may not be reproduced for commercial use but may be copied for educational purposes.

**TEST OBJECTIVES**  
**FIELD 103: ELEMENTARY EDUCATION**

**VI. HEALTH EDUCATION AND PHYSICAL EDUCATION**

**027 Understand concepts and strategies of health education.**

Includes:

- knowledge of basic concepts of safety; social-emotional health; healthy eating; physical activity; and disease prevention; and the relationships of these factors to health and learning
- knowledge of the health effects of alcohol, tobacco, and other drug use; and the relationships of these factors to health and learning
- knowledge of research-based methods that promote students' knowledge, skills, and behaviors that contribute to lifelong health
- knowledge of characteristics of research-based quality health education curricula, and health education resources in Michigan
- knowledge of appropriate decision-making processes relative to healthy life choices
- recognition of connections between health education and other content areas and everyday life
- knowledge of effective strategies and resources for developing and assessing knowledge and skills related to health education
- types and characteristics of sources of information used in health education (e.g., printed media, electronic media); and effective strategies for helping students construct meaning from these sources, apply critical and creative thinking, and convey information about health education through writing, speaking, and visual representation
- ethical considerations associated with researching, producing, and representing written, oral, and multiple-media communications in health education

**Effective after October 1, 2013**

Copyright © 2013 Pearson Education, Inc. or its affiliate(s). All rights reserved.  
Evaluation Systems, Pearson, P.O. Box 226, Amherst, MA 01004

This document may not be reproduced for commercial use but may be copied for educational purposes.

**TEST OBJECTIVES**  
**FIELD 103: ELEMENTARY EDUCATION**

**028 Understand concepts and strategies of physical education.**

Includes:

- components of health-related physical fitness, the F.I.T.T. principle, and methods for applying these components and principles to promote students' skills, knowledge, and behaviors that contribute to learning and healthy lifestyles
- application of principles and theories of motor development to promote students' skill acquisition and knowledge
- recognition of movement concepts as they apply to the development of motor skills in isolated and controlled settings
- recognition of methods for applying concepts of personal/social development in the context of physical activity (e.g., responsibility, cooperation, positive self concept) to promote students' skills, knowledge, and behaviors that contribute to learning and healthy lifestyles
- recognition of connections between physical education and other content areas and everyday life
- knowledge of effective strategies and resources for developing and assessing knowledge and skills related to physical education
- types and characteristics of sources of information used in physical education (e.g., printed media, electronic media); and effective strategies for helping students construct meaning from these sources, apply critical and creative thinking, and convey information about physical education through writing, speaking, and visual representation
- ethical considerations associated with researching, producing, and representing written, oral, and multiple-media communications in physical education

**Effective after October 1, 2013**

Copyright © 2013 Pearson Education, Inc. or its affiliate(s). All rights reserved.  
Evaluation Systems, Pearson, P.O. Box 226, Amherst, MA 01004

This document may not be reproduced for commercial use but may be copied for educational purposes.