Florida Teacher Certification Examinations

Test Information Guide

for

Earth-Space Science 6–12

FLORIDA DEPARTMENT OF EDUCATION
www.fldoe.org

Third Edition

Developed, produced, and printed under the authority of the
Florida Department of Education

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Contents

1 Test and Test Information Guide Development

Teacher Certification Testing

Since 1980, Florida teacher certification candidates have been required to pass the Florida Teacher Certification Examinations (FTCE), which has consisted of tests in reading, writing, mathematics, and professional knowledge. The 1986 Florida Legislature modified the testing program by also requiring teacher candidates to pass a test in the subject area in which they wish to be certified. In addition, the Legislature substituted the Florida College-Level Academic Skills Test (CLAST) for the reading, writing, and mathematics portions of the FTCE. The 2000 Florida Legislature replaced the CLAST with the General Knowledge Test, effective July 1, 2002.

The subject area knowledge tested on the Earth-Space Science 6–12 examination was identified and validated by committees of content specialists from within the state of Florida. Committee members included public school teachers, district supervisors, and college faculty with expertise in this field. Committee members were selected on the basis of recommendations by district superintendents, public school principals, deans of education, experts in the field, and other organizations. In developing the test, the committees used an extensive literature review, interviews with selected public school teachers, a large-scale survey of teachers, pilot tests, and their own professional judgment.

Role of the Test Information Guide

The purpose of this test information guide is to help candidates taking the subject area test in Earth-Space Science 6–12 prepare effectively for the examination. The guide was designed to familiarize prospective test takers with various aspects of the examination, including the content that is covered and the way it is represented. The guide should enable candidates to direct their study and to focus on relevant material for review.

This test information guide is intended primarily for use by certification candidates, who may be students in a college or university teacher-preparation program, teachers with provisional certification, teachers seeking certification in an additional subject area, or persons making a career change to public school teaching. Candidates may have studied and worked in Florida or may be from out of state.

College or university faculty may also use the guide to prepare students for certification, and inservice trainers may find the guide useful for helping previously certified teachers prepare for recertification or multiple certification.

This test information guide is not intended as an all-inclusive source of subject area knowledge, nor is it a substitute for college course work in the subject area. The sample questions are representative of the content of the actual test; however, they are not actual test questions from an actual test form. Instead, the guide is intended to help candidates prepare for the subject area test by presenting an overview of the content and format of the examination.

2 Preparation for the Test

The following outline may help you to prepare for the examination. Adapt these suggestions to suit your own study habits and the time you have available for review.

Overview

- **Look over the organization of the test information guide.**

  Section 1 discusses the development of the test and test information guide.
  Section 2 (this section) outlines test preparation steps.
  Section 3 offers strategies for taking the test.
  Section 4 presents information about the content and structure of the test.
  Section 5 lists question formats and includes sample test questions.
  Section 6 provides an annotated bibliography of general references you may find useful in your review.
  Section 7 identifies a source of further information.

Self-Assessment

- **Decide which content areas you should review.**

  Section 4 includes the competencies and skills used to develop this subject area test and the approximate proportion of test questions from each competency area.

Review

- **Study according to your needs.**

  Review all of the competencies and concentrate on areas with which you are least familiar.

Practice

- **Acquaint yourself with the format of the examination.**

  Section 5 describes types of questions you may find on the examination.

- **Answer sample test questions.**

  Section 5 gives you an opportunity to test yourself with sample test questions and provides an answer key and information regarding the competency to which each question is linked.

Final preparation

- **Review test-taking advice.**

  Section 3 includes suggestions for improving your performance on the examination.

- **Refer to field-specific references.**

  Section 6 includes an annotated bibliography listing general references keyed to the competencies and skills used to develop this subject area test.

3 Test-Taking Advice

- Go into the examination prepared, alert, and well rested.
- Complete your travel arrangements prior to the examination date. Plan to arrive early so that you can locate the parking facilities and examination room without rushing.
- Dress comfortably and bring a sweater or jacket in case the room is too cool.
- Take the following with you to the test site:
  - — Admission ticket
  - — Proper identification as described in "Identification Policy"
- There are many strategies for taking a test and different techniques for dealing with different types of questions. Nevertheless, you may find the following general suggestions useful.
  - — Read each question and all the response options carefully before selecting your answer. Pay attention to all of the details.
  - — Go through the entire test once and answer all the questions you are reasonably certain about. Then go back and tackle the questions that require more thought.
  - — When you are not certain of the right answer, eliminate as many options as you can and choose the response that seems best. It is to your advantage to answer all the questions on the test, even if you are uncertain about some of your choices.
  - — After completing the examination, go back and check every question. Verify that you have answered all of the questions and that your responses are correctly entered.

4 Competencies and Skills and Test Blueprint

The table on the following pages lists the competencies and skills used as the basis for the Earth-Space Science 6–12 examination. These competencies and skills represent the knowledge that teams of teachers, subject area specialists, and district-level educators have determined to be important for beginning teachers. This table could serve as a checklist for assessing your familiarity with each of the areas covered by the test. The competencies and skills should help you organize your review. The test blueprint indicates the approximate percentage of test questions that will cover the specific competency on the exam.

Competencies are broad areas of content knowledge.

Skills identify specific behaviors that demonstrate the competencies.

Percentages indicate the approximate proportion of test questions that represent the competencies on the test.

The following excerpt illustrates the components of the table.

Competency

Approximate percentage of total test questions (test blueprint)

Competency/Skill		**Approx. %**
1	**Knowledge of the nature of science**	**16%**
1	Analyze processes of scientific inquiry.	
2	Evaluate models used in science to explain patterns observed in nature (e.g., rock cycle, heliocentric, geocentric, nitrogen cycle, water cycle).	
3	Identify the influences of science and society on each other.	
4	Analyze the synergistic relationships between basic and applied research, technology, the economy, and the public good.	
5	Evaluate the appropriate use of inferences, assumptions, observations, hypotheses, conclusions, laws, and theories.	
6	Analyze scientific data presented in tables, graphs, and diagrams.	
7	Differentiate between qualitative and quantitative data in experimental, observational, and modeling methods of research.	
8	Apply state statutes and national guidelines regarding laboratory safety, hazardous materials, experimentation, and/or the use of organisms in the classroom.	
9	Differentiate between the various roles of communication in the development of scientific ideas (e.g., collaboration, peer review, scientific debate).	
10	Distinguish between accuracy, precision, systematic error, and random error, using significant figures appropriately.	
11	Evaluate variables and affected outcomes for appropriate experimental designs with minimum bias.	

Skills (1-11)

Table of Competencies, Skills, and Approximate Percentages of Questions

Competency/Skill		**Approx. %**
1	**Knowledge of the nature of science**	**16%**
1	Analyze processes of scientific inquiry.	
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6	Analyze scientific data presented in tables, graphs, and diagrams.	
7	Differentiate between qualitative and quantitative data in experimental, observational, and modeling methods of research.	
8	Apply state statutes and national guidelines regarding laboratory safety, hazardous materials, experimentation, and the use of organisms in the classroom.	
9	Differentiate between the various roles of communication in the development of scientific ideas (e.g., collaboration, peer review, scientific debate).	
10	Distinguish between accuracy, precision, systematic error, and random error, using significant figures appropriately.	
11	Evaluate variables and affected outcomes for appropriate experimental designs with minimum bias.	
12	Identify the equipment Earth and space scientists use to gather, analyze, and interpret data in field and laboratory investigations.	
2	**Knowledge of the composition, characteristics, and structure of Earth**	**9%**
1	Identify the characteristics of Earth's layers and the methods used to investigate Earth's interior.	
2	Identify common rocks and minerals based on their physical and chemical properties.	
3	Distinguish between igneous, metamorphic, and sedimentary rocks.	
4	Identify processes and products within the rock cycle.	

Competency/Skill		Approx. %
3	**Knowledge of plate tectonics and related processes**	**9%**
1	Identify the historical development and supporting evidence that has led to the theory of plate tectonics.	
2	Analyze the geologic processes involved in the movement of tectonic plates and the landforms produced by their movements.	
3	Differentiate between the physical and chemical characteristics of oceanic crust and continental crust.	
4	Identify the types, causes, and effects of volcanoes.	
5	Identify the causes and effects of earthquakes.	
6	Distinguish between the characteristics of seismic waves.	
7	Identify how the movement of tectonic plates has influenced climate (e.g., hydrosphere, geosphere, biosphere).	
4	**Knowledge of Earth's surface processes**	**8%**
1	Compare physical and chemical weathering and their effects on landforms.	
2	Analyze the principles and processes of sedimentation (i.e., erosion, deposition).	
3	Identify the properties of aquifers and the movement of groundwater through sediments and rock formations.	
4	Analyze the movement of water through the hydrologic cycle, including energy changes that occur as water changes phase.	
5	Evaluate the origin and distribution of freshwater resources in Florida.	
6	Discriminate between landforms and sedimentary deposits created by water, wind, and ice.	
7	Identify the geologic features of Florida and the processes that produced them.	
5	**Knowledge of mapping and remote sensing**	**4%**
1	Identify surface features from topographic maps, photographs, and satellite images.	
2	Interpret topographic and oceanographic maps.	
3	Compare landforms illustrated on maps and imagery to geologic processes.	
4	Evaluate the function and benefits of Earth-observing systems (e.g., Landsat, Topex, aircraft, balloons).	

Competency/Skill		Approx. %
	5 Identify the applications of remote sensing technologies used on Earth and in space science (e.g., magnetometry, seismic survey, ground-penetrating radar, high-resolution photography).	
6	**Knowledge of the scope and measurement of geologic time**	**6%**
	1 Identify appropriate methods of absolute and relative dating for given situations.	
	2 Apply the law of original horizontality, the principle of superposition, and the principle of cross-cutting relationships to interpret geologic cross sections.	
	3 Identify major events in Earth's history (e.g., mass extinctions, evolution of plants, development of an oxygen-rich atmosphere).	
	4 Identify major events in Florida's geologic history, including sea-level changes.	
	5 Interpret fossils and geologic evidence to reconstruct Earth's history.	
7	**Knowledge of the characteristics and management of Earth's resources**	**8%**
	1 Identify characteristics of renewable and nonrenewable resources.	
	2 Evaluate management strategies for renewable and nonrenewable resources.	
	3 Assess the use and management of Florida's geologic, marine, and environmental resources.	
	4 Compare various energy production technologies (e.g., fossil fuels, nuclear, solar) and their past, present, and future consequences to the environment.	
	5 Identify the impact of humans on Earth (e.g., deforestation, urbanization, desertification, erosion, air and water quality, changing the flow of water).	
8	**Knowledge of oceans and coastal processes**	**8%**
	1 Identify the characteristics of ocean basins, continental shelves, and coral reefs.	
	2 Identify the geologic features of coastal geomorphic structures (e.g., barrier islands, estuaries, sandbars, capes, deltas, coral reefs).	
	3 Analyze the movement of water through waves, tides, and currents.	
	4 Identify the chemical, physical, and biological characteristics of seawater.	
	5 Determine the causes and effects of surface currents, coastal upwelling, and density-driven (i.e., thermohaline) circulation.	

Competency/Skill		Approx. %
6	Identify the effects of human activity on the coastal and marine environment.	
9	**Knowledge of factors that influence atmospheric conditions and weather**	**8%**
1	Analyze the composition and structure of the atmosphere and how it protects life and insulates the planet.	
2	Differentiate between the sources, characteristics, and movement of air masses (e.g., maritime, continental, polar, tropical).	
3	Identify characteristics of high and low pressure systems, including the formation of fronts and severe weather systems.	
4	Identify factors that cause local winds (i.e., land and sea breezes) and global winds (e.g., pressure belts, Coriolis effect).	
5	Determine how the transfer of energy throughout the atmosphere influences weather conditions (e.g., hydrologic cycle).	
6	Interpret weather maps and the indicated atmospheric conditions.	
7	Evaluate how local weather is affected by geographic features (e.g., proximity to bodies of water, urban versus rural settings, unequal heating of land and water).	
8	Identify characteristics of weather systems that affect Florida.	
9	Identify how global climate influences, such as jet streams and ocean currents, affect weather (e.g., El Niño).	
10	**Knowledge of Earth's climate patterns**	**9%**
1	Identify the factors that contribute to the climate of a geographic area.	
2	Identify the causes and effects of climate changes throughout Earth's history.	
3	Assess how the cycling of carbon, energy, and water between the geosphere, hydrosphere, and atmosphere affects climate.	
4	Determine the effects of climate phenomena (e.g., monsoons, jet streams, El Niño).	
5	Identify how climate changes may affect Florida's surface features, weather patterns, and biological diversity.	

Competency/Skill		**Approx. %**
11	**Knowledge of astronomical objects and processes**	**9%**
1	Identify the characteristics (e.g., mass, composition, location) of the major and minor objects in the solar system.	
2	Identify types and characteristics of deep space objects (e.g., quasars, galaxies, pulsars, black holes).	
3	Interpret the Hertzsprung-Russell diagram with regard to stellar evolution and star characteristics.	
4	Interpret the sequences and forces involved in the origin and evolution of the solar system.	
5	Identify the causes and effects of the cycles of the Earth-Moon-Sun system (e.g., seasons, tides, eclipses, precession, moon phases).	
6	Identify the physical properties of the Sun, its dynamic nature, and its effects on Earth systems.	
7	Identify the matter and forces involved in the evolution of the universe (e.g., big bang theory).	
12	**Knowledge of space exploration**	**6%**
1	Compare relative and absolute methods for measurement of astronomical distances.	
2	Evaluate functions and benefits of the different types of ground- and space-based astronomical instruments (e.g., x-ray, optical, infrared, radio telescopes, spectrometers).	
3	Interpret electromagnetic spectra and radiation intensity data from astronomical objects.	
4	Identify significant manned and unmanned space exploration events, programs, and objectives.	
5	Identify the historical development of astronomy based on the contributions of Aristotle, Ptolemy, Copernicus, Brahe, Kepler, Galileo, Newton, Einstein, and Hubble.	
6	Evaluate the cultural and economic effects of the space program in Florida.	

5 Test Format and Sample Questions

The Earth-Space Science 6–12 subject area test consists of approximately 120 multiple-choice questions. You will have two and one-half hours to complete the test.

Each question will contain four response options, and you will indicate your answer by selecting **A**, **B**, **C**, or **D**.

The table below presents types of questions on the examination and refers you to a sample question of each type.

Type of Question	Sample Question
Scenario Examine a situation, problem, or case study. Then answer a question, make a diagnosis, or recommend a course of action by selecting the best response option.	Question 4, page 15
Sentence completion Select the response option that best completes the sentence.	Question 8, page 16
Graphics Examine a drawing or a diagram and select the response option that best answers the question.	Question 14, page 17
Command Select the best response option.	Question 17, page 18
Direct question Choose the response option that best answers the question.	Question 26, page 19

Sample Questions

The following questions represent both the form and content of questions on the examination. These questions will acquaint you with the general format of the examination; however, these sample questions do not cover all of the competencies and skills that are tested and will only approximate the degree of examination difficulty.

An answer key follows at the end of the sample questions. The answer key includes information regarding the competency to which each question is linked.

DIRECTIONS: Read each question and select the best response.

1. In scientific investigations, which of the following steps is most likely to occur first?
   A. forming conclusions
   B. posing questions
   C. designing an experiment
   D. communicating results

2. A class of 7th-grade science students conducting an experiment involving tomato plants collected both quantitative and qualitative data. Which data were qualitative?
   A. average height of the plants
   B. length of the stems of each plant
   C. number of leaves on each plant
   D. general appearance of the plants

3. Evidence that supported Harry Hess's theory of seafloor spreading led scientists to review which scientist's hypothesis of continental drift?
   A. Evangelista Torricelli
   B. Alfred Wegener
   C. Joseph Louis Gay-Lussac
   D. Auguste Piccard

4. A scientist collects and tests the pH of water from six local ponds following major rainstorms to determine whether rainfall increases the acidity of pond water. The most significant flaw in the scientist's experimental design is that it is lacking
   A. manipulated variables.
   B. a clear hypothesis.
   C. control data.
   D. a dependent variable.

5. An anemometer would be used in determining
   A. air temperature.
   B. relative humidity.
   C. wind speed.
   D. atmospheric pressure.

6. The continental crust is thickest beneath
   A. mountains.
   B. oceans.
   C. valleys.
   D. plains.

7. Which of the following types of rock is formed by the cooling and hardening of magma or lava?
   A. metamorphic
   B. clastic sedimentary
   C. igneous
   D. organic precipitate

8. Crystals ranging in size from 2 cm to 5 cm are found embedded in rock being excavated from a mine. The size of the crystals being excavated suggests that the rock being excavated is a(an)
   A. igneous rock that took a very short time to cool.
   B. igneous rock that took a very long time to cool.
   C. metamorphic rock that formed near the surface.
   D. metamorphic rock that formed from granite.

9. Paleomagnetic surveys of the Atlantic Ocean indicate that the oceanic crust is
   A. older near the Mid-Atlantic Ridge and younger near Africa.
   B. older near North America and younger near Africa.
   C. younger near the Mid-Atlantic Ridge and older near North America.
   D. younger near North America and older near Africa.

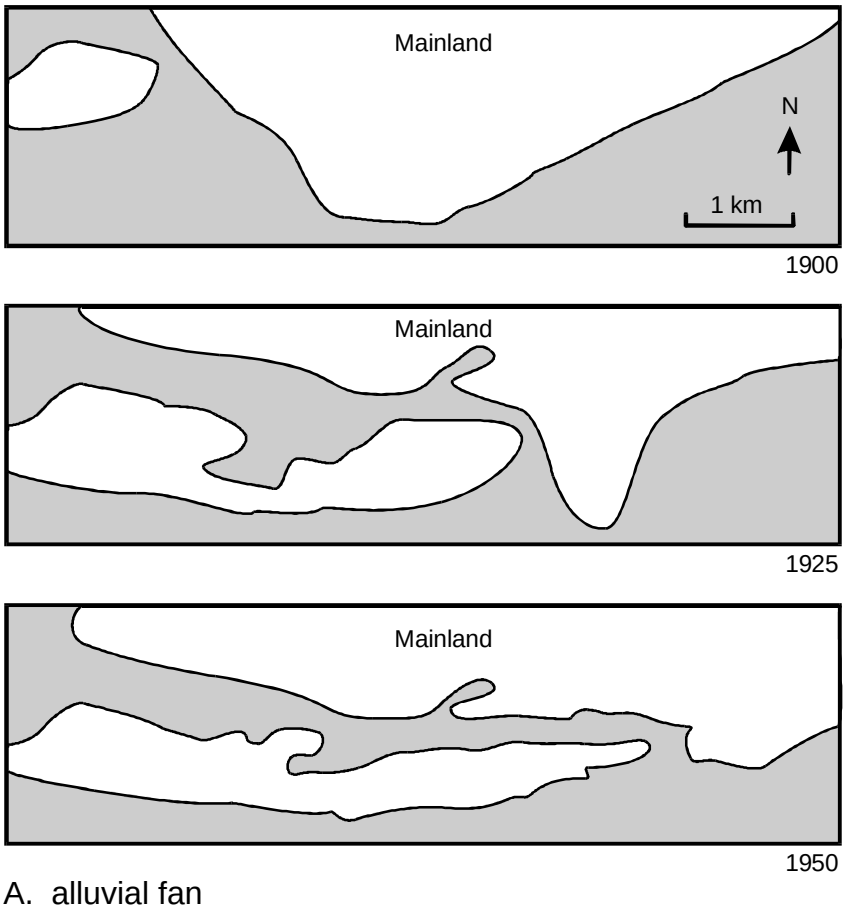
10. One major difference between mechanical weathering and chemical weathering is that mechanical weathering
   A. leaves the composition of the rock unchanged.
   B. causes decomposition of rock through organic acids.
   C. breaks down rock through hydrolysis.
   D. changes rock by the process of oxidation.

11. In graded bedding of sedimentary rocks, the largest grains of sediment are found
   A. evenly dispersed among the finer grains of the sedimentary deposit.
   B. randomly clustered as concretions in different layers of the sediment.
   C. uniformly layered between multiple layers of the finer sediments.
   D. primarily concentrated toward the bottom of the sedimentary deposit.

12. The process of sublimation would most likely be a part of the hydrologic cycle in which of the following environments?
    A. temperate
    B. desert
    C. tropical
    D. arctic

13. Which region in Florida would most likely have deep peat soils?
    A. Everglades
    B. central highlands
    C. Panhandle
    D. barrier islands

14. Which geologic feature is shown to be forming in the map sequence?



    A. alluvial fan
    B. sea arch
    C. barrier island
    D. sea stack

15. Radiosondes carried by balloons into the upper atmosphere allow meteorologists to obtain which of the following measurements?
    A. humidity, air temperature, pressure
    B. precipitation amounts, vorticity, cloud type
    C. precipitation type, helicity, cloud type
    D. bathymetry, sea-surface temperature, ozone level

16. The presence of rich deposits of phosphate indicate what geologic events in Florida's history?
    A. rise and fall of sea level
    B. active plate movements
    C. presence of ancient volcanoes
    D. advance of glaciers over Florida

17. Identify a proven source of renewable energy.
    A. natural gas
    B. nuclear fusion
    C. tidal energy
    D. shale oil

18. Methane production, incomplete decomposition, and release of leachates are problems associated with
    A. waste disposal.
    B. deforestation.
    C. desertification.
    D. nuclear disposal.

19. Phytoplankton play an important role in balancing Earth's climate by taking in
    A. ozone and producing diatomic oxygen.
    B. carbon dioxide and producing oxygen.
    C. nitrogen oxides and producing methane.
    D. water vapor and producing carbon dioxide.

20. Surface currents in the Northern Hemisphere curve toward the right because of the
    A. differences in ocean water temperatures.
    B. surface variations in ocean water salinity.
    C. gravitational attraction of the Moon.
    D. rotation of Earth.

21. Scientists can best preserve the Everglades and save its endangered wildlife by
    A. spreading cattails throughout the region.
    B. adding blue-green algae to the water.
    C. reducing the amount of water diverted for agriculture.
    D. replacing the soil nutrients with nitrogen and phosphorus.

22. Which of the following is a major factor in the suppression of hurricanes in the Atlantic Basin?
    A. increased Intertropical Convergence Zone activity
    B. warmer than normal Gulf Stream current
    C. blocking low pressure system over eastern Florida
    D. a strong El Niño event

23. The temperature at which frost will form is most heavily influenced by
    A. barometric pressure.
    B. wind speed.
    C. adiabatic lapse rate.
    D. relative humidity.

24. As a very cold, dry air mass moves over the Great Lakes during early December, which of the following weather events can be expected?
    A. thunderstorms along the southern side of the lakes
    B. heavy snow on the eastern and southern sides of the lakes
    C. ice storms along the northern side of the lakes
    D. heavy rainfall on the western and northern sides of the lakes

25. Maritime tropical air masses that settle across the state of Florida in the summer typically produce
    A. high humidity.
    B. tornado outbreaks.
    C. low dew points.
    D. drought conditions.

26. Which of the following planets could float on water due to its low density?
    A. Mars
    B. Saturn
    C. Venus
    D. Earth

27. During which phases of the Moon do spring tides occur?
    A. new and full
    B. first and last quarter
    C. waxing and waning crescent
    D. waxing and waning gibbous

28. The average distance between Earth and the Sun is how many astronomical units?
    A. 1
    B. 93
    C. 93,000,000
    D. 150,000,000

29. One advantage of a radio telescope over an optical telescope is that a radio telescope
    A. can view the sky continuously regardless of surface weather conditions.
    B. is capable of producing sharper images of celestial bodies.
    C. is able to enlarge the image of a celestial object to a greater extent.
    D. can be built smaller and still receive an adequate signal.

30. Scientists can identify the composition of an excited gas from its emission spectrum. This process measures the
    A. van der Waals constant of the emitted photon.
    B. position of the moving electron.
    C. frequency of the emitted wave lengths.
    D. directional electron spin in the *s* orbital.

Answer Key

Question Number	Correct Response	Competency
1.	B	1
2.	D	1
3.	B	1
4.	C	1
5.	C	1
6.	A	2
7.	C	2
8.	B	2
9.	C	3
10.	A	4
11.	D	4
12.	D	4
13.	A	4
14.	C	5
15.	A	5
16.	A	6
17.	C	7
18.	A	7
19.	B	8
20.	D	8
21.	C	8
22.	D	9
23.	D	9
24.	B	9
25.	A	9
26.	B	11
27.	A	11
28.	A	12
29.	A	12
30.	C	12

6 Annotated Bibliography

The annotated bibliography that follows includes basic references that you may find useful in preparing for the exam. Each resource is keyed to the competencies and skills found in Section 4 of this guide.

This bibliography is representative of the most important and most comprehensive texts as reflected in the competencies and skills. The Florida Department of Education does not endorse these references as the only appropriate sources for review; many comparable texts currently used in teacher preparation programs also cover the competencies and skills that are tested on the exam.

1. Ahrens, C. D. (2009). *Meteorology today* (9th ed.). Belmont, CA: Brooks/Cole Cengage Learning.

Encourages active observation of weather to apply information in the text to the real world. Emphasizes the dynamic nature of weather phenomena. Includes pedagogical features that encourage observing, calculating, and synthesizing information. Useful for review of competencies 9 and 10.

2. American Association for the Advancement of Science. (2001). *Atlas of science literacy Vol. 1 (2001), Vol. 2 (2007).* Washington, DC: AAAS Press.

Conceptual maps depict connections among the learning goals established in *Benchmarks for Science Literacy* and *Science for All Americans*. Fifty linked maps show how students from kindergarten through 12th grade can expand their understanding and skills toward specific science literacy goals. Maps also show connections across different areas of mathematics, technology, and science, including gravity, evolution and natural selection, the structure of matter, and the flow of matter and energy in ecosystems. Volume two provides an additional 44 maps and includes a focus on historical perspective and the nature of science. Useful for review of competency 1.

3. American Meteorological Society (2006–2007). [Online].

Provides links to atmospheric, oceanic, and hydrological sciences. Includes National Weather Service glossary of atmospheric terms. Useful for review of competencies 4, 5, 7–10, and 12.

4. Arny, T. T. (2008). *Explorations: An introduction to astronomy* (5th ed.). Boston: McGraw-Hill Higher Education.

Emphasizes accuracy and current information. Uses analogies and everyday examples to present information about astronomy in a way students can understand. Useful for review of competencies 11 and 12.

5. Chaisson, E., & McMillan, S. (2008). *Astronomy: A beginner's guide to the universe* (5th ed.). Upper Saddle River, NJ: Pearson Prentice Hall.

Basic astronomy and space science text. Focuses on the process of scientific method and discovery. Also includes some information on geology and Earth science. Useful for review of competencies 11 and 12.

6. Chang, R. (2009). *Chemistry* (10th ed.). Boston: McGraw-Hill Higher Education.

Balances theory and application by incorporating examples and helping students visualize three-dimensional atomic and molecular structures. Useful for review of competencies 1 and 2.

7. Florida Department of Environmental Protection. (2008). *Florida Geological Survey.* [Online].

Contains Florida-specific information on rocks and minerals, fossils, hydrogeology, mineral resources, and sinkholes. Useful for review of competencies 4, 6, and 7.

8. Lutgens, F. K., Tarbuck, E. J., & Tasa, D. (2008). *Foundations of Earth science* (5th ed.). Boston: Pearson Allyn & Bacon.

Emphasizes broad, up-to-date coverage of basic topics and principles in geology, oceanography, meteorology, and astronomy. Useful for review of competencies 1–4 and 6–12.

9. Miller, G. T., & Brewer, R. (2008) *Living in the environment.* (15th ed.). Brooks/Cole.

Provides theory and practical applications of Earth's major resources and how they are used. Useful for review of competency 7.

10. National Geographic Society. (2008). *Earth science: Geology, the environment, and the universe.* New York: Glencoe McGraw-Hill.

Provides comprehensive coverage of concepts exceeding state and local standards. Conceptual presentation is organized around themes, big ideas, and main ideas in Earth science. Useful for review of competencies 1–12.

11. National Oceanic and Atmospheric Administration. (2008). *Florida Keys National Marine Sanctuary.* [Online].

Offers information about Florida marine habitats, resources for education, and research. Useful for review of competencies 4, 7, and 8.

12. National Oceanic and Atmospheric Administration. (2008). *NOAA education.* [Online].

Contains information on weather, climate change, and the Earth, oceans and coasts, satellites and space, as well as other links. Useful for review of competencies 5, 7–10, and 12.

13. Owen, C., Pirie, D., & Draper, G. (2006). *Earth lab: Exploring the Earth sciences* (2nd ed.). Belmont, CA: Brooks/Cole Cengage Learning.

Includes new chapters on glaciation, mass wasting, and natural processes in deserts. Other chapters include activities on rock identification that help students explore Earth's history, and information on plate tectonics and earthquakes. Useful for review of competencies 2–10

14. Schnee, J. (n.d.). *The economic impacts of the U.S. space program*. [Online].

Report from the Business Administration Department of Rutgers University on the economic effects of the United States space exploration program. Useful for review of competency 12.

15. Tarbuck, E. J., Lutgens, F. K., & Tasa, D. (2008). *Earth science* (12th ed.). Upper Saddle River, NJ: Pearson Prentice Hall.

Introductory college-level text. Includes coverage of geology, oceanography, meteorology, and astronomy. Useful for review of competencies 2–4 and 6–12.

16. Townsend, C. R., Begon, M., & Harper, J. L. (2008). *Essentials of ecology* (3rd ed.). Malden, MA: Blackwell Publishing.

Outlines essential principles of ecology from theoretical fundamentals to practical applications. Includes a chapter on evolutionary ecology. Useful for review of competency 7.

17. Trujillo, A. P., & Thurman, H. V. (2008). *Essentials of oceanography* (9th ed.). Upper Saddle River, NJ: Pearson Prentice Hall.

Presents in-depth discussions of oceanographic concepts. Systems approach highlights the interdisciplinary relationship between oceanographic phenomena and other Earth systems. Scientific information from geology, chemistry, physics, and biology is incorporated to illustrate how each of these disciplines relates to the ocean. Useful for review of competency 8.

18. U.S. Environmental Protection Agency. (2008). *Climate change.* [Online].

Contains comprehensive information on the issue of climate change. Useful for review of competency 10.

19. U.S. Environmental Protection Agency. (2008). *National Estuary Program.* [Online].

Contains information on the National Estuary Program for attaining or maintaining water quality in estuaries. Focuses on the watershed, uses science to inform decision making, and emphasizes collaborative problem solving. Useful for review of competencies 4 and 7

20. U.S. Geological Survey. (2008). [Online].

Contains fact sheets, data links, and educational resources on mapping geology, climate, natural resources, and natural hazards. Includes an online book *This Dynamic Earth: The Story of Plate Tectonics*. Useful for review of competencies 2–10.

21. U.S. Geological Survey. (2008). *This Dynamic Earth: The story of plate tectonics.* [Online].

Contains an illustrated overview of plate tectonics. Useful for review of competency 3.

22. U.S. Geological Survey. (2008). *Florida Integrated Science Center.* [Online].

The Florida Integrated Science Center has a special mission to provide U.S. Geological Survey science to Florida, the southeastern states, the U.S. Caribbean, and elsewhere. Provides information on stream stage, stream flow, water quality, and groundwater levels for sites throughout Florida. Useful for review of competencies 4, 7, and 8.

23. University of Florida Institute of Food and Agricultural Sciences Extension. (2008). *Electronic Data Information Source*. [Online].

Provides a comprehensive, single-source repository of all current University of Florida Institute of Food and Agricultural Sciences publications. Each publication is numbered and peer-reviewed. Useful for review of competency 7.

24. Victor, E., Kellough, R. D., & Tai, R. H. (2008). *Science K–8: An integrated approach* (11th ed.). Boston: Pearson Allyn & Bacon.

Based on integrated learning by inquiry. Content outlines the big ideas of life, Earth, and physical science. Content correlates with National Science Education Standards. Discusses the relationships between curriculum standards, assessment, and high-stakes achievement testing. Includes a listing of science-oriented Web sites. Useful for review of competencies 1–12.

25. Wright, R. T. (2008). *Environmental science: Toward a sustainable future* (10th ed.). Upper Saddle River, NJ: Pearson Prentice Hall.

Presents a full spectrum of views and information on environmental science to allow students to evaluate issues and make informed decisions. Useful for review of competency 7.

26. Zhang, K., Douglas, B. C., & Leatherman, S. P. (2004). Global warming and coastal erosion. *Climatic Change*, 64(1-2), 41–58.

Uses shoreline field data to show an association between beach erosion and rising sea levels in the 19th and 20th centuries. Emphasizes the exacerbation of rising sea levels associated with global warming. Useful for review of competencies 8 and 9.

7 Additional Information

Please visit the following Web site to review FTCE registration details and to find additional FTCE information, including test locations and passing scores.

www.fldoe.org/accountability/assessments/postsecondary-assessment/ftce/