

**Florida Teacher Certification Examination
Test Preparation Guide
for
Middle Grades General Science 5-9**



FLORIDA DEPARTMENT OF EDUCATION

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Institute for Instructional Research and Practice
College of Education
University of South Florida

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FTCE Administrator
Florida Department of Education
325 West Gaines Street, Suite 414
Tallahassee, Florida 32399-0400

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Test and Test Preparation Guide Development

Teacher Certification Testing

Since 1980, Florida teacher certification candidates have been required to pass the Florida Teacher Certification Examination (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 Middle Grades General Science 5-9 examination was identified and validated by committees of content specialists from within the state of Florida. A majority of the committee members were public school teachers, but the committees also included district supervisors and college faculty with expertise in this field. Committee members were selected on the basis of recommendations by professional associations, experts in the field, and teachers' unions. 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 Preparation Guide

The purpose of this test preparation guide is to help candidates taking the Initial Teacher Subject Area Test in Middle Grades General Science 5-9 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 preparation 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 preparation 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 items are not an exact representation of the content of the actual test. 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.



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 preparation guide.**

Section 1 discusses the development of the test and test preparation guide.

Section 2 (this section) outlines test preparation steps.

Section 3 presents information about the content of the test.

Section 4 lists question formats and includes sample test items.

Section 5 offers strategies for taking the test.

Section 6 identifies sources of further information.

Self-Assessment

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

Section 3 includes the competencies and skills used to develop this subject area test and the approximate proportion of test items from each competency area.

Review

- **Study according to your needs.**

Review all of the competencies, concentrating on areas with which you are least familiar.

Practice

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

Section 4 describes types of questions you may find on the examination.

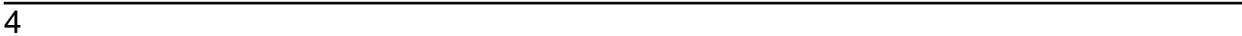
- **Answer sample test questions.**

Section 4 gives you an opportunity to test yourself with sample test questions and provides an answer key.

Final preparation

- **Review test-taking advice.**

Section 5 includes suggestions for improving your performance on the examination.



3

Competencies and Skills

The table on the following pages lists the competencies and skills used as the basis for the Middle Grades General Science 5-9 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 to organize your review.

The following excerpt illustrates the components of the table:

<i>Competency</i>	<i>Percentage of total test items</i>
Competency/Skill	%
1 Knowledge of the structure and behavior of matter	9
1 Identify the physical and chemical properties of matter (e.g., mass, volume, density, chemical reactivity). 2 Distinguish between the states of matter (e.g., solid, liquid, gas, plasma). 3 Apply knowledge of the gas laws (e.g., relationships between temperature, pressure, volume of gases). 4 Identify the major discoveries in the development of the atomic theory. 5 Identify the characteristics of elements, compounds, and mixtures. 6 Apply knowledge of symbols, formulas, and equations for common elements and compounds, and their reactions. 7 Identify characteristics and functions of the components of an atom.	

Skill

Competencies are areas of content knowledge.

Skills identify behaviors that demonstrate the competencies.

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

Table of Competencies, Skills, and Percentages

Competency/Skill	%
1 Knowledge of the structure and behavior of matter	9
<ol style="list-style-type: none">1 Identify the physical and chemical properties of matter (e.g., mass, volume, density, chemical reactivity).2 Distinguish between the states of matter (e.g., solid, liquid, gas, plasma).3 Apply knowledge of the gas laws (e.g., relationships between temperature, pressure, volume of gases).4 Identify the major discoveries in the development of the atomic theory.5 Identify the characteristics of elements, compounds, and mixtures.6 Apply knowledge of symbols, formulas, and equations for common elements and compounds, and their reactions.7 Identify characteristics and functions of the components of an atom.8 Identify chemical or physical properties of elements based on their placement on the periodic table.9 Identify characteristics of types of chemical bonding (e.g., covalent, ionic, metallic, hydrogen).10 Identify types of chemical reactions and their characteristics.	
2 Knowledge of forces and motion and their relationship	10
<ol style="list-style-type: none">1 Differentiate between the types and characteristics of forces (e.g., electrical, magnetic, nuclear, gravitational, frictional).2 Identify applications of Newton's laws of motion.3 Solve problems involving force and motion.4 Identify types, characteristics, and properties of waves (e.g., sound, electromagnetic, seismic, water).5 Identify characteristics of wave phenomena (e.g., intensity, refraction, diffraction, interference, Doppler effect, wave-particle duality) as they apply to everyday situations.6 Identify causes, characteristics, and examples of electricity (e.g., static, current).7 Apply knowledge of currents, circuits, conductors, insulators, and resistors to everyday situations.8 Identify types of magnets and characteristics of magnetic fields.9 Apply knowledge of magnets and magnetic fields to everyday situations.	

Competency/Skill	%
10 Identify characteristics of motion (e.g., speed, velocity, acceleration, distance, time, units of measurement).	
3 Knowledge of energy and its effects	10
<ol style="list-style-type: none"> 1 Relate energy to transitions between states of matter. 2 Distinguish between temperature, heat, and thermal energy. 3 Distinguish between the types of thermal energy transfer (e.g., radiation, conduction, convection). 4 Apply the laws of thermodynamics to real-world situations. 5 Differentiate between potential and kinetic energy. 6 Identify characteristics of nuclear reactions. 7 Identify the regions of the electromagnetic spectrum and energy associated with each. 8 Identify the use of light and optics in practical applications (e.g., optical instruments, communication). 9 Solve problems involving energy, work, power, mechanical advantage, and efficiency. 10 Apply the law of conservation of mass and energy to chemical reactions, nuclear reactions, physical processes, and biological processes. 11 Identify types, characteristics, and measurement of electrical quantities. 12 Solve mathematical problems involving current, voltage, power, and energy in direct current (DC) circuits. 	
4 Knowledge of Earth and the processes that affect it	18
<ol style="list-style-type: none"> 1 Relate geologic processes to the movement of tectonic plates. 2 Identify characteristics of geologic structures and the mechanisms by which they were formed. 3 Identify the characteristics of geologic eras (e.g., geologic events, biotic factors, abiotic factors). 4 Apply methods for determining geologic age. 5 Interpret various map types, including topographic, geologic, and weather maps, that contain symbols, scales, legends, directions, time zones, elevations, latitudes, and longitudes. 6 Identify characteristics of ocean currents and their formations. 7 Identify characteristics of seafloors, shorelines, estuaries, and sea zones. 	

Table of Competencies, Skills, and Percentages

Competency/Skill	%
<ul style="list-style-type: none"> 8 Identify chemical and physical properties of ocean water. 9 Identify major classifications of rocks, minerals, and fossils and processes by which each is formed. 10 Identify properties of major types of rocks, minerals, and soils. 11 Apply knowledge of the processes of weathering, erosion, and deposition. 12 Identify the features, functions, and characteristics of the atmospheric layers. 13 Relate atmospheric conditions to weather. 14 Identify the relationship between climate, landforms, and continental drift in both past and present. 15 Identify the movement of water in the hydrologic cycle, including sources of water, types of precipitation, and causes of condensation. 16 Identify ways in which earth and water interact (e.g., soil absorption, runoff, leaching, groundwater, karst topography). 17 Identify natural and man-made methods of water storage (e.g., aquifers, reservoirs, water sheds). 18 Interpret processes that affect Earth by applying chemical and physical laws. 	
5 Knowledge of space science	8
<ul style="list-style-type: none"> 1 Identify consequences of Earth's motions and orientation (e.g., seasons, tides, lunar phases). 2 Compare characteristics of stars. 3 Identify devices and techniques for collecting and analyzing data about stars and other celestial objects. 4 Interpret astronomical data (e.g., spectral analysis, retrograde motion). 5 Identify the components of the solar system (e.g., Kuiper belt, Oort cloud), their individual characteristics, and how they interact (e.g., solar winds, impacts, gravitation attraction). 6 Identify structures in the universe in terms of formation, age, location, characteristics, and evolution of the universe. 	

Competency/Skill	%
6 Knowledge of processes of life	16
<ol style="list-style-type: none"> 1 Identify the relationships between biological processes and the chemical nature of life. 2 Distinguish between prokaryotes and eukaryotes. 3 Relate cell organelles to their functions. 4 Identify the sequence of events, the significance of the process, and the consequences of irregularities of mitosis and meiosis. 5 Apply principles of Mendelian genetics in working monohybrid and dihybrid crosses and crosses involving linked genes. 6 Apply principles of human genetics, including relationships between genotypes and phenotypes and causes and effects of disorders. 7 Identify the role of deoxyribonucleic acid (DNA) and ribonucleic acid (RNA) in protein synthesis and replication. 8 Classify organisms based on the levels of biological taxonomy. 9 Identify microorganisms and their characteristics. 10 Differentiate between structures and functions of plant and animal cells and their organelles. 11 Identify plant structures and their functions. 12 Identify the major steps of plant processes (e.g., photosynthesis, respiration, transpiration, reproduction). 13 Identify the major steps of animal physiological processes (e.g., digestion, respiration, circulation, reproduction). 14 Identify the structures and functions of the organs and organ systems of various kinds of animals, including humans. 15 Identify patterns of animal behavior (e.g., territorial, social communication, learned, instinctive). 	
7 Knowledge of the effects of physical and biological factors on the environment	10
<ol style="list-style-type: none"> 1 Identify components and sequences of biogeochemical cycles (e.g., carbon, oxygen, hydrogen, nitrogen). 2 Identify issues related to the development, use, and conservation of natural resources. 3 Relate environmental factors to the adaptation and survival rates of organisms. 	

Table of Competencies, Skills, and Percentages

Competency/Skill	%
<ol style="list-style-type: none"> 4 Identify the major characteristics of world biomes and communities, including succession and interrelationships of organisms. 5 Identify how biotic and abiotic factors influence environmental conditions (e.g., population density, ozone depletion, greenhouse effect). 6 Identify interactions between microorganisms and the environment. 7 Identify the effects of homeostasis on the survivability of a biologic entity. 8 Relate the interactions of biotic and abiotic factors within a system to the flow of matter and energy. 9 Identify the relationship between physical and biological factors and Florida's ecosystems. 	
<p>8 Knowledge of classroom and laboratory management</p>	<p>5</p>
<ol style="list-style-type: none"> 1 Identify procedures for proper use, care, and handling of organisms. 2 Identify the appropriate use and management of laboratory equipment for specified activities. 3 Identify appropriate alternative sources of and substitutions for laboratory materials. 4 Identify the accepted State and local procedures for safe preparation, use, storage, and disposal of chemicals and other materials. 	
<p>9 Knowledge of process skills and application of scientific inquiry</p>	<p>14</p>
<ol style="list-style-type: none"> 1 Apply knowledge of the science processes of observing, inferring, communicating, classifying, and predicting. 2 Apply knowledge of the science processes of measuring and graphing. 3 Apply knowledge of designing and performing scientific investigations (e.g., forming hypotheses, controlling variables, defining operationally, interpreting data). 4 Apply knowledge of using indirect evidence and models. 5. Identify historical figures and their contributions to the development of scientific thought. 6. Apply knowledge of mathematics and technology to scientific investigation. 7 Identify student misconceptions by analyzing student work. 8 Identify appropriate strategies for teaching scientific inquiry. 	



4 Test Format and Sample Questions

The Middle Grades General Science 5-9 subject area test consists of approximately 120 multiple-choice questions. You will have two-and-one-half hours to complete the test.

You will receive a test booklet and a separate answer sheet. Each question will contain four response options, and you will record your selection by bubbling in **A**, **B**, **C**, or **D** on the answer sheet.

The table below presents types of questions on the examination and directs you to examples of these formats among the sample items that follow.

Table of Question Formats

Type of question	Sample item
Direct question Choose the response option that best answers the question.	Item 1, page 13
Sentence completion Select the response option that best completes the sentence.	Item 3, page 13
Graphics Examine a drawing or a diagram and select the response option that best answers the question.	Item 10, page 15
Command Select the best response option.	Item 26, page 20
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.	Item 39, page 23

Sample Items

The following items represent both the form and content of questions you will encounter on the examination. These sample items cannot cover all of the competencies and skills that are tested, and they can only approximate the degree of difficulty of actual examination questions. However, these items will acquaint you with the general format of the examination.

An answer key follows on page 32.

DIRECTIONS: Read each item and select the best response.

- 1. Which of the properties listed below is a characteristic of a liquid but not of a gas?**
 - A. It has the ability to flow.
 - B. It maintains its volume in an open container.
 - C. Its molecules are constantly in motion.
 - D. Its volume varies depending on temperature.

- 2. A 0.100 m³ chamber is filled with oxygen gas at standard conditions (101 kPa at 273 k). Assuming ideal conditions and behavior, what will be the pressure of the gas in the chamber after it is heated to 819 k?**
 - A. 34 kPa
 - B. 51 kPa
 - C. 202 kPa
 - D. 303 kPa

- 3. In 1898, J.J. Thomson provided the first hard evidence for the existence of subatomic particles in the atom by using a cathode ray tube to discover the**
 - A. proton.
 - B. neutron.
 - C. electron.
 - D. nucleus.

- 4. If all of the atoms in a substance have the same atomic number, the substance is a(an)**
 - A. compound.
 - B. element.
 - C. mixture.
 - D. alloy.

- 5. The balanced chemical equation for the formation of iron(III) oxide is**
 - A. $\text{Fe} + \text{O}_2 \rightarrow \text{FeO}_2$.
 - B. $4\text{Fe} + 3\text{O}_2 \rightarrow 2\text{Fe}_2\text{O}_3$.
 - C. $3\text{Fe} + \text{O}_2 \rightarrow \text{Fe}_3\text{O}_2$.
 - D. $\text{Fe} + \text{O} \rightarrow \text{FeO}$.

6. **Small molecules that contain H bonded to O have higher boiling points than similar molecules in which H is bonded to S. Why does this change occur?**

- A. The H to O bond is nonpolar.
- B. The H to S bond is more polar than the H to O bond.
- C. The H to O bond is more polar than the H to S bond.
- D. The H to S bond is nonpolar.

7. **$A + B \rightarrow AB$**

What type of reaction is given above?

- A. combination
- B. decomposition
- C. double displacement
- D. single displacement

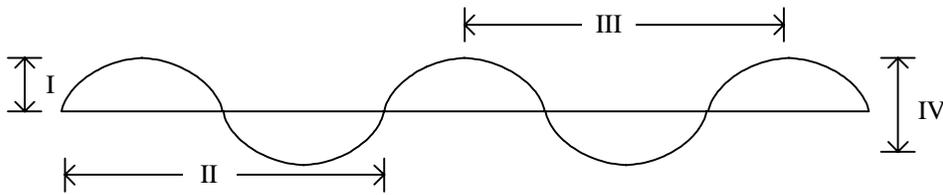
8. **According to Hooke's Law, the relationship between the elastic force and the distance of stretch for an elastic material is**

- A. inversely proportional.
- B. directly proportional.
- C. exponential.
- D. power squared.

9. **A ball rolls off a horizontal table and hits the floor at a faster vertical speed than when it leaves the table. This is an example of which law of objects in motion?**

- A. Newton's 1st law
- B. Newton's 2nd law
- C. Kepler's 1st law
- D. Kepler's 2nd law

10.



The diagram above shows an instantaneous image of a wave on a string. The rest position of the string is the horizontal straight line. Which of the double-headed arrows indicates the amplitude of the wave?

- A. I
- B. II
- C. III
- D. IV

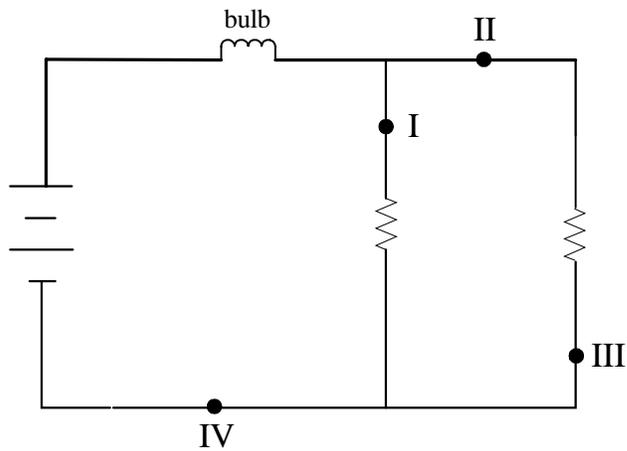
11. The pitch of a car's horn changes as the car approaches. This is an example of

- A. constructive interference.
- B. destructive interference.
- C. diffraction.
- D. the Doppler effect.

12. Two identical objects with identical electrostatic charges will

- A. repel one another.
- B. attract one another.
- C. have no effect on each other.
- D. emit a spark.

13.



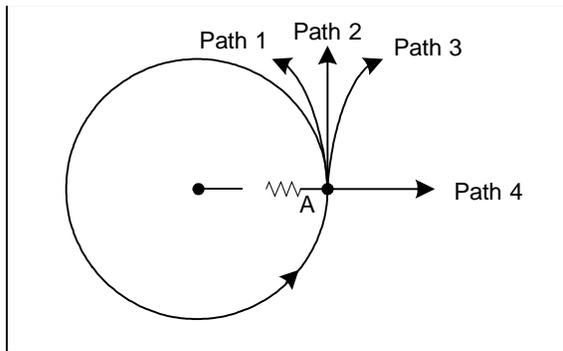
A light bulb is shown in the wiring diagram above. A second light bulb is to be inserted in series with the first bulb. Indicate at which of the locations I, II, III, or IV the bulb should be inserted.

- A. location I
- B. location II
- C. location III
- D. location IV

14. The device that converts electric energy to mechanical energy by the use of magnetic forces is a (an)

- A. generator.
- B. transformer.
- C. motor.
- D. rectifier.

15.



A stone attached to string 1 meter in length whirls horizontally on a table top. The string breaks when the stone is at point A on the diagram. Which path most closely resembles the resulting path of the stone?

- A. Path 1
- B. Path 2
- C. Path 3
- D. Path 4

16. Which phase change releases energy?

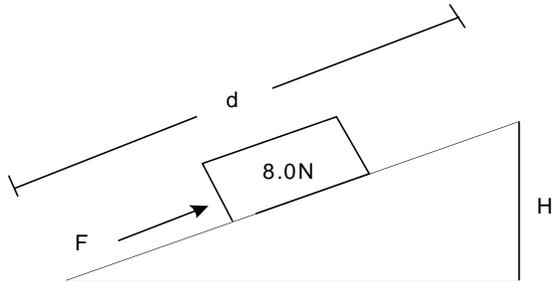
- A. melting
- B. evaporation
- C. condensation
- D. sublimation

17. Which of the following contains the greatest amount of thermal energy?

- A. burning candle
- B. cup of coffee
- C. oak tree
- D. lake

-
- 18. The input electrical energy of an overhead projector results in light emission, heat emission, and mechanical motion of the fan. This is a demonstration of**
- A. conservation of energy.
 - B. excess input energy.
 - C. decrease in entropy.
 - D. total loss of energy.
- 19. The splitting of the nucleus of U-235 into two or more fragments is called**
- A. alpha decay.
 - B. beta decay.
 - C. fission.
 - D. fusion.
- 20. Which type of radiation has the lowest energy?**
- A. x-rays
 - B. visible light
 - C. infrared
 - D. radio
- 21. A security mirror located in the back corner of a convenience store to enable a view of the entire store uses a**
- A. convex mirror.
 - B. concave mirror.
 - C. flat mirror.
 - D. parabolic mirror.

22.



A force of 5.0 N is required to push a block up an inclined plane of length $d = 3.0$ m at a constant speed. The block is lifted a height $H = 1.0$ m. The block weighs 8.0 N. What is the efficiency of the inclined plane?

- A. 62%
- B. 53%
- C. 33%
- D. 40%

23. What is the power drawn by a 120-volt microwave oven that is rated for 15 amps?

- A. 0.125 joules
- B. 8.0 watts
- C. 1800 watts
- D. 135 joules

24. According to the theory of plate tectonics, the energy that drives crustal plate movement originates in

- A. earthquakes.
- B. lithosphere fluidity.
- C. seafloor spreading.
- D. mantle convection.

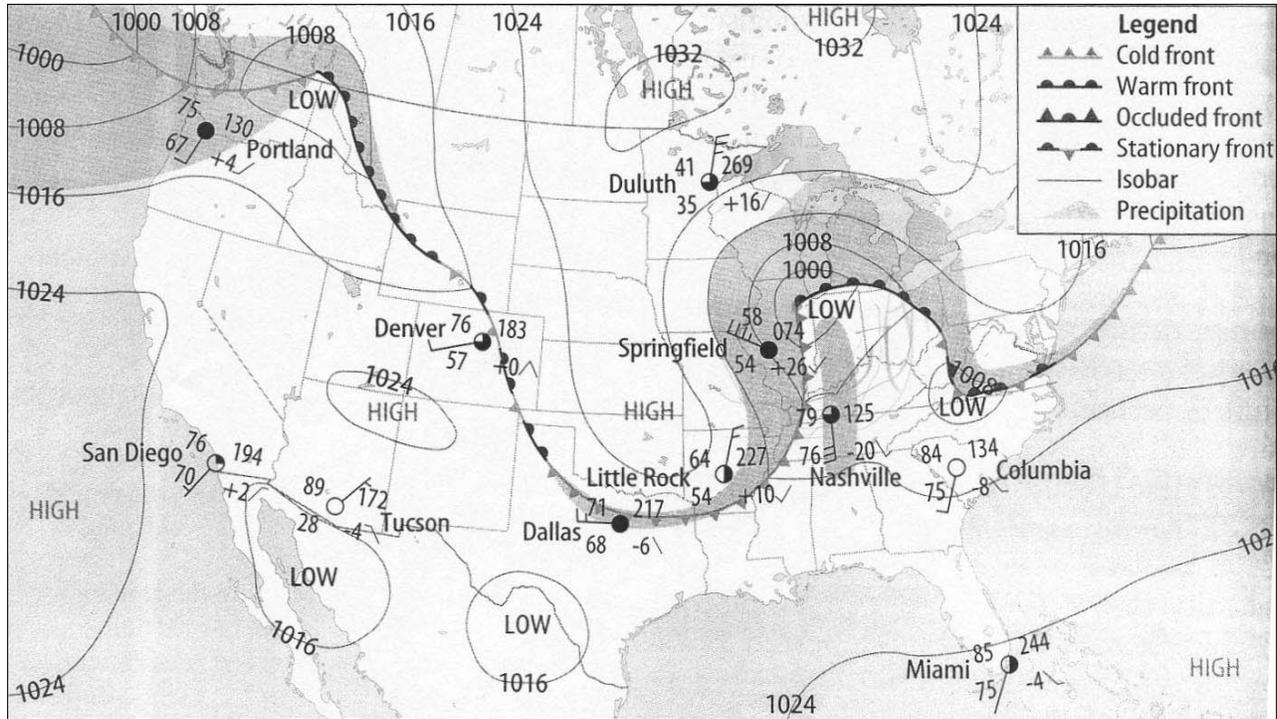
25. The time known as the "coal age" occurred during which geologic era?

- A. Precambrian
- B. Cenozoic
- C. Mesozoic
- D. Paleozoic

26. Identify the best method of determining the age of a single rock sample that contains no fossils.

- A. radioactive dating
- B. examination of mineral content
- C. application of the law of superposition
- D. crystal analysis

27.



According to the weather map, over the next 24 hours the cold front in the central United States will likely bring what conditions to the Midwest?

- A. dry weather and colder temperatures
- B. steady rain and colder temperatures
- C. dry weather and warmer temperatures
- D. steady rain and warmer temperatures

28. Which of the following surface ocean currents is known for being warm, fast, and narrow?

- A. California Current
- B. Canary Current
- C. West Wind Drift
- D. Gulf Stream

29. How do oceanic ridges differ from trenches?

- A. Ridges include extremely deep ocean structures; trenches refer to shallow ocean structures.
- B. Ridges mark divergent plate boundaries; trenches mark convergent plate boundaries.
- C. Ridges are referred to as the "shoulder" of the continents; trenches are found in the middle of the oceans.
- D. Ridges are the slopes from the continental shelf to the abyssal plain; trenches are where freshwater meets seawater.

30. The average salinity level of seawater in parts per thousand is closest to

- A. 10.
- B. 15.
- C. 35.
- D. 50.

31. Rocks that have cooled from the molten state are called

- A. igneous rocks.
- B. sedimentary rocks.
- C. metamorphic rocks.
- D. precipitated rocks.

32. Which list of minerals is arranged in order from lowest to highest, using the Mohs hardness scale?

- A. quartz, diamond, talc, calcite
- B. diamond, quartz, calcite, talc
- C. talc, calcite, quartz, diamond
- D. calcite, quartz, talc, diamond

-
- 33. How does the stratosphere differ from the troposphere?**
- A. Atmospheric pressure increases with height in the stratosphere.
 - B. The stratosphere is in contact with Earth's surface.
 - C. Most day-to-day weather originates in the stratosphere.
 - D. Temperatures increase with height in the stratosphere.
- 34. What major cloud formation is associated with warm, moist, rapidly rising air?**
- A. cirrocumulus
 - B. cirrostratus
 - C. cumulonimbus
 - D. nimbostratus
- 35. Limestone that is weathered by water results in the formation of land surface features known as**
- A. karst topography.
 - B. dunes.
 - C. loess deposits.
 - D. crevasses.
- 36. Worldwide problems of global warming, acid rain, and photochemical smog are mainly the result of**
- A. releasing chlorofluorocarbons.
 - B. overcultivating land.
 - C. burning fossil fuels.
 - D. dumping toxic wastes.
- 37. Why does Australia experience winter during the months of June, July, and August?**
- A. The Earth's orbital distance is farther from the Sun.
 - B. The Earth's Southern hemisphere is tilting on its axis away from the Sun.
 - C. The Earth's Southern hemisphere is tilting on its axis toward the Sun.
 - D. The Earth's orbital distance is closer to the Sun.

-
- 38. An astronomer would use a spectrometer to look at a star because the spectrometer**
- A. increases the magnification of the telescope.
 - B. provides detailed information on a star's mass.
 - C. helps analyze a star's temperature and composition.
 - D. increases the light gathering ability of a telescope.
- 39. An astronomer viewing a distant star notices the star's spectral lines are shifted toward longer wavelengths. This indicates the star is**
- A. moving toward the Earth.
 - B. very old.
 - C. very young.
 - D. moving away from the Earth.
- 40. A component of the solar system that consists of a nucleus, a dust tail, and an ion tail is a(an)**
- A. asteroid.
 - B. comet.
 - C. meteor.
 - D. meteorite.
- 41. What is the name of the cloud of gas and dust that, in theory, condenses to form a planetary system?**
- A. galaxy
 - B. constellation
 - C. nebula
 - D. comet
- 42. Saltwater surged into a pond, causing the *Elodea* population to decrease. What process contributed to the decrease in the population of these plants?**
- A. Saltwater is hypertonic, so water diffused into the plant cells.
 - B. Saltwater is hypertonic, so water diffused out of the plant cells.
 - C. Saltwater is hypotonic, so water diffused out of the plant cells.
 - D. Saltwater is hypotonic, so water diffused into the plant cells.

-
- 43. Which of the following is a distinguishing characteristic of prokaryotes?**
- A. no nucleus
 - B. no cell wall
 - C. cell organelles
 - D. mitochondria
- 44. A muscle cell contains a large number of which organelles?**
- A. lysosomes
 - B. endoplasmic reticula
 - C. nuclei
 - D. mitochondria
- 45. In humans, nondisjunction during meiosis may result in which of the following irregularities?**
- A. cystic fibrosis
 - B. pleiotropy
 - C. sickle cell
 - D. Down syndrome
- 46. What is the inheritance pattern typified by a 9:3:3:1 phenotype ratio in the F-2 generation?**
- A. complete dominance in a dihybrid cross
 - B. complete dominance in a monohybrid cross
 - C. incomplete dominance in a monohybrid cross
 - D. incomplete dominance in a dihybrid cross
- 47. Sickle-cell disease is a recessive genetic condition. Which genotype indicates that an individual has this disorder?**
- A. AA
 - B. Aa
 - C. AB
 - D. aa

48. Which sequence of events precedes protein synthesis?

- A. DNA replicates RNA, which goes to the lysosomes.
- B. RNA translates DNA, which goes to the lysosomes.
- C. DNA transcribes RNA, which goes to the ribosomes.
- D. RNA synthesizes DNA, which goes to the ribosomes.

49. A new aquatic invertebrate has been found. Its body is bilaterally symmetrical and flat, and it has the ability to regenerate. To what phylum does it belong?

- A. Porifera
- B. Platyhelminthes
- C. Nematoda
- D. Annelida

50. What characteristic is used in the classification of protozoans?

- A. their mode of locomotion
- B. their manner of obtaining food
- C. their method of reproduction
- D. the toxicity of their waste

51. Which of the following organelles is present in plant cells but not in animal cells?

- A. ribosome
- B. Golgi apparatus
- C. chloroplast
- D. endoplasmic reticulum

52. The endodermis of a mature primary root plays a role in

- A. absorbing water and minerals from the soil.
- B. regulating transport of water and minerals into vascular tissue.
- C. storing water, minerals, or nutrients for the plant.
- D. supporting the root structure of the plant.

53. Which of the following is a step in the sexual reproduction of plants?

- A. rhizome production
- B. spore production
- C. bulb production
- D. pollen production

54. In human digestion, stomach enzymes and acids break proteins into

- A. vitamins.
- B. sugars.
- C. peptides.
- D. pepsin.

55. Which of the following is part of the human endocrine system?

- A. pancreas
- B. larynx
- C. pharynx
- D. urethra

56. Which kind of behavior is illustrated in chimpanzees by their ability to use tools?

- A. instinctive
- B. learned
- C. social
- D. territorial

57. Which of the following is part of the nitrogen cycle?

- A. Bacteria fix nitrogen from the air.
- B. Nitrogen is produced by respiration.
- C. Nitrogen is given off during photosynthesis.
- D. Green plants use atmospheric nitrogen for food.

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- 58. Using hydrogen fuel cells instead of gasoline engines in cars would cause a(an)**
- A. decrease in carbon dioxide emission.
 - B. increase in chloroflourocarbon emissions.
 - C. increase in the amount of atmospheric ozone.
 - D. decrease in radioactivity in the atmosphere.
- 59. Which of the following is associated with a desert biome?**
- A. deciduous plant life
 - B. karst topography
 - C. shade-tolerant plant life
 - D. wind erosion
- 60. Which of the following is most likely to cause a bad odor and surface scum on a natural pond?**
- A. blue-green algae
 - B. nitrogen-fixing bacteria
 - C. yeast
 - D. bracket fungi
- 61. As a result of homeostasis, a marathon runner experiences which of the following physical effects as the body works to regulate its temperature?**
- A. increasing blood pressure and motor reflexes
 - B. increasing perspiration and breathing rates
 - C. decreasing blood pressure and motor reflexes
 - D. decreasing perspiration and breathing rates
- 62. The ecological succession of Florida grassland communities to forest communities is interrupted by**
- A. grazing mammals.
 - B. insect infestation.
 - C. periods of heavy rainfall.
 - D. seasonal fires.

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- 63. A biology teacher plans to bring his pet snake to class and feed it a live mouse in front of the students. He will obtain a signed parental permission slip from each student. His planned demonstration is**
- A. appropriate only if all parents have given their permission.
 - B. valuable for students to observe because it shows predator-prey relationships.
 - C. not permitted according to current State laws concerning the care and handling of vertebrates in schools.
 - D. subject to approval by the school administration.
- 64. At the end of a morning class, the teacher realizes that the laboratory equipment is spread throughout the room and not ready for use in the next class. To avoid this problem in the future, she should**
- A. set up a materials management procedure in which one person from each group checks the equipment out and in.
 - B. assign two students the responsibility of checking equipment out and in.
 - C. do laboratory activities that require fewer pieces of equipment and give students time to put them away.
 - D. have each class do the laboratory assignment on a different day to allow cleanup and preparation time.
- 65. The appropriate alternative piece of equipment to replace a voltmeter is a(an)**
- A. galvanometer.
 - B. multimeter.
 - C. odometer.
 - D. ohm meter.
- 66. The use of effective eye protective devices in school laboratories where potentially hazardous chemicals are used is**
- A. determined by the local district.
 - B. not required by State law.
 - C. recommended by State law.
 - D. required by State law.

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- 67. Which set of instruments is the best to use for calculating the density of an irregularly shaped object?**
- A. beaker, balance, and thermometer
 - B. metric ruler, balance, and thermometer
 - C. graduated cylinder and balance
 - D. metric ruler and balance
- 68. In the design of a scientific experiment, the investigator considers all factors that may influence the results and then plans ways to keep all but one of these factors constant. In so doing, the investigator is engaging in the scientific process of**
- A. collecting data.
 - B. organizing data.
 - C. forming hypotheses.
 - D. controlling variables.
- 69. A scientific investigation is set up to compare the cleaning ability of three different laundry detergents. Each of three identical pans containing 1 L of water at 75 °C has 100 g of a different laundry detergent dissolved in it. Three 5 cm x 5 cm squares, one of white cotton cloth, one of white wool, and one of white nylon, are each stained with 5 g of mustard. Each of these clothes is then soaked in a different pan for 1 hour, then allowed to dry. The results are recorded.**
- What is the major flaw in this experiment?**
- A. There is more than one independent variable.
 - B. The variables are not correctly identified.
 - C. All variables are held constant throughout the experiment.
 - D. There is no dependent variable.
- 70. Who is credited with creating the law showing that the relationship between current and voltage in a circuit depends upon the resistance in the circuit itself?**
- A. Alessandro Volta
 - B. James Watt
 - C. Georg Ohm
 - D. André-Marie Ampere

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- 71. A student group reported the mass of a sample of hydrochloric acid to be 4.5 g and the mass of a sample of calcium carbonate to be 6.8 g. Then the students mixed the two chemicals and reported the final mass of the product in the beaker to be 10.0 g. They reported that there was no significant difference between the reactants and the products, and that the difference was due to human error and the precision of the balance they used. The teacher should**
- A. praise the students for realizing that instruments used in the laboratory have limitations and that it is not unreasonable for them to find differences due to those limitations.
 - B. explain to the students how to use the balances again and ask the students to measure several objects while watching them to make sure that the students know how to use the balances.
 - C. ask the students if they remembered to subtract the mass of the beaker when they found the mass of the product and ask them to review their math calculations and reread the chapter in the book about how to use balances.
 - D. have the students describe what happened when the chemicals were combined, ask them how the formation of bubbles would affect the data they reported, and ask the students to reconsider their conclusion.
- 72. A teacher wishes to use inquiry techniques to introduce the topic of osmosis. Which of the following activities would be the most appropriate?**
- A. The teacher demonstrates osmosis while explaining the steps.
 - B. The students design a laboratory activity exploring osmosis.
 - C. The teacher assigns a reading passage on osmosis.
 - D. The students complete a laboratory worksheet on osmosis.



Answer Key

1. B	19. C	37. B	55. A
2. D	20. D	38. C	56. B
3. C	21. A	39. D	57. A
4. B	22. B	40. B	58. A
5. B	23. C	41. C	59. D
6. C	24. D	42. B	60. A
7. A	25. D	43. A	61. B
8. B	26. A	44. D	62. D
9. B	27. B	45. D	63. C
10. A	28. D	46. A	64. A
11. D	29. B	47. D	65. B
12. A	30. C	48. C	66. D
13. D	31. A	49. B	67. C
14. C	32. C	50. A	68. D
15. B	33. D	51. C	69. A
16. C	34. C	52. B	70. C
17. D	35. A	53. D	71. D
18. A	36. C	54. C	72. B



5 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
 - Picture identification
 - Watch
 - Money for lunch and change for vending machines
- 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 marking 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.
 - Check periodically to be sure that you are correctly coding your answers on the answer sheet. When you answer a question out of sequence, be certain that the number of the circle you mark on your answer sheet corresponds to the proper question number in the test booklet.
 - 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.
 - Be certain to mark your answers clearly on the answer sheet. If you change an answer, erase the first pencil mark completely. Also make sure there are no stray marks on the answer sheet.
 - 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.





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