Massachusetts
Tests for Educator Licensure® (MTEL®)

General Science (10)

PRACTICE TEST

www.mtel.nesinc.com

01/10

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INTRODUCTION

This document is a printable version of the Massachusetts Tests for Educator Licensure® (MTEL®) General Science (10) Online Practice Test. This practice test is a sample test consisting of 100 multiple-choice questions and 2 open-response item assignments.

To assist you in recording and evaluating your responses on the practice test, a Multiple-Choice Answer Sheet, an Answer Key Worksheet, and an Evaluation Chart by test objective are included for the multiple-choice questions. A blank Response Sheet, Evaluation Information, and Sample Responses and Analyses, as well as a Scoring Rubric, are included for the open-response items. Lastly, there is a Practice Test Score Calculation worksheet.

PURPOSE OF THE PRACTICE TEST

The practice test is designed to provide an additional resource to help you effectively prepare for the MTEL General Science (10) test. The primary purpose of the practice test is to help you become familiar with the structure and content of the test. It is also intended to help you identify areas in which to focus your studies. Education faculty and administrators of teacher preparation programs may also find this practice test useful as they help students prepare for the official test.

TAKING THE PRACTICE TEST

In order to maximize the benefits of the practice test, it is recommended that you take this test under conditions similar to the conditions under which the official MTEL tests are administered. Try to take the practice test in a quiet atmosphere with few interruptions and limit yourself to the four-hour time period allotted for the official test administration. You will find your results to be more useful if you refer to the answer key only after you have completed the practice test.

INCORPORATING THE PRACTICE TEST IN YOUR STUDY PLAN

Although the primary means of preparing for the MTEL is your college education, adequate preparation prior to taking or retaking the MTEL test is strongly recommended. How much preparation and study you need depends on how comfortable and knowledgeable you are with the content of the test.

The first step in preparing to take the MTEL is to identify what information the test will address by reviewing the objectives for your field. A complete, up-to-date list of the Test Objectives is included in the Test Information Booklet for each test field. The test objectives are the core of the testing program and a helpful study tool. Before taking or retaking the official test, focus your study time on those objectives for which you wish to strengthen your knowledge.

This practice test may be used as one indicator of potential strengths and weaknesses in your knowledge of the content on the official test. However, because of potential differences in format and difficulty between the practice test and an official MTEL General Science (10) test, it is not possible to predict precisely how you might score on an official MTEL General Science (10) test. Keep in mind that the subareas for which the test weighting is greatest will receive emphasis on this test. Refer to the Test Information Booklet for additional information about how to prepare for the test.

GENERAL SCIENCE
PRACTICE TEST

GENERAL TEST DIRECTIONS

This practice test consists of two sections: (1) a multiple-choice question section and (2) an open-response item assignment section. Each multiple-choice question on the practice test has four answer choices. Read each question carefully and choose the ONE best answer. Record each answer on the answer sheet provided.

Sample Question: 1. What is the capital of Massachusetts?

A. Worcester
B. New Bedford
C. Boston
D. Springfield

The correct answer to this question is C. You would indicate that on the answer sheet.

The open-response section of this practice test requires written responses. Directions for the open-response item assignments appear immediately before those assignments.

You may work on the multiple-choice questions and open-response item assignments in any order that you choose. You may wish to monitor how long it takes you to complete the practice test. When taking the actual MTEL General Science (10) test, you will have one four-hour test session in which to complete the test.

MULTIPLE-CHOICE ANSWER SHEET

Question Number	Your Response
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MULTIPLE-CHOICE QUESTIONS

1. Which of the following would be most helpful in determining whether researcher bias affected the results of a scientific investigation?

   A. review of the research by professional editors

   B. publication of the research in the mainstream media

   C. comparison of the research results with the originally stated hypothesis

   D. identification of the source of funding for the research

2. Which of the following describes a major contribution of Isaac Newton to the development of modern science?

   A. stating the laws of nature in a mathematical form

   B. merging the wave and particle theories of light

   C. developing the heliocentric theory of the solar system

   D. clarifying the relationship between classical and quantum mechanics

3. Researchers present experimental evidence in defense of a controversial scientific hypothesis they have investigated. In order to be accepted by the wider scientific community, the hypothesis must be:

   A. based on evidence from experiments that can be repeated by other researchers.

   B. evaluated by scientists who disagree with the researchers' investigative approach.

   C. corroborated by earlier research conducted by scientists unaffiliated with the investigation.

   D. supported by professional scientific organizations that monitor research in that particular field.

4. The major discovery by Nicolaus Copernicus in the sixteenth century involved which of the following?

   A. the formation of geologic deposits

   B. the structure of the solar system

   C. the existence of microscopic life

   D. the conservation of energy

5. Which of the following was primarily responsible for the growth in scientific understanding of the natural and mineral resources of the United States during the nineteenth century?

   A. Educational reforms in major U.S. cities sparked a national movement to understand and use the untapped resources of the West.

   B. Legislation expanding the railroads to unmapped regions of the United States promoted the scientific study of those regions and their resources.

   C. Public works projects throughout the United States increased the need for engineers with knowledge of the physical and natural sciences.

   D. Congressional legislation created the United States Geological Survey, giving it a mandate to investigate the geology of public lands.

6. A scientist observes and records a particular species of spring warbler over a two-week period to better understand the role that birdsongs play in the warblers' mating behavior. Which of the following is a testable hypothesis based on the scientist's preliminary research?

   A. Singing evolved in warblers as a means to facilitate mating.

   B. Female warblers respond most often to males that sing more complex songs.

   C. Some species of warblers are more vocal than other species.

   D. The mating of warblers results in fewer offspring when food resources are scarce.

7. Which of the following questions must be answered to form a testable hypothesis as part of a scientific investigation?

   A. Can the hypothesis be proved or disproved within the scope of the proposed investigation?

   B. Has the hypothesis been validated by research projects carried out in the past by different researchers?

   C. Will the investigation's outcome provide multiple ways to evaluate the accuracy of the hypothesis?

   D. Is the hypothesis based on thorough background research of the phenomenon being studied?

8. It has been observed that at lower elevations in New England screech owls are the dominant owl species, while at higher elevations these owls are replaced by a similarly sized species, the saw-whet owl. In planning an investigation to determine a cause for this distribution pattern, which of the following steps should a researcher take *first*?

   A. researching the distribution of a variety of different owl species to determine how they interact

   B. estimating the population density of the two different species in their preferred habitats

   C. comparing the diet of raptor species that live in the region to the diet of local owl species

   D. determining what variables are most likely to affect the distribution of the two species of owl

9. A researcher is conducting an experiment to determine whether there is a relationship between acidic precipitation and the decreasing calcium ion concentration of boreal lakes. To ensure that the results of the scientific experiment are valid, the researcher must:

   A. evaluate the full range of factors that may affect the chemistry of freshwater systems.

   B. manipulate only one variable while holding the other variables constant.

   C. explain the causal mechanism that drives the relationship between the two variables.

   D. exclude data that contradict the expected outcome.

10. In which of the following populations would systematic sampling methods produce better estimates of the characteristics of a population than random sampling methods?

    A. a very large population containing distinct characteristics clustered in local groups

    B. a large population with heterogeneous characteristics

    C. a small population with great variation in its characteristics spread evenly across the population

    D. a very small population with homogeneous characteristics

11. A biologist studying how climate change has affected ecosystems plans to collect data on when a specific species of tree flowers in the spring and then compare these data with historical records. It is most important that the biologist take which of the following steps to prepare for collecting data on the flowering of the tree species?

    A. reviewing the research design to ensure that the data to be collected will support the stated hypothesis

    B. establishing criteria for rejecting observations that contradict the majority of the data on flowering

    C. identifying how local weather conditions may have altered data collected in the past

    D. developing a systematic approach for collecting the data that matches the goals and limitations of the study

12. In which of the following scientific investigations would it be most useful to average the data collected during the investigation?

    A. a 10-year study of weekly rainfall totals carried out to determine whether the climate has changed significantly in that period

    B. a regional study of the population decline of a species of frog conducted to identify which ponds are associated with the problem

    C. a research project determining the change in the frequency of major hurricanes over the past 25 years

    D. a research project evaluating the dark-line spectra of several newly discovered stars in a large star cluster

13. For which of the following purposes would estimation provide the best means of measuring a natural occurence?

    A. analyzing the concentration of iron in a sample of ground water

    B. determining the proportion of maple trees in a ten-acre deciduous forest

    C. assessing the number of cases of whooping cough in a school district

    D. establishing the annual frequency of rainstorms with over one inch of rain

14. A researcher wants to determine the pH of a local lake. To produce an accurate measurement of the lake's pH the researcher should:

    A. analyze several pH readings taken from the center of the lake and select the median value.

    B. collect water samples from several shoreline locations to determine a pH reading that represents the mode.

    C. take multiple pH readings from the lake's inflow and outflow to determine the range of values.

    D. establish the mean value of multiple pH readings taken from a variety of locations in the lake.

15. A scientist has a number of separate tasks to complete related to a climate study. For which of the following tasks related to this study would calculating the statistical mode be necessary?

    A. determining the category of hurricane that occurs most frequently in the Atlantic Ocean

    B. identifying the minimum and maximum temperature of the ocean surface over the course of a year

    C. determining the average time that the largest hurricanes remain stronger than the category 4 level

    D. establishing the number of years in the past century when hurricane activity was greater than normal

16. A chemist plans to measure out 2.5 g of table salt and mix it with 50 mL of distilled water. When using an electronic scale to carry out the task, the correct procedure would be to:

    A. calibrate the scale with a weight of known mass and then weigh the salt directly on the scale platform before adding it to the water.

    B. zero the scale and then weigh the salt in a container with a known tare weight, which is subtracted from the scale reading.

    C. calibrate the scale with a set of weights and then weigh the salt in the graduated cylinder it will be mixed in later.

    D. zero the scale with a previously measured beaker of water on it and then add salt to the water until it reaches the required weight.

17. Students culture bacteria collected from water fountains and doorknobs in petri dishes. Following the activity, the petri dishes should be:

    A. cleaned with soap and hot water and recycled for later use.

    B. soaked in a mild bleach solution and allowed to air-dry before reuse.

    C. put in sealed plastic bags and thrown in the trash.

    D. sterilized and treated as a biohazard to be disposed of properly.

18. To determine the toxicity of and level of safety required to handle a chemical, a researcher should always refer to which of the following resources?

    A. the state handbook that covers general laboratory safety and best practice in science

    B. the Environmental Protection Agency web site that discusses the chemical's use and misuse

    C. the proper-use guidelines for the substance provided by the company it was ordered from

    D. the Material Safety Data Sheet for the substance available from the manufacturer or distributor

19. Which of the following strategies is most effective in making sure that potentially dangerous scientific equipment will operate properly when used by students?

    A. discussing the consequence for students who misuse the equipment before allowing it to be used without direct supervision

    B. checking that the equipment functions as it is supposed to before allowing its supervised use in the classroom

    C. verifying with the manufacturer that the equipment is safe when used for its designated purpose by young people who may be unfamiliar with it

    D. limiting access to the equipment to those students who have shown competence in past activities

20. Which of the following is a major health concern related to the care and handling of reptiles kept in captivity?

    A. contraction of rabies from bites

    B. allergic reaction to shed skin

    C. infection with salmonella bacteria

    D. development of viral warts

21. In 1911 Ernest Rutherford conducted an experiment in which he directed alpha particles from a radioactive source at gold foil. He discovered that the vast majority of the alpha particles were passing through the thin gold foil, but very rarely one of the particles would bounce off the gold foil. The results of the experiment suggested to Rutherford that the mass of an atom was:

    A. scattered in pockets outside of the nucleus of the atom.

    B. concentrated in concentric shells surrounding the center of the atom.

    C. evenly dispersed throughout the entire atom.

    D. concentrated in a very small nucleus at the center of the atom.

22. Table salt is an example of which of the following types of matter?

    A. alloy

    B. ionic compound

    C. isotope

    D. diatomic molecule

23. In chemistry, the concept of electron-dot structures, also known as Lewis structures, provides an especially useful model for describing:

    A. the behavior of valence electrons in chemical bonding.

    B. the relationship between the number of electrons in an element and its atomic number.

    C. the rate at which radioactive elements give off electrons.

    D. the ionization energy required to remove electrons from a neutral atom.

24. Which of the following is an example of a pure substance as opposed to a mixture?

    A. alcohol

    B. milk

    C. gasoline

    D. blood

25. A unit of concentration commonly used in chemistry is molarity. Which of the following correctly represents molarity?

    A. $\frac{\text{mass of solute}}{\text{moles of solution}}$

    B. $\frac{\text{moles of solute}}{\text{liters of solution}}$

    C. $\frac{\text{mass of solvent}}{\text{moles of solution}}$

    D. $\frac{\text{moles of solvent}}{\text{liters of solution}}$

26. Which of the following is the best example of a physical change?

    A. A copper pipe becomes stained with green tarnish over several years.

    B. The yolk of an egg hardens as it is cooked.

    C. Water droplets form on a cold soda bottle on a humid summer day.

    D. Bread dough rises in a warm kitchen.

27. When a compound in the liquid state vaporizes and becomes a gas, which of the following characteristics of the compound remains the same?

    A. distance between the molecules

    B. chemical composition of the substance

    C. kinetic energy of the molecules

    D. specific heat capacity of the substance

28. Rock salt is often sprinkled on frozen roads and walkways to melt ice. This practice is effective primarily because the salt:

    A. decreases the freezing point of the water.

    B. breaks the covalent bonds within the water molecules.

    C. increases the temperature of the water.

    D. eliminates the hydrogen bonds between the water molecules.

29. What is the mass in grams of 1 mol of MgOH?

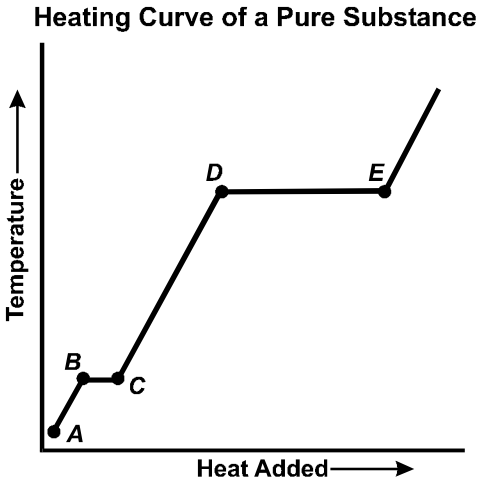
    A. 13.8 g

    B. 21.0 g

    C. 33.3 g

    D. 41.3 g

30. **Use the heating curve below to answer the question that follows.**



According to the heating curve above, the greatest amount of energy is being used to break the bonds between the substance's molecules at which of the following line segments?

A. $\overline{DE}$

B. $\overline{CD}$

C. $\overline{BC}$

D. $\overline{AB}$

31. **Use the reaction equation below to answer the question that follows.**

$3Cu + xHNO_3 \longrightarrow 3Cu(NO_3)_2 + 2NO + 4H_2O$

Which of the following numbers should be substituted for *x* to properly balance this reaction equation?

A. 2

B. 4

C. 6

D. 8

32. Water has a significantly higher surface tension than most other substances. Which of the following factors is directly responsible for this characteristic of water?

A. the size of atoms in a water molecule

B. the solvent properties of water

C. the hydrogen bonding between water molecules

D. the specific heat capacity of water

33. Which of the following types of chemical reactions is characterized by a substance reacting with oxygen?

A. combustion

B. neutralization

C. decomposition

D. electrochemical

34. **Use the reaction equation below to answer the question that follows.**

$HCl(aq) + NaOH(aq) \longrightarrow H_2O(l) + X$

According to the principle of conservation of matter, which of the following is the chemical formula for the reaction product *X* in the equation shown above?

A. $NaOH(aq)$

B. $HCl(aq)$

C. $NaCl(aq)$

D. $O_2(g)$

35. An outdoor iron railing rusts after several years. The rust on the railing is composed of:

A. the elemental iron that has separated from the railing as the result of temperature fluctuations.

B. an oxide of iron produced during the chemical reaction of the railing with the atmosphere.

C. the product of broken chemical bonds between the iron and oxygen atoms that make up the railing.

D. a reduced form of iron produced by the chemical reaction of water in the atmosphere with the railing.

36. According to the kinetic molecular theory, liquid bromine differs from solid bromine in which of the following ways?

A. Bromine atoms in the liquid state are easily compressed.

B. Bromine atoms in the liquid state are unaffected by intermolecular forces.

C. Bromine atoms in the liquid state can move past one another.

D. Bromine atoms in the liquid state are arranged in a regular array.

37. **Use the information below to answer the question that follows.**

- molecules vibrating in fixed positions
- strong intermolecular forces
- nonrandom arrangement of molecules
- fixed volume

The characteristics listed above describe which of the following states of matter?

A. solid

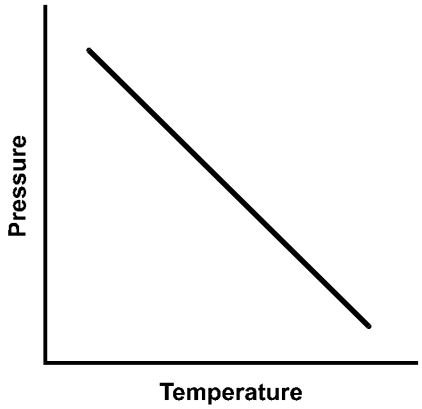
B. liquid

C. gas

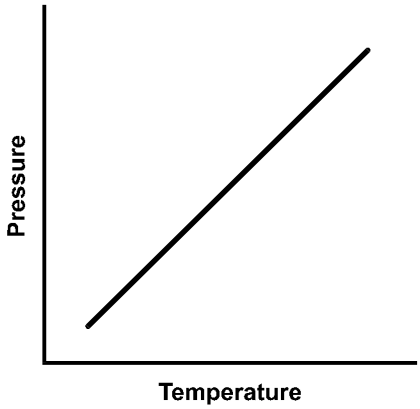
D. plasma

38. Which of the following graphs illustrates the relationship between the temperature and pressure of an ideal gas in a closed system?

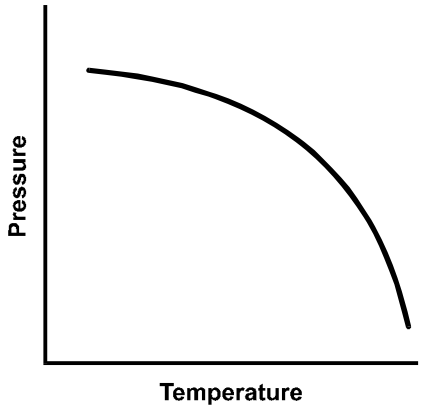
A.



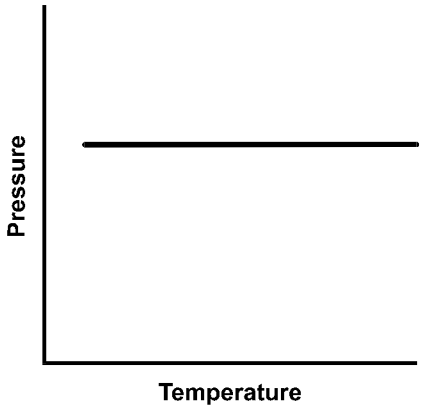
B.



C.



D.



39. The pressure of a gas in a 1 L closed container at 298 K is 125 atm. If the temperature is increased to 325 K, the pressure of the gas will be:

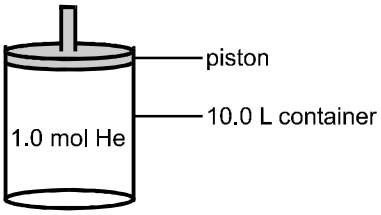
    A. 26.7 atm.

    B. 115 atm.

    C. 136 atm.

    D. 152 atm.

40. **Use the diagram below to answer the question that follows.**



When 1.0 mol of helium at 298 K is placed in the 10.0 L container shown above, it exerts a pressure of 2.4 atm. Which of the following changes to this system would lead to a decrease in pressure?

    A. increasing the temperature of the system

    B. adding additional helium to the container

    C. moving the piston to a lower position within the container

    D. removing some of the helium from the container

41. Which of the following accurately describes how the net force on an object affects its state of motion?

    A. The velocity of the object is inversely proportional to the net force acting on the object and directly proportional to its mass.

    B. The acceleration of the object is directly proportional to the net force acting on the object and inversely proportional to the object's mass.

    C. The velocity of the object is inversely proportional to its mass and inversely proportional to the net force acting on the object.

    D. The acceleration of the object is directly proportional to the net force acting on the object and directly proportional to its mass.

42. A scientist in outer space measures the acceleration of an object after a known force is applied to the object. Using only the acceleration measurements and the magnitude of the applied force, the scientist can calculate the object's:

A. mass.

B. volume.

C. density.

D. weight.

43. The weight of an object is most accurately described as the:

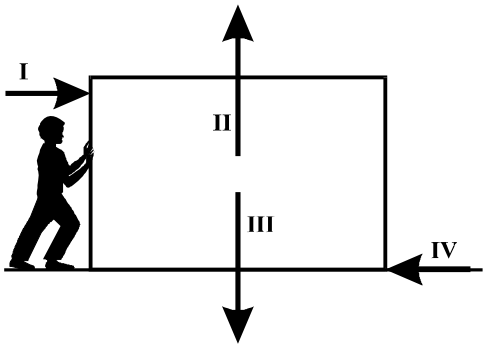
A. measure of the amount of matter contained in an object.

B. volume of the object multiplied by its density.

C. force on an object due to the gravitational pull of another body.

D. mass of an object divided by its volume.

Use the information below to answer the two questions that follow.



In the free-body diagram shown above a person applies a force to a box in order to slide it across the floor.

44. If the box is sliding at a constant velocity, which of the following forces in the free-body diagram must be equal in magnitude?

A. I and III

B. I and IV

C. II and IV

D. III and IV

45. If the box is accelerating to the right, which of the following relationships between the magnitudes of the forces must be true?

A. I > IV

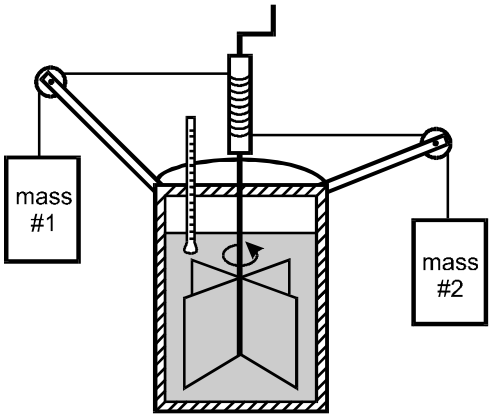
B. II > III

C. I > II

D. III > IV

46. **Use the diagram below to answer the question that follows.**

Cross Section of Paddle Apparatus Used to Compare Heat Energy to Mechanical Energy



The device shown in the diagram above was developed to compare heat energy and mechanical energy. As the two masses fall, they turn the paddle wheel inside the sealed container, causing the temperature of the water to rise. The operation of this device shows that:

A. the change in the work done on the system is equal to the kinetic energy lost by the system.

B. the increase in the mechanical energy of the system reduces the internal energy of the water.

C. the change in the potential energy of the weight is equal to the change in the internal energy of the water.

D. the entropy of the water is reduced as mechanical energy is expended to do work on the system.

47. According to the principle of energy conservation, when a piston in an automobile engine compresses the gas in a cylinder, which of the following must occur?

A. The kinetic energy of the gas molecules must increase.

B. The gas must undergo a chemical change.

C. The energy of the gas molecules must be converted into work.

D. The gas must undergo a change of state.

48. As an air mass near the earth's surface rises and expands, which of the following energy changes occurs within the rising air mass?

    A. The potential energy of the air mass is expended as water vapor condenses.

    B. The thermal energy of the air mass is converted into chemical energy.

    C. The mechanical energy of the rising air mass is converted into heat energy.

    D. The kinetic energy of the air mass decreases as it cools.

49. A railway freight car with a mass of 10,000 kg is moving at 6 m/s when it hits another freight car with a mass of 20,000 kg that is at rest on the tracks. The cars automatically couple as they collide, producing an inelastic collision, and both freight cars move together down the track. Disregarding the effects of friction, what will the velocity of the two coupled freight cars be as they move down the track after the collision?

    A. 0.5 m/s

    B. 1 m/s

    C. 2 m/s

    D. 3 m/s

50. In which of the following systems is entropy decreasing?

    A. A tree produces sugar during photosynthesis.

    B. Salt dissolves in a pot of boiling water.

    C. Coastal cliffs erode during a winter storm.

    D. The metal frame of a bicycle rusts when left outside.

51. In which of the following scenarios will transverse waves produce longitudinal waves?

    A. A wind gust blows across the surface of a lake.

    B. A person claps his/her hands.

    C. A supersonic jet breaks the sound barrier.

    D. A musician plucks a guitar string.

52. A water wave vibrates up and down four times each second and the wave crests are 0.5 m apart. What is the velocity of the wave in this situation?

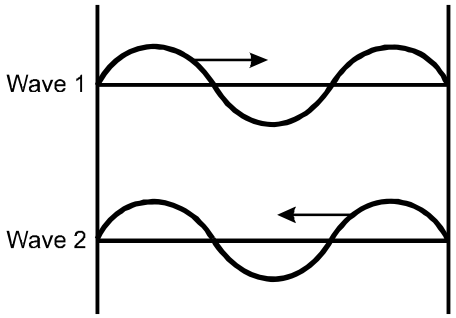
A. 1 m/s

B. 2 m/s

C. 8 m/s

D. 20 m/s

53. **Use the diagram below to answer the question that follows.**



The diagram above shows two identical waves passing each other going in opposite directions. As the waves pass each other, they are exactly in phase, producing a single wave with:

A. a smaller amplitude.

B. a higher frequency.

C. a larger amplitude.

D. a lower frequency.

54. Which of the following explains why white light separates into the different colors of the spectrum as it travels through a prism?

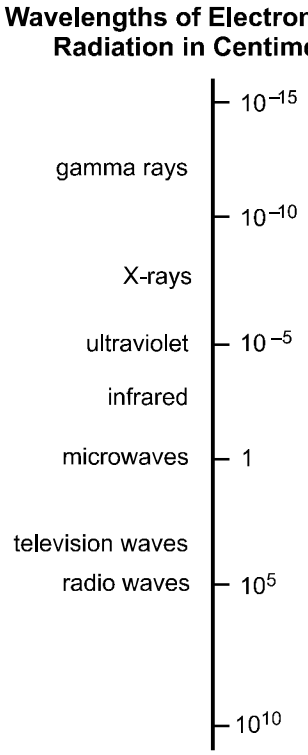
A. Different frequencies of light move through a prism at different speeds, causing them to refract differently as they cross air-glass boundaries.

B. The prism magnifies the amplitude of high-frequency wavelengths more than low-frequency wavelengths.

C. Variable reflection of light entering the prism at different angles splits the light into different wavelengths.

D. The prism polarizes the light waves as they travel through the glass, dividing them into distinct wavelengths.

55. **Use the diagram below to answer the question that follows.**



The range of wavelengths shown in the diagram above represents the electromagnetic spectrum. The wavelengths for visible light are located between which of the following parts of the spectrum?

A. radio waves and microwaves

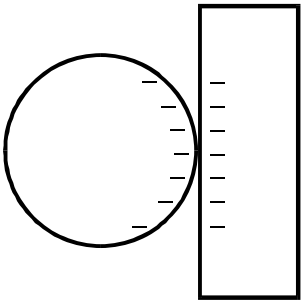
B. microwaves and infrared

C. infrared and ultraviolet

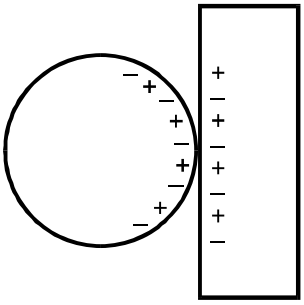
D. ultraviolet and X-rays

56. A child rubs a balloon against a wool sweater on a dry winter day. The child then finds that the balloon sticks to a wall for several minutes before falling. Which of the following diagrams best represents the charge distribution on the surfaces of the balloon and the wall?

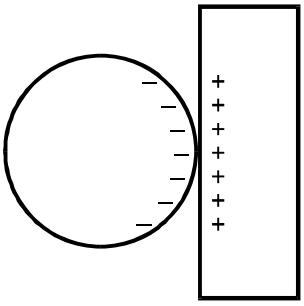
A.



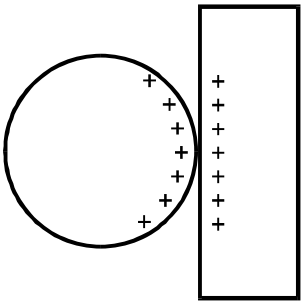
B.



C.



D.



57. Several lights are connected in a parallel circuit and one of the lights burns out. Which of the following describes how the burning out of the light affects the other lights in the parallel circuit?

A. Charge still flows through the burned out light, providing the lights in the other branches of the circuit with electricity.

B. The other lights continue to draw the same current since neither resistance or voltage is affected in those branches of the circuit.

C. Current is increased in the other branches of the circuit so the lights will brighten as a result of the increased flow of charge.

D. The branches of the circuit draw less charge overall because the burned out light no longer draws a charge, reducing the brightness of the lights.

58. A person turns on a light switch and almost instantaneously the light goes on. The rapid response of the light to the turning of the switch results from the transfer of:

A. electrons through the circuit at the speed of light.

B. charged ions through the electric circuit.

C. an electric field through the circuit at close to the speed of light.

D. kinetic energy of the atoms making up the electric circuit.

59. Which of the following relationships defines electric resistance?

A. $\frac{\text{voltage}}{\text{current}}$

B. $\frac{\text{amperage}}{\text{voltage}}$

C. $\frac{\text{joules}}{\text{current}}$

D. $\frac{\text{electric power}}{\text{joules}}$

60. The magnetism of a common bar magnet results from:

A. the oscillating polarization of atoms in the magnet.

B. the alignment of magnetic fields generated by spinning electrons in the magnet.

C. the vibration of the atomic nuclei in the magnet.

D. the magnetic field produced by electrons orbiting the nucleus in opposite directions.

61. Which of the following characteristics of an unknown object would provide the best evidence that the object is a living organism?

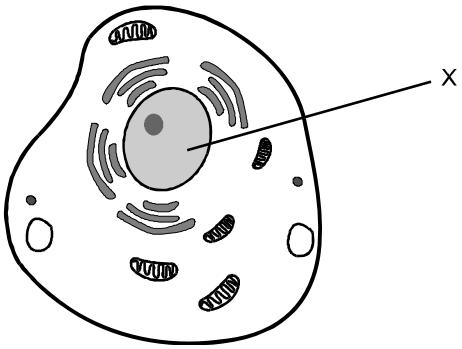
    A. It possesses carbon-containing molecules.

    B. It is able to reproduce.

    C. Its temperature is higher than that of the surrounding air or water.

    D. It has a highly ordered structure.

62. **Use the diagram below to answer the question that follows.**



One of the primary roles of the structure labeled *X* in the generalized cell shown in the diagram above is to:

    A. control the concentration of ions in the cellular fluids.

    B. store nutrients necessary for cell functioning.

    C. contain the genetic material between cell divisions.

    D. provide a site for the breakdown of cellular waste products.

63. In plants, individual cells can contribute to rapid growth of the entire plant primarily by cell division and:

    A. expansion through the uptake of water into central vacuoles.

    B. formation of thicker cell walls.

    C. deposition of a matrix to support large intercellular spaces.

    D. production of more cytoplasm.

64. Whether the products of glycolysis undergo fermentation or cellular respiration during glucose metabolism is dependent on which of the following factors?

    A. the surface area of the cell

    B. the cell's immediate energy needs

    C. the presence or absence of oxygen

    D. the availability of light

65. As the concentration of carbon dioxide in the blood of a mammal begins to rise, the body maintains homeostasis through which of the following physiological responses?

    A. decreased cellular respiration

    B. increased breathing rate

    C. decreased cardiac output

    D. increased hemoglobin production

66. The fur color of a rodent species is determined by a single gene with two possible alleles. The allele for black fur, *B*, is dominant, and the white fur allele, *b*, is recessive. A rodent with genotype *Bb* is bred with a rodent with genotype *bb*. What is the expected phenotypic ratio of the offspring from this cross?

A. 25% black fur
75% white fur

B. 50% black fur
50% white fur

C. 75% black fur
25% white fur

D. 100% black fur
0% white fur

67. In pea plants, the allele for purple flowers (*P*) is dominant to the allele for white flowers (*p*). The allele for flowers positioned along the stems (*S*) is dominant to the allele for flowers at the tips of the stems (*s*). A plant with unknown genotype has purple flowers along the stems. This plant is crossed with a second plant with genotype *ppss*. Half of the resulting offspring have purple flowers along the stems and the other half of the offspring have purple flowers at the tips of the stems. Which of the following is the most likely genotype of the first plant?

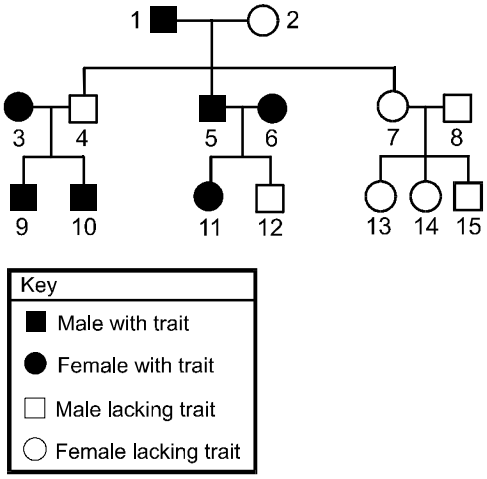
A. *Ppss*

B. *PpSs*

C. *PPSs*

D. *PPSS*

68. **Use the pedigree chart below to answer the question that follows.**



The pedigree chart above shows the inheritance pattern of a dominant trait over three generations in a family. Based on the information in the chart, which of the following statements is true?

A. Individual 6 is heterozygous for the trait.

B. It is impossible to determine the genotype of individual 9.

C. Individuals 12 and 13 have different genotypes for the trait.

D. The trait is determined by a recessive allele.

69. Bacterial chromosomes differ from chromosomes in eukaryotes primarily in that bacterial chromosomes most often:

A. are membrane-bound.

B. consist of RNA.

C. contain histone proteins.

D. are circular.

70. A DNA molecule is about to undergo replication. The base sequence of a small section of one of the original DNA strands is shown below.

A–A–G–C–G–T–A

What will be the base sequence of the corresponding section of the new complementary DNA strand that is formed?

A. A–A–G–C–G–T–A

B. T–T–C–G–C–A–T

C. U–U–C–G–C–A–U

D. C–C–T–A–T–G–C

71. Which of the following observations provides support for the theory of evolution?

A. A snowshoe hare's coat turns from brown to white as the winter approaches.

B. A young lion becomes a more skilled hunter during its first years of life.

C. A tree seedling develops a root system that allows it to cling to the rocky hillside where it germinated.

D. A population of insects develops resistance to a particular pesticide over several generations.

72. The fact that mitochondria and chloroplasts have their own DNA provides the strongest support for which of the following hypotheses?

A. Organic molecules formed spontaneously under the conditions found on the early earth.

B. Aerobic organisms evolved after anaerobic organisms.

C. Eukaryotes evolved as a result of endosymbiotic relationships among prokaryotes.

D. Life on the earth first arose in the oceans rather than on land.

73. A scientist who wants to conduct an investigation of the effects of natural selection on the evolution of a population would most likely select a type of organism characterized by:

A. a short generation time.

B. high mutation rates.

C. asexual reproduction.

D. a large genome.

74. A random nonlethal genetic mutation that appears in an individual organism is most likely to spread rapidly in a population if it:

A. does not affect the expression of any phenotypic traits.

B. is found in the body cells but not the germ cell line.

C. provides a selective advantage to those who possess it.

D. is located on an X or Y sex chromosome.

75. Which of the following phenomena is best explained by the theory of evolution?

A. Two species that share a recent common ancestor have more similarities in their DNA than two species with a more distant common ancestor.

B. Bird species in temperate climates begin to display courtship behaviors as day length increases.

C. Two species that have very similar ecological needs are less likely to coexist in the same community than two species with very different requirements.

D. Some of the same fossil species are found in corresponding geologic layers on different continents.

76. The type of biome that characterizes a particular region is most significantly influenced by which of the following pairs of factors?

A. soil type and depth

B. day length and prevailing wind direction

C. temperature and rainfall

D. nutrient availability and food web complexity

77. In which of the following ways do deep sea vent ecosystems differ from most other ecosystems found on the earth?

    A. There is only a single trophic level in the food chain.

    B. The underlying source of energy is chemical rather than solar.

    C. The physical conditions remain stable over time.

    D. There is little competition among organisms for resources.

78. A sagebrush plant releases chemical compounds into the soil around it. These compounds inhibit the germination and growth of other plants in the area immediately surrounding the sagebrush plant. This strategy most likely serves to:

    A. reduce competition for resources in short supply.

    B. make the plant less appealing to herbivores.

    C. limit cross-pollination with other sagebrush plants.

    D. slow the spread of diseases and insect pests.

79. A scientist hypothesizes that species A is excluded from a particular area by competition from species B. Which of the following pieces of evidence would provide the strongest support for this hypothesis?

    A. Species B has a higher rate of reproduction than species A.

    B. Species A has very similar nutrient, water, and light needs as species B.

    C. Species B is more robust in locations where it is close to species A.

    D. Species A is able to survive in species B's range in the absence of species B.

80. **Use the passage below to answer the question that follows.**

    A field in central New England where corn was grown is abandoned and left undisturbed. Initially grasses and weed species take over the field. Gradually, woody shrubs and species such as sumac and poplar become established, followed by white pines. After several decades, the area is characterized by a stable community of mixed hardwood trees dominated by oaks.

    Which of the following processes is described in the in the passage above?

    A. evolution

    B. biological magnification

    C. exponential growth

    D. succession

81. The upper portion of oceanic crust is primarily composed of which of the following types of rock?

A. basalt

B. granite

C. quartzite

D. shale

82. A geologist working in a cave discovers some very large crystals of quartz. The large size of the crystals is most likely due to their having been formed:

A. near the surface, where cooling occurs rapidly.

B. in a confined high-pressure magma chamber.

C. from a magma rich in silicate minerals.

D. in a magma that cooled very slowly deep underground.

83. Regional metamorphism typically occurs in which of the following situations?

A. the collision of two tectonic plates

B. the formation of ocean crust

C. the cooling of a granitic batholith

D. the development of a rift valley

84. The theory of plate tectonics has demonstrated that the formation of the majority of ocean crust occurs at:

A. convergent plate boundaries.

B. spreading centers.

C. transform fault boundaries.

D. volcanic hot spots.

85. Which of the following provides the best example of chemical weathering?

A. the slumping of unconsolidated sediments during a rainstorm

B. the breakup of a granite outcrop from temperature changes

C. the dissolution of limestone by ground water

D. the formation of talus slopes from frost wedging

86. Which of the following is primarily responsible for the downwelling of ocean waters involved in the circulation of deep-ocean currents?

A. strong surface winds in coastal regions

B. temperature and salinity gradients

C. the earth's rotation and orbital motion

D. the topography of the ocean floor

87. The tendency of ocean currents to flow to the right in the northern hemisphere is due primarily to the:

A. direction of prevailing winds.

B. contour of coastal regions.

C. orientation and orbit of the moon.

D. shape and rotation of the earth.

88. A geologist is trying to locate ground water for a community in New England and plans to drill test wells in several locations. In which of the following locations would the geologist be most likely to find an adequate source of ground water for the community?

A. sand and gravel deposits along the edges of a river valley

B. a deeply buried layer of fine-grained glacial till

C. a bedrock formation composed primarily of shale

D. silt and clay deposits from an ancient glacial lake

89. Which of the following contains the greatest quantity of freshwater in the hydrosphere?

A. rivers and streams

B. ground water

C. lakes and ponds

D. glaciers

90. In which of the following locations will ground water recharge likely be greatest during a heavy rainfall event that occurs over a short period of time?

A. rolling grasslands

B. recently logged hillsides

C. level wetlands

D. plowed agricultural fields

91. Which of the following is most directly caused by differential heating of the land surface and ocean surface?

A. the changing strength of the trade winds in different seasons

B. the early spring tornadoes that occur along the Gulf Coast

C. the varying speeds of the jet stream over the course of the year

D. the onshore breezes that develop on warm summer afternoons

92. The weakening or reversal of the trade winds during an El Niño-Southern Oscillation event is initiated by which of the following changes in the atmosphere?

A. the reversal of dominant pressure regimes on either side of the Pacific Ocean Basin

B. the southward shift of the subtropical jet stream to equatorial latitudes

C. the development of atmospheric high pressure over westernmost South America during droughts

D. the spread of cold deep-ocean water from coastal Peru to the central Pacific Ocean

93. During late February in southern New England, a warm precipitation-producing air mass moves into the region. Although the temperature of air aloft is well above average for the time of year, a thin layer of extremely cold air remains trapped at the bottom of valleys in the interior. Under these conditions, it is most likely that if steady precipitation falls in the these valleys, it will be in the form of:

A. snow pellets.

B. wet snow that accumulates rapidly.

C. heavy sleet.

D. rain that freezes on impact.

94. During the 1990s, Doppler radar replaced the radar systems that had been in place for many decades. One of the primary advantages of Doppler radar over conventional radar is that it can be used to:

A. estimate the water equivalent of falling frozen precipitation.

B. measure the horizontal velocity of falling precipitation.

C. calculate the total precipitation that falls over an area.

D. measure precipitation intensity over a particular area.

95. Climate scientists have observed that the El Niño-Southern Oscillation has an El Niño phase and a La Niña phase. Which of the following characteristics of the global climate system is used initially to determine which phase is developing?

A. the strength and position of high pressure in the Atlantic Ocean

B. the latitude of the subtropical jet stream

C. the surface temperature of the Pacific Ocean

D. the timing and strength of the Asian monsoon

96. Which of the following best explains why gaseous hydrogen at the surface of Jupiter is replaced by liquid metallic hydrogen in the planet's interior?

    A. Temperatures in the interior of the planet are below the boiling point of hydrogen.

    B. Nuclear fusion reactions in the core of the planet force hydrogen nuclei to combine.

    C. Extremely high pressures in the interior of the planet force hydrogen molecules closer together.

    D. Rapid rotation of the planet has a centrifuge effect, separating the gaseous and liquid hydrogen.

97. The speed at which the moon rotates about its axis is the primary factor explaining which of the following?

    A. the frequency of high and low tides

    B. the observation that only one side of the moon is visible from the earth

    C. the occurrence of lunar eclipses

    D. the timing and progression of the phases of the moon

98. Stars known as blue giants are likely to have a much shorter life cycle than yellow main-sequence stars primarily because they:

    A. burn much faster and hotter and use up their nuclear fuel quickly.

    B. are not hot enough to fuse elements heavier than hydrogen.

    C. rely on nuclear fission instead of fusion to produce their energy.

    D. possess less nuclear fuel at the start of their lives.

99. Sunspots on the surface of the sun are caused by:

    A. convergence of solar winds into large whirlpools.

    B. eruptions of extremely hot gas from the sun's core.

    C. impacts of meteors and comets into the surface of the sun.

    D. strong magnetic fields that slow the ascent of hot gas.

100. Which of the following planets has a thick atmosphere that consists primarily of carbon dioxide gas?

    A. Mars

    B. Neptune

    C. Venus

    D. Mercury

DIRECTIONS FOR THE OPEN-RESPONSE ITEM ASSIGNMENTS

This section of the test consists of two open-response item assignments that appear on the following pages. You will be asked to prepare a written response of approximately 150–300 words (1–2 pages) for each assignment. You should use your time to plan, write, review, and edit your response for each assignment.

For each assignment, read the topic and directions carefully before you begin to work. Think about how you will organize your response. You may use any blank space in this test booklet to make notes, write an outline, or otherwise prepare your response.

As a whole, your response to each assignment must demonstrate an understanding of the knowledge of the field. In your response to each assignment, you are expected to demonstrate the depth of your understanding of the subject area by applying your knowledge rather than by merely reciting factual information.

Your response to each assignment will be evaluated based on the following criteria.

- **PURPOSE:** the extent to which the response achieves the purpose of the assignment
- **SUBJECT KNOWLEDGE:** appropriateness and accuracy in the application of subject knowledge
- **SUPPORT:** quality and relevance of supporting evidence
- **RATIONALE:** soundness of argument and degree of understanding of the subject area

The open-response item assignments are intended to assess subject knowledge. Your responses must be communicated clearly enough to permit valid judgment of the evaluation criteria by scorers. Your responses should be written for an audience of educators in this field. The final version of each response should conform to the conventions of edited American English. Your responses should be your original work, written in your own words, and not copied or paraphrased from some other work.

Be sure to write about the assigned topics. Please write legibly. You may not use any reference materials during the test. Remember to review your work and make any changes you think will improve your responses.

Write or print your response in the space provided following the assignment.

OPEN-RESPONSE ITEM ASSIGNMENT #1

Use the information below to complete the exercise that follows.

A geologist hypothesizes that a mineral found on a field trip is a carbonate mineral. The mineral sample was collected from an outcrop and is in the form of a crystal that is approximately 4 cm long and 2 cm wide.

Using your knowledge of earth science, write an essay describing a laboratory experiment in which the characteristics of the unknown minerals are used to identify the mineral and verify the geologist's hypothesis. In your essay:

- describe the experimental setup needed to determine the density of the unknown mineral;
- describe two other characteristics typically used by geologists to classify and identify minerals; and
- explain how the setting in which a crystal is found and the size of a crystal can help determine the conditions under which it formed.

OPEN-RESPONSE SHEET—ASSIGNMENT #1

OPEN-RESPONSE SHEET—ASSIGNMENT #1

OPEN-RESPONSE ITEM ASSIGNMENT #2

Use the information below to complete the exercise that follows.

A biologist investigating the decline in a species of seal hypothesizes that overfishing by commercial fishing trawlers may be involved in the decrease in the size of the seal population. The biologist decides to evaluate the health of the existing seal population for evidence to support the overfishing hypothesis.

Using your knowledge of ecology and mammal physiology, write an essay describing a field investigation on the seal population. In your essay:

- describe two characteristics of the seal population that would indicate that the seals are malnourished;
- describe field research that could provide evidence supporting the biologist's hypothesis; and
- explain the relationships within a typical marine-mammal food web and how changes in the seals' food web could affect the health of their population.

OPEN-RESPONSE SHEET—ASSIGNMENT #2

OPEN-RESPONSE SHEET—ASSIGNMENT #2

PRACTICE TEST RESULTS

PRACTICE TEST RESULTS OVERVIEW

The practice test provides valuable information regarding your preparedness for the MTEL General Science (10) test. In this section, you will find information and tools to help you determine your preparedness on the various sections of the test.

Multiple-Choice Questions

A Multiple-Choice Question Answer Key Worksheet is provided to assist you in evaluating your multiple-choice responses. The worksheet contains five columns. The first column indicates the multiple-choice question number, the second column indicates the objective to which the test question was written, and the third column indicates the correct response. The remaining columns are for your use in calculating the number of multiple-choice questions you answered correctly or incorrectly.

An Evaluation Chart for the multiple-choice questions is also provided to help you assess which content covered by the test objectives may require additional study.

Open-Response Items

Evaluation Information, Sample Responses and Analyses, as well as a Scoring Rubric are provided for these items. You may wish to refer to this information when evaluating your practice test responses.

Total Test

Practice Test Score Calculation information is provided to help you estimate your score on the practice test. Although you cannot use this practice test to precisely predict how you might score on an official MTEL General Science (10) test, you may be able to determine your degree of readiness to take an MTEL test at an operational administration. No passing score has been determined for the practice test.

MULTIPLE-CHOICE QUESTION ANSWER KEY WORKSHEET

Question Number	Objective Number	Correct Response	Your Response	
			Correct?	Incorrect?
1	0001	D		
2	0001	A		
3	0001	A		
4	0001	B		
5	0001	D		
6	0002	B		
7	0002	A		
8	0002	D		
9	0002	B		
10	0002	A		
11	0003	D		
12	0003	A		
13	0003	B		
14	0003	D		
15	0003	A		
16	0004	B		
17	0004	D		
18	0004	D		
19	0004	B		
20	0004	C		
21	0005	D		
22	0005	B		
23	0005	A		
24	0005	A		
25	0005	B		
26	0006	C		
27	0006	B		
28	0006	A		
29	0006	D		
30	0006	A		
31	0007	D		
32	0007	C		
33	0007	A		
34	0007	C		

MULTIPLE-CHOICE QUESTION
ANSWER KEY WORKSHEET (continued)

Question Number	Objective Number	Correct Response	Your Response	
			Correct?	Incorrect?
35	0007	B		
36	0008	C		
37	0008	A		
38	0008	B		
39	0008	C		
40	0008	D		
41	0009	B		
42	0009	A		
43	0009	C		
44	0009	B		
45	0009	A		
46	0010	C		
47	0010	A		
48	0010	D		
49	0010	C		
50	0010	A		
51	0011	D		
52	0011	B		
53	0011	C		
54	0011	A		
55	0011	C		
56	0012	C		
57	0012	B		
58	0012	C		
59	0012	A		
60	0012	B		
61	0013	B		
62	0013	C		
63	0013	A		
64	0013	C		
65	0013	B		
66	0014	B		
67	0014	C		
68	0014	A		

MULTIPLE-CHOICE QUESTION ANSWER KEY WORKSHEET (continued)

Question Number	Objective Number	Correct Response	Your Response	
			Correct?	Incorrect?
69	0014	D		
70	0014	B		
71	0015	D		
72	0015	C		
73	0015	A		
74	0015	C		
75	0015	A		
76	0016	C		
77	0016	B		
78	0016	A		
79	0016	D		
80	0016	D		
81	0017	A		
82	0017	D		
83	0017	A		
84	0017	B		
85	0017	C		
86	0018	B		
87	0018	D		
88	0018	A		
89	0018	D		
90	0018	A		
91	0019	D		
92	0019	A		
93	0019	D		
94	0019	B		
95	0019	C		
96	0020	C		
97	0020	B		
98	0020	A		
99	0020	D		
100	0020	C		

Count the number of multiple-choice questions you answered correctly:

_____ of 100 multiple-choice questions

MULTIPLE-CHOICE QUESTION PRACTICE TEST EVALUATION CHART

In the evaluation chart that follows, the multiple-choice questions are arranged in numerical order and by test objective. Check your responses against the correct responses provided to determine how many questions within each objective you answered correctly.

Subarea I: History, Philosophy, and Methodology of Science

Objective 0001: Understand the nature of scientific thought and inquiry and the historical development of major scientific ideas.
1D_____ 2A_____ 3A_____ 4B_____ 5D_____ _____/5

Objective 0002: Understand principles and procedures of research and experimental design.
6B_____ 7A_____ 8D_____ 9B_____ 10A_____ _____/5

Objective 0003: Understand procedures for gathering, organizing, interpreting, evaluating, and communicating scientific information.
11D_____ 12A_____ 13B_____ 14D_____ 15A_____ _____/5

Objective 0004: Understand the safe and proper use of tools, equipment, and materials (including chemicals and living organisms) related to classroom and other science investigations.
16B_____ 17D_____ 18D_____ 19B_____ 20C_____ _____/5

Subarea I (Objectives 0001–0004) Total _____/20

MULTIPLE-CHOICE QUESTION
PRACTICE TEST EVALUATION CHART (continued)

Subarea II: Chemistry

Objective 0005: Understand the structure and nature of matter.	
21D_____ 22B_____ 23A_____ 24A_____ 25B_____	_____/5

Objective 0006: Understand the nature of physical changes in matter.	
26C_____ 27B_____ 28A_____ 29D_____ 30A_____	_____/5

Objective 0007: Understand the nature of chemical changes in matter.	
31D_____ 32C_____ 33A_____ 34C_____ 35B_____	_____/5

Objective 0008: Understand the kinetic molecular model of matter.	
36C_____ 37A_____ 38B_____ 39C_____ 40D_____	_____/5

Subarea II (Objectives 0005–0008) Total _____/20

MULTIPLE-CHOICE QUESTION
PRACTICE TEST EVALUATION CHART (continued)

Subarea III: Physics

Objective 0009: Understand the concepts of force, motion, work, and power.	
41B_____ 42A_____ 43C_____ 44B_____ 45A_____	_____/5

Objective 0010: Understand the concept of energy and the forms that energy can take.	
46C_____ 47A_____ 48D_____ 49C_____ 50A_____	_____/5

Objective 0011: Understand characteristics of waves and the behavior of sound and light waves.	
51D_____ 52B_____ 53C_____ 54A_____ 55C_____	_____/5

Objective 0012: Understand principles of electricity, magnetism, and electromagnetism.	
56C_____ 57B_____ 58C_____ 59A_____ 60B_____	_____/5

Subarea III (Objectives 0009–0012) Total _____/20

MULTIPLE-CHOICE QUESTION
PRACTICE TEST EVALUATION CHART (continued)

Subarea IV: Biology

Objective 0013: Understand the characteristics and life processes of living organisms.	
61B_____ 62C_____ 63A_____ 64C_____ 65B_____	**_____/5**

Objective 0014: Understand principles related to the inheritance of characteristics.	
66B_____ 67C_____ 68A_____ 69D_____ 70B_____	**_____/5**

Objective 0015: Understand principles and theories related to biological evolution.	
71D_____ 72C_____ 73A_____ 74C_____ 75A_____	**_____/5**

Objective 0016: Understand characteristics of populations, communities, ecosystems, and biomes.	
76C_____ 77B_____ 78A_____ 79D_____ 80D_____	**_____/5**

Subarea IV (Objectives 0013–0016) Total _____/20

MULTIPLE-CHOICE QUESTION
PRACTICE TEST EVALUATION CHART (continued)

Subarea V: Earth and Space Science

Objective 0017: Understand geologic history and processes related to the changing earth.	
81A_____ 82D_____ 83A_____ 84B_____ 85C_____	_____/5

Objective 0018: Understand characteristics and properties of the hydrosphere.	
86B_____ 87D_____ 88A_____ 89D_____ 90A_____	_____/5

Objective 0019: Understand the earth's atmosphere, weather, and climate.	
91D_____ 92A_____ 93D_____ 94B_____ 95C_____	_____/5

Objective 0020: Understand components of the solar system and universe and their interactions.	
96C_____ 97B_____ 98A_____ 99D_____ 100C_____	_____/5

Subarea V (Objectives 0017–0020) Total _____/20

OPEN-RESPONSE ITEM EVALUATION INFORMATION

How Open-Response Items Are Scored

Open-response items are scored through a process called focused holistic scoring. Scorers judge the overall effectiveness of the response rather than individual aspects considered in isolation. Scorer judgments are based on the quality of the response, not on length or neatness. Responses must be long enough to cover the topic adequately and scorers must be able to read what is written.

How to Evaluate Your Practice Responses

On the following pages, you will find two "strong" and two "weak" sample responses. PLEASE DO NOT REVIEW THE SAMPLE RESPONSES UNTIL AFTER YOU HAVE WRITTEN YOUR OWN RESPONSE. When you do review the two "strong" and "weak" sample responses and analyses included here, please note the following points:

- ✓ For the purposes of the practice test, responses are identified as "strong" or "weak" rather than given a score point of 1–4.
- ✓ The responses identified as "strong" may contain flaws; however, these responses do demonstrate the performance characteristics of a "strong response."
- ✓ The two "strong" responses demonstrate the examinees' appropriate understanding and application of the subject matter knowledge. However, these responses do not necessarily reflect the full range of "correct answers" that would demonstrate an understanding of the subject matter.
- ✓ The "Analysis" accompanying each "strong" and "weak" response discusses the main attributes of the responses, but does not identify all flaws or strengths that may be present.

Compare your practice responses to the Sample Responses to determine whether your responses are more similar to the strong or weak responses. Also review the Analyses on those pages and the Scoring Rubric to help you better understand the characteristics of strong and weak responses. This evaluation will help you identify specific problems or weaknesses in your practice responses. Further information on scoring can be found in the Test Information Booklet and Faculty Guide at www.mtel.nesinc.com and at www.doe.mass.edu/mtel; select "FAQ," then "After the Test."

OPEN-RESPONSE ITEM
SCORING RUBRIC, SAMPLE RESPONSES, AND ANALYSES

Massachusetts Tests for Educator Licensure®
SCORING RUBRIC FOR SUBJECT TESTS

Performance Characteristics:

Purpose	The extent to which the response achieves the purpose of the assignment.
Subject Matter Knowledge	Accuracy and appropriateness in the application of subject matter knowledge.
Support	Quality and relevance of supporting details.
Rationale	Soundness of argument and degree of understanding of the subject matter.

Scoring Scale:

Score Point	Score Point Description
4	**The "4" response reflects a thorough knowledge and understanding of the subject matter.** • The purpose of the assignment is fully achieved. • There is a substantial, accurate, and appropriate application of subject matter knowledge. • The supporting evidence is sound; there are high-quality, relevant examples. • The response reflects an ably reasoned, comprehensive understanding of the topic.
3	**The "3" response reflects an adequate knowledge and understanding of the subject matter.** • The purpose of the assignment is largely achieved. • There is a generally accurate and appropriate application of subject matter knowledge. • The supporting evidence is adequate; there are some acceptable, relevant examples. • The response reflects an adequately reasoned understanding of the topic.
2	**The "2" response reflects a limited knowledge and understanding of the subject matter.** • The purpose of the assignment is partially achieved. • There is a limited, possibly inaccurate or inappropriate, application of subject matter knowledge. • The supporting evidence is limited; there are few relevant examples. • The response reflects a limited, poorly reasoned understanding of the topic.
1	**The "1" response reflects a weak knowledge and understanding of the subject matter.** • The purpose of the assignment is not achieved. • There is little or no appropriate or accurate application of subject matter knowledge. • The supporting evidence, if present, is weak; there are few or no relevant examples. • The response reflects little or no reasoning about or understanding of the topic.

U	**The response is unrelated to the assigned topic, illegible, primarily in a language other than English, not of sufficient length to score, or merely a repetition of the assignment.**
B	**There is no response to the assignment.**

FIRST SAMPLE WEAK RESPONSE FOR OPEN-RESPONSE ITEM ASSIGNMENT #1

Sample weak responses to the open-response item assignments will be available in summer 2010.

ANALYSIS FOR FIRST WEAK RESPONSE TO OPEN-RESPONSE ITEM ASSIGNMENT #1

Analyses for weak responses to the open-response item assignments will be available in summer 2010.

SECOND SAMPLE WEAK RESPONSE FOR OPEN-RESPONSE ITEM ASSIGNMENT #1

Sample weak responses to the open-response item assignments will be available in summer 2010.

ANALYSIS FOR SECOND WEAK RESPONSE TO OPEN-RESPONSE ITEM ASSIGNMENT #1

Analyses for weak responses to the open-response item assignments will be available in summer 2010.

FIRST SAMPLE STRONG RESPONSE FOR OPEN-RESPONSE ITEM ASSIGNMENT #1

Sample strong responses to the open-response item assignments will be available in summer 2010.

ANALYSIS FOR FIRST STRONG RESPONSE TO OPEN-RESPONSE ITEM ASSIGNMENT #1

Analyses for strong responses to the open-response item assignments will be available in summer 2010.

SECOND SAMPLE STRONG RESPONSE FOR OPEN-RESPONSE ITEM ASSIGNMENT #1

Sample strong responses to the open-response item assignments will be available in summer 2010.

ANALYSIS FOR SECOND STRONG RESPONSE TO OPEN-RESPONSE ITEM ASSIGNMENT #1

Analyses for strong responses to the open-response item assignments will be available in summer 2010.

FIRST SAMPLE WEAK RESPONSE FOR OPEN-RESPONSE ITEM ASSIGNMENT #2

Sample weak responses to the open-response item assignments will be available in summer 2010.

ANALYSIS FOR FIRST WEAK RESPONSE TO OPEN-RESPONSE ITEM ASSIGNMENT #2

Analyses for weak responses to the open-response item assignments will be available in summer 2010.

SECOND SAMPLE WEAK RESPONSE FOR OPEN-RESPONSE ITEM ASSIGNMENT #2

Sample weak responses to the open-response item assignments will be available in summer 2010.

ANALYSIS FOR SECOND WEAK RESPONSE TO OPEN-RESPONSE ITEM ASSIGNMENT #2

Analyses for weak responses to the open-response item assignments will be available in summer 2010.

FIRST SAMPLE STRONG RESPONSE FOR OPEN-RESPONSE ITEM ASSIGNMENT #2

Sample strong responses to the open-response item assignments will be available in summer 2010.

ANALYSIS FOR FIRST STRONG RESPONSE TO OPEN-RESPONSE ITEM ASSIGNMENT #2

Analyses for strong responses to the open-response item assignments will be available in summer 2010.

SECOND SAMPLE STRONG RESPONSE FOR OPEN-RESPONSE ITEM ASSIGNMENT #2

Sample strong responses to the open-response item assignments will be available in summer 2010.

ANALYSIS FOR SECOND STRONG RESPONSE TO OPEN-RESPONSE ITEM ASSIGNMENT #2

Analyses for strong responses to the open-response item assignments will be available in summer 2010.

PRACTICE TEST SCORE CALCULATION

The practice test score calculation is provided so that you may better gauge your performance and degree of readiness to take an MTEL test at an operational administration. Although the results of this practice test may be used as one indicator of potential strengths and weaknesses in your knowledge of the content on the official test, it is not possible to predict precisely how you might score on an official MTEL test.

The Sample Responses and Analyses for the open-response items may help you determine whether your responses are more similar to the strong or weak samples. The Scoring Rubric can also assist in estimating a score for your open responses. You may also wish to ask a mentor or teacher to help evaluate your responses to the open-response questions prior to calculating your total estimated score.

How to Calculate Your Practice Test Score

Review the directions in the sample below and then use the blank practice test score calculation worksheet on the following page to calculate your estimated score.

SAMPLE

Multiple-Choice Section

Enter the total number of multiple-choice questions you answered correctly:	66	
Use Table 1 below to convert that number to the score and write your score in **Box A**:		**A:** 195

Open-Response Section

Enter the number of points (1 to 4) for your first open-response question:	3	
Enter the number of points (1 to 4) for your second open-response question:	3	
	======	
Add those two numbers (Number of open-response question points):	6	
Use Table 2 below to convert that number to the score and write your score in **Box B**:		**B:** 52

Total Practice Test Score (Estimated MTEL Score)

Add the numbers in **Boxes A and B** for an estimate of your MTEL score:	**A + B =** 247

Practice Test Score Calculation Worksheet: General Science

Table 1:

Number of Multiple-Choice Questions Correct	Estimated MTEL Score	Number of Multiple-Choice Questions Correct	Estimated MTEL Score
0 to 25	131	61 to 65	188
26 to 30	138	66 to 70	195
31 to 35	145	71 to 75	202
36 to 40	152	76 to 80	209
41 to 45	160	81 to 85	216
46 to 50	167	86 to 90	223
51 to 55	174	91 to 95	230
56 to 60	181	96 to 100	237

Table 2:

Number of Open-Response Question Points	Estimated MTEL Score
2	36
3	40
4	44
5	48
6	52
7	56
8	60

Print the form below to calculate your estimated practice test score.

Multiple-Choice Section

Enter the total number of multiple-choice questions you answered correctly:

Use Table 1 above to convert that number to the score and write your score in **Box A**: **A:** ____

Open-Response Section

Enter the number of points (1 to 4) for your first open-response question:

Enter the number of points (1 to 4) for your second open-response question:

======

Add those two numbers (Number of open-response question points):

Use Table 2 above to convert that number to the score and write your score in **Box B**: **B:** ____

Total Practice Test Score (Estimated MTEL Score)

Add the numbers in **Boxes A and B** for an estimate of your MTEL score: **A + B =** ____