5th

8th

Grade 8

meap™
Michigan Educational Assessment Program

Item Descriptors

SCIENCE

FALL 2009

MICHIGAN STATE BOARD OF EDUCATION

STATEMENT OF ASSURANCE OF COMPLIANCE WITH FEDERAL LAW

The Michigan State Board of Education complies with all Federal laws and regulations prohibiting discrimination and with all requirements and regulations of the U.S. Department of Education. It is the policy of the Michigan State Board of Education that no person on the basis of race, color, religion, national origin or ancestry, age, sex, marital status, or handicap shall be discriminated against, excluded from participation in, denied the benefits of, or otherwise be subjected to discrimination in any program or activity for which it is responsible or for which it receives financial assistance from the U.S. Department of Education.

Students were instructed to read the directions below silently as the test administrator read them aloud.

PART 1:

DIRECTIONS:

This test includes multiple-choice questions. For these multiple-choice questions, use only a No. 2 pencil to mark your answers. Make a dark mark that completely fills the corresponding circle in your **Answer Document**. If you are not sure of the answer to a question, mark your **best** choice and go on to the next question. If you change an answer, be sure to erase the first mark completely. Mark only one answer for each question.

If you finish early, you may check your work for Part 1 only. Do **NOT** work on Part 2 of this test until you are told to do so.

NOTE: The directions for Part 2 are the same as the above instructions.

NOTE: For each item listed throughout this booklet, the first statement represents the Michigan Science Curriculum Framework (MSCF) benchmark and the second statement is the descriptor for the item's stem or question.

1 **L.2.m.1:** Compare and classify organisms into major groups on the basis of their structure.

Given a specific body part used to classify animals, select the list of three animals that each have this body part in common.

A correct, each animal has this body part

B one animal does not have this body part

C two animals do not have this body part

D one animal does not have this body part

2 **L.2.m.2:** Describe the life cycle of a flowering plant

As an animal feeds off a plant, without killing the plant, the animal transfers material from the flower of one plant to the flowers of other plants, which enable the plant to carry on its life cycle across generations. Identify the word that labels this process of material transport.

A not the process; refers to another process in a plant's life cycle

B applies to animal life cycles or providing plant nutrients

C correct, the word that describes the plant material transfer process

D not the process; refers to another process in a flowering plant's life

3 **L.1.m.1:** Demonstrate evidence that all parts of living things are made of cells.

Arrange levels of body structures listed from the most basic to the most complex.

A an arrangement that did not start with most basic; incorrectly ordered the remaining components

B correct, the list from most basic to most complex

C an arrangement that did not start with most basic; incorrectly ordered the remaining components

D an arrangement that did not start with most basic; incorrectly ordered the remaining components

4 **L.1.m.2:** Explain why and how selected specialized cells are needed by plants and animals.

Identify the reason why a plant must have this type of specialized cells.

A a plant process for which the specified cells are not used

B a plant function for which the specified cells are not used

C correct, the function for which these cells are needed by a plant

D a function from which the specified cells are not needed by the plant

5 **L.3.m.1:** Describe how the characteristics of living things are passed on through generations.

Identify the description that indicates how a plant can pass a specified characteristic on to future generations.

A correct, indicates how structures within a cell carry information to reproduce parent characteristics in offspring

B does not reveal how a structure within a cell transfers characteristics of parent to offspring

C does not indicate the process of characteristic information transfer from parent to offspring

D does not indicate how structures within a cell develop in order to transfer parent characteristic information to offspring

6 **L.2.m.4:** Explain how selected systems and processes work together in animals

Identify the three body systems involved in obtaining and delivering a specified necessary chemical from the environment for use by an animal.

A two body systems not involved in obtaining and delivering the chemical

B two body systems not involved in obtaining and delivering the chemical

C correct, the three body systems which obtain and deliver the chemical for use by an animal

D one body system is not involved in obtaining and delivering the chemical

7 **L.5.m.6:** Describe ways in which human beings alter the environment.

Given a description of the way bats rely on other organisms available in their environment to survive, identify the reason that best explains how a regional bat population changed in size.

A correct, the most likely reason for a specified change in the bat population

B a reason that would likely have the opposite effect on the size of the bat population

C a reason that would not lead to the change in the size of the bat population

D a reason that would likely have the opposite effect on the size of the bat population

8 **L.1.m.1:** Demonstrate evidence that all parts of living things are made of cells.

Identify the specific type of cell that provides a specified chemical to a specified tissue.

A a cell type that does not provide the chemical to the tissue

B a cell type that does not provide the chemical to the tissue

C correct, the cell type that provides the specified chemical to the specified tissue

D a cell type that does not provide a specified chemical to the specified tissue

9 **C.1.m.1:** Generate scientific questions about the world based on observation.

Identify the research question a student is attempting to answer based on a description of an investigation that manipulates specified variables regarding plants.

A does not apply to the manipulated variables

B does not apply to the manipulated variables

C correct, pertains to the manipulated variables

D does not apply to the manipulated variables

10 **C.1.m.4:** Use metric measurement devices to provide consistency in an investigation.

Identify the appropriate metric unit to measure the specified characteristic of a specified object.

A a metric unit too large to best measure the characteristic

B correct, the metric unit that best measures the characteristic of the object

C a metric unit too large to best measure the characteristic

D a metric unit too large to best measure the characteristic

11 **R.1.m.2:** Describe limitations in personal knowledge.

Identify the best source of information regarding specified requirements for body function.

A a source that has an implied sales bias

B a source that has an implied sales bias

C correct, a source that has an implied scientific basis

D a source that has an implied celebrity endorsement bias

12 **P.2.m.1:** Describe common physical changes in matter: evaporation, condensation, sublimation, thermal expansion, and contraction.

Identified what happened to a substance that, under specified conditions, changed from one physical state to another physical state.

A correct, the process by which the physical change occurred under the specified conditions

B an incorrect process that brought about the change in state

C an incorrect process that brought about the change in state

D an incorrect process that brought about the change in state

13 **P.1.m.4:** Describe the arrangement and motion of molecules in solids, liquids, and gases.

Identify the state of matter of a substance based on specified motion of molecules of the substance.

A correct, the state of matter based on the pattern of molecular movement

B the incorrect state of matter based on the specified molecular movement

C a description of a substance independent of its state of matter

D the incorrect state of matter based on the specified molecular movement

14 **P.1.m.2:** Explain when length, mass, weight, area, volume, or temperature are appropriate to describe the properties of an object or a substance.

Recognize which property, if identical for two different samples of matter, indicates that the two samples are the same material.

A a property that can be different, though the substances are the same material

B a property that can be different, though the substances are the same

C correct, the property that is the same, independent of the difference in amounts, size, or temperature, between two substances

D a property that can be different though the substances are the same

15 **P.1.m.3:** Classify substances as elements, compounds, or mixtures and justify classifications in terms of atoms and molecules.

Given a specified material, determine and justify whether the material is an element, compound, or mixture.

A the correct substance class, however the justification for the classification is incorrect

B incorrect substance class

C incorrect substance class

D correct, the correct substance class and correct justification for the classification

16 **P.2.m.2:** Describe common chemical changes in terms of properties of reactants and products.

Given a specific chemical equation that uses chemical abbreviations, identify the two substances that react chemically.

A one reactant and one product

B one reactant and one product

C correct, the two chemical reactants

D two products

17 **P.2.m.4:** Describe common energy transformations in everyday situations.

Identify the order of three energy transformations that occur from the source of energy to the output of energy in a specified, simple, daily-use object.

A three energy transformations listed in an incorrect order

B correct, the three energy transformations in the correct order

C three energy transformations, where one is an energy by-product not needed for the daily-use object to work

D three energy sources, where one is not used by the object and the other is an unintended by-product

18 **C.1.m.2:** Design and conduct a scientific investigation.

Given a specified description of a science experiment, recognize the statement that is the most appropriate hypothesis for the experiment.

A does not include the predictor variable

B correct, the statement that indicates anticipated criterion results based on manipulation of the predictor variable

C includes conditions not described as part of the specified experiment

D manipulates a predictor variable not described as part of the specified investigation

19 **C.1.m.6:** Write and follow procedures in the form of step-by-step instructions, formulas, flow diagrams, and sketches.

Given a list of step-by-step investigation procedures, recognize to which part of an investigation these procedures apply.

A part of an investigation which would follow after the procedures had been applied

B part of an investigation that describes the information obtained after the procedures had been applied

C correct, the part of a scientific investigation in which the given procedures are performed

D a part of an investigation that precedes the application of the listed procedures

20 **R.1.m.2:** Describe limitations of personal knowledge.

Identify the process by which a manageable unit of measurement is used to represent a similar unit of measurement, where all measurements maintain the same ratio between the actual unit and the represented units.

A a measurement of space

B a property of matter measurement

C correct, a process where a given unit of measurement is used to represent another similar unit, keeping the ratio between units constant

D a measurement of amount

21 **E.1.m.1:** Describe and identify surface features using maps.

Given a type of map, identify the surface feature represented by the map.

A correct, the Earth-surface feature described using this type of map

B a surface feature not represented by the map

C a surface feature not represented by the map

D a surface feature not represented by the map

22 **E.1.m.2:** Explain how rocks are formed.

Recognize how a specified type of rock is formed.

A correct, the process by which the specified type of rock is formed

B a process used to produce a different type of rock

C a process that does not produce a recognized type of rock

D a process that does not produce a recognized type of rock

23 **E.1.m.3:** Explain how rocks are broken down, how soil is formed, and how surface features change.

Recognize which process that changes the surface features of the Earth would take the longest time to make a specified change to a given surface feature.

A a process that would change the given feature, but not a process that would take the most time

B a process that would change the given feature, but not a process that would take the most time

C correct, the process that would take the longest to make the specified change to the given surface feature

D a process that would change the given feature, but not a process that would take the most time

24 **E.2.m.1:** Use maps of the Earth to locate water in its various forms and describe conditions under which they (the forms) exist.

Recognize the likely form of water at a specified location on Earth.

A an unlikely form of surface water that would exist in this location on Earth

B a form of water at a location other than that indicated on the map

C correct, the form of water that would exist at this location on the map

D a form of water at a location other than that indicated on the map

25 **E.2.m.4:** Describe the origins of pollution in the hydrosphere.

Given a map which depicts stream flow in relation to designated landmarks, recognize the source of water and contaminants that would yield a change in organism population at a specific point downstream.

A correct, the likely source of water and contaminants that would likely occur from that source to change organism population size downstream

B a source of water downstream from the specified point, though this source would likely have contaminants that would bring about the organism population change

C a source of water downstream that would not likely have the contaminant that would bring about the organism population change

D a source at the specific point that would not likely contribute contaminants to the stream

26 **E.2.m.3:** Explain how water exists below the Earth's surface and how it is replenished.

Recognize the source of water that replenishes most of the water in the Earth's surface.

A correct, the source from which most of the water comes to replenish the water in the surface of Earth

B a process description that does not replenish or is the source of water in the Earth's surface

C a process description that does not replenish or is the source of water in the Earth's surface

D a source that does not replenish the water in the surface of Earth

27 **C.1.m.3:** Use tools and equipment appropriate to scientific investigations.

Identify the discovery made by using a specified tool to make observations.

A a discovery that cannot be made by use of the specified tool

B a discovery that is not true

C correct, an observation that can be accurately made by the specified tool

D a conclusion that is not made from data gathered from use of the specified tool

28 **C.1.m.4:** Use metric measurement devices to provide consistency in an investigation.

Identify the correct metric unit needed to measure the observation specified.

A an inadequate unit in terms of dimensions to measure the observation

B an inadequate unit in terms of dimensions to measure the observation

C correct, uses a unit that appropriately measures the specified observation

D a unit that does not apply to the specified observation

29 **R.1.m.4:** Describe the advantages and risks of new technology.

Recognize the results of human activity that would likely affect the specified behavior of another animal that occurred among these animals prior to the human activity.

A correct, this result of human activity would directly affect the specified behavior of the animal

B a human activity that would not necessarily affect the animal's established behavior

C a human activity that would not necessarily affect the animal's established behavior

D a human activity that would not necessarily affect the animal's established behavior

30 **R.1.m.1:** Evaluate the strengths and weaknesses of claims, arguments, or data.

Given information about rock layers and fossils within the rock layers, use the information to select the best inference based on this information.

A correct, the inference that best fits the information provided

B an inference that is not true based on the provided information

C an inference which would incorporate information not provided

D an inference which would incorporate information not provided

31 **C.1.m.3:** Use tools and equipment appropriate to science investigations.

Identify the tool needed to measure a given characteristic of a specified object.

A a tool that measures a fixed amount of the characteristic

B correct, a tool that measures variable amounts of the characteristic

C a tool that does not measure the characteristic

D a tool that does not accurately measure the characteristics under all object conditions

32 **C.1.m.3:** Use tools and equipment appropriate to science investigations.

Identify the tool needed to measure a given characteristic of a specified substance.

A a tool that does not measure the characteristic

B correct, a tool that measures the characteristic

C a tool that does not measure the characteristic

D a tool that does not measure the characteristic

33 **E.3.m.2:** Describe the composition and characteristics of the atmosphere.

Given weather condition measurement data, describe human perception of the weather.

A a perception of weather conditions not supported by the data

B a perception of weather conditions not supported by the data

C a perception of weather conditions not supported by the data

D correct, the perception of weather conditions generally reported, given the data

34 **E.3.m.1:** Explain patterns of changing weather and how they are measured.

Given the symbol of a weather condition placed on a map of Michigan, identify the weather condition in words.

A a weather condition opposite the condition of the symbol

B words that do not represent a weather pattern

C a weather condition not illustrated by the symbol

D correct, the weather condition in words as indicated by the symbol

35 **E.3.m.2:** Describe the composition and characteristics of the atmosphere.

Recognize which atmospheric condition will likely have a specified effect on atmospheric water vapor.

A atmospheric conditions that will not have the specific effect on atmospheric water vapor

B correct, the atmospheric condition that will have the specified effect on atmospheric water vapor

C atmospheric conditions that will not have the specific effect on atmospheric water vapor

D atmospheric conditions that will not have the specific effect on atmospheric water vapor

36 **E.4.m.2:** Describe, compare, and explain the motion of solar system objects.

Recognize the basis for seasonal temperature change on Earth.

A correct, the reason for temperature change based on Earth's rotation position as it revolves around the Sun

B a statement about Earth's movement that does not account for seasonal temperature change

C a statement about Earth's movement that does not account for seasonal temperature change

D a statement about Earth and the Sun that does not influence seasonal temperature change

37 **E.4.m.3:** Describe and explain common observations of the night skies.

Describe the basis for observation of a specified object in the night sky using one's eyesight.

A a description that does not enable visual observation of an object in the night sky

B correct, the reason humans can observe an object in the night sky

C a description that is not true

D a reason that would not enable a human to observe the specified object in the night sky

38 **E.4.m.3:** Describe and explain common observation of the night skies.

Recognize how different objects in the night sky are seen in different locations on an annual basis.

A correct, the reason that indicates Earth's change in position

B incorrectly describes motion of objects in the night sky

C incorrectly states that the moon influences the appearance of different location of the objects

D incorrectly states how stars move in the night sky

39 **R.1.m.4:** Describe the advantages and risks of new technology.

Recognize a disadvantage among the advantages for making a specified improvement.

A an important advantage for making the improvement

B correct, a disadvantage the improvement brings to the specified situation

C a possible advantage stemming from the resources used to make the improvement

D an economic advantage from using the materials to manufacture the improvement objects

40 **C.1.m.2:** Design and conduct scientific investigations.

Given a specified investigation plan, including the effects of a predictor variable on the criterion variable, select the list of four objects a student would need to conduct the investigation.

A one of the four objects would not be used in the specified investigation

B correct, all four objects would be used to carry out the investigation

C one of the four objects would not be used in the specified investigation

D one of the four objects would not be used in the specified investigation

41 **C.1.m.5:** Use sources of information in support of scientific investigations.

Given a specified investigation plan, recognize the best source for obtaining information about the manipulated variable in the investigation.

A a source of information, intended for marketing, that would not specify facts about the objects studied in the investigation

B a source of information that does not provide needed information about the objects of study in the investigation

C correct, the primary source of information about the objects studied to get specific information about each object

D a source and method of information gathering that would not provide relevant information

42 **P.3.m.4:** Use electric currents to create magnetic fields and explain the application of this principle.

Recognize which of the described situations involving energy will produce a magnetic field.

A correct, the situation involving electricity

B the situation that involves light energy

C a situation involving a chemical reaction and heat energy

D a situation involving physical change and heat energy

43 **P.3.m.2:** Relate motion of objects to unbalanced forces in two dimensions.

Given a graph of speed (ordinate) and time (abscissa), describe how the forces on an object affect the object's speed at and after a specified point in time.

A a statement regarding forces that does not account for the object's speed

B a statement regarding forces that does not account for the object's speed

C correct, the statement that gives the reason for the object's speed at or after the point in time

D a statement regarding forces that does not account for the object's speed

44 **P.3.m.5:** Design strategies for moving objects by application of forces, including the use of simple machines.

Recognize the advantage for using a specified simple machine.

A a statement regarding the simple machine's effect on gravity is not true

B a statement that, if true, the simple machine would not provide any advantage

C correct, a statement that lists the advantage while noting the corresponding side-effect cost of the advantage

D an untrue statement that the simple machine would reduce work required

45 **P.4.m.2:** Explain how echoes occur and how they are used.

Given a textual description about a specific animal, identify the process by which it detects its food source

A a process by which energy from the food is transformed and detected by the animal

B a process by which one type of energy is released by the animal and reflected from the food source, which is then transformed to another type of energy for the animal to detect

C correct, the animal emits and detects a specific source of energy reflected off the food source

D a process where a specific energy is emitted by the prey and detected by the animal

46 **P.4.m.3:** Explain how light is required to see objects.

Recognize what must happen to light on a non-luminous object for a human to see the object.

A correct, the word indicating how light is detected by a human to see an object

B the word by which light on an object would not be sensed by a human to see the object

C the word by which the object would not necessarily provide light for a human to see the object

D a word that does enable a human to see an object, but it does not apply in the specified situation since the object is non-luminous

47 **P.4.m.5:** Describe the motion of vibrating objects.

Identify the source of sound waves.

A a type of sound wave

B correct, the type of physical motion in a medium that produces sound waves

C a type of sound wave

D describes the applied use of sound waves

48 **R.1.m.1:** Evaluate the strengths and weaknesses of claims, arguments, or data.

Given a textual description of an animal, recognize the best source for further information about the characteristics of the animal.

A a source of information about the animal that is anecdotal, possibly conflicting, does not necessarily provide accurate information, and does not have precise standards for characteristic measurement

B a source of information about the animal that is anecdotal, possibly conflicting, does not necessarily provide accurate information, and does not have precise standards for characteristic measurement

C a source of information that is not necessarily detailed or focused on providing information about the animal

D correct, a source of information that has standards for accurate and precise information, is focused on the specific animal and its characteristics, and has systematic organization of the information

49 **C.1.m.2:** Design and conduct scientific investigations.

Given a description of the methods and results of an experiment, recognize the next step in the research plan to obtain a more reliable conclusion from the investigation.

A a subsequent step in the research that does not improve the reliability of the experiment's conclusion

B a step prior to gathering data for the experiment that does not improve the reliability of the experiment's conclusion

C correct, a subsequent step that will gather more information to improve the reliability of the conclusion

D a subsequent step that will add more predictor variables to the experiment that will not improve the reliability of the conclusion

50 **C.1.m.1:** Generate scientific questions about the world based on observation.

Given a choice of scientific questions, identify the question that can be investigated by a student using the equipment and resources of a school laboratory.

A a question that seeks to obtain a single library-published fact

B a question that asks how to use a metric measurement tool

C a question that would have many facets for investigation generally exceeding the time and resources available in a school laboratory

D correct, a question that investigates the differences (i.e., compares) in a characteristic among many similar objects to identify the object with the greatest characteristic value

51 **L.4.m.2:** Explain how new traits might become established in a population and how species become extinct.

Recognize the best explanation for the disappearance of a specified animal, with a given structural characteristic, from the population of the specified animals having a different structural characteristic.

A an explanation that does not indicate the survival disadvantage for the animal with the structural characteristic that disappeared

B correct, the explanation that indicates the disadvantaged animals, having the given characteristic that disappeared, for survival in population

C an explanation that relies on information beyond that presented about the animal and its situation and is not necessarily true in comparison to the animal with a different structural characteristic

D an explanation that implies Lemarckian heredity of acquired traits, a theory that has been discredited

52 **L.4.m.1:** Describe how scientific theory traces possible evolutionary relationships among present and past life forms.

Recognize the best technique to study evolutionary relationships.

A a process that contributes to understanding of evolutionary relationships, however, the method relies on using past evidence to depict conditions that can no longer be observed

B a measure that does not necessarily provide evidence of relationships and is not available for microscopic organisms as it could be by using fossil evidence for large organisms

C correct, the use of evidence left by ancient life forms that can be compared among different organisms that coexisted during specified times

D a measure for which evidence is not available among remains of large ancient life forms and is somewhat meaningless for microscopic organisms from past eras

53 **L.3.m.1:** Describe how the characteristics of living things are passed on through generations.

Identify the plant cells that are the source of genetic information for passing plant traits across generations.

A two types of plant cells that do not carry genetic information across generations

B correct, the plants cells that carry genetic information across generations

C two types of plant cells that do not carry genetic information across generations

D two types of plant cells that do not carry genetic information across generations

54 **L.4.m.2:** Explain how new traits might become established in a population and how species become extinct.

Given a short text and illustrated information about a specific animal population, recognize how differences in traits among the animals provide the animal with one type of trait a better survival advantage.

A a conclusion that the survival rate is better among the animals with the trait not adaptive to environmental change

B a conclusion that the survival rate does not change among the animals with the trait not adaptive to environmental change

C correct, a conclusion that the survival rate is better among the animal with the trait that is adaptive to environmental change

D a conclusion that the survival rate does not change among the animal with the trait that is adaptive to environmental change

55 **L.5.m.2:** Describe how organisms acquire energy directly or indirectly from sunlight.

Given a food chain, recognize how the organism at the end of the chain relies on energy from the Sun.

A correct, the description that correctly classifies the organism and indicates how it gets energy that originates from the Sun

B a description that misclassifies the organism and incorrectly indicates how it gets energy from the Sun

C a description that correctly classifies the organism, but incorrectly describes how its uses the Sun's energy to survive

D a description that incorrectly classifies the organism and incorrectly describes how it uses the Sun's energy to survive

56 **L.5.m.3:** Predict the effects of changes in one population in a food web on other populations.

Recognize that a change in a producer population in a defined area can change the consumer population that feeds on the producer in the defined area.

A an incorrect change on the consumers of the specified consumer

B correct, the likely change in the specified consumer population

C an unlikely change in the specified consumer population

D an unlikely change in the specified consumer population

57 **L.3.m.1:** Describe how the characteristics of living things are passed on through generations.

Recognize how a specified trait of a parent is passed on to its offspring.

A an incorrect method by which the trait is passed on

B correct, the correct method by which the trait is passed on

C an incorrect description of how the trait is passed on

D an incorrect source of the trait that is passed on to offspring

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