OKLAHOMA SCHOOL TESTING PROGRAM
OKLAHOMA CORE CURRICULUM TESTS

TEST and ITEM SPECIFICATIONS

Science
Grade 5

2013-2014 Edition

OKLAHOMA
STATE DEPARTMENT of EDUCATION
JANET BARRESI
STATE SUPERINTENDENT of PUBLIC INSTRUCTION

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Oklahoma State Department of Education
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Oklahoma Core Curriculum Tests

TEST AND ITEM SPECIFICATIONS

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Purpose

The purpose of the Grade 5 Science Test is to measure Oklahoma students' level of proficiency. On this test, students are required to respond to a variety of items linked to the fifth-grade science process and content standards and objectives identified in the Oklahoma Academic Standards (OAS). All science test forms will assess the identified standards and objectives listed below. The following standards and objectives are intended to summarize the knowledge as identified in Oklahoma Academic Standards.

Oklahoma Academic Standards Process Standards and Objectives
Observe and Measure • SI (metric) units (P1.1) • Similar/different characteristics (P1.2)
Classify • Observable properties (P2.1) • Serial order (P2.2)
Experiment • Experimental design (P3.2) • Hazards/safety practices (P3.4)
Interpret and Communicate • Data tables/line/bar/trend and circle graphs (P4.2) • Prediction based on data (P4.3) • Explanations based on data (P4.4)

Oklahoma Academic Standards Content Standards and Objectives
Properties of Matter and Energy • Matter has physical properties (C1.1) • Physical properties can be measured (C1.2) • Energy can be transferred (C1.3) • Potential/Kinetic energy (C1.4)
Organisms and Environments • Organisms dependence (C2.1) • Individual organism and species survival (C2.2)
Structure of Earth and the Solar System • Properties of soils (C3.1) • Weather patterns (C3.2) • Earth as a planet (C3.3)

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Test Structure, Format, and Scoring

The Oklahoma Core Curriculum Tests consist of multiple-choice items. Each multiple-choice item is scored as correct or incorrect. The student's raw score is converted to a scaled score using the number correct method. Of the total items, 10 items are field-test items and do not contribute to the student's scaled score.

Content Assessment	Total Items	Total Operational Items	Total Field Test Items
Science	55	45	10

Test Alignment with Oklahoma Academic Standards

Criteria for Aligning the Test with the Standards and Objectives of the Oklahoma Academic Standards
1. Categorical Concurrence The test is constructed so that there are at least six items measuring each OAS standard of the. The number of items is based on estimating the number of items that could produce a reasonably reliable estimate of a student's mastery of the content measured.
2. Depth of Knowledge Consistency The test is constructed using items from a variety of Depth of Knowledge levels that are consistent with the processes students need in order to demonstrate proficiency for each OAS objective.
3. Range of Knowledge Correspondence The test is constructed so that at least 75% of the objectives for an OAS standard of the have at least one corresponding assessment item.
4. Balance of Representation The test is constructed according to the Test Blueprint which reflects the degree of representation given on the test to each OAS standard and/or OAS objective in terms of the percent of total test items measuring each standard and the number of test items measuring each standard and/or objective. The test construction shall yield a balance of representation with an index of 0.7 or higher of assessed objectives related to a standard.
5. Source of Challenge Each test item is constructed in such a way that the major cognitive demand comes directly from the targeted OAS objective or OAS concept being assessed, not from specialized knowledge or cultural background of the test taker.

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Test Blueprint

The Test Blueprint reflects the degree to which each OAS standard and OAS objective is represented on the test. The overall distribution of operational items in a test form is intended to look as follows:

Process/Inquiry Standards & Objectives	Ideal Number of Items	Ideal Percentage of Items
P1.0 Observe and Measure	**8-10**	**18-22%**
1.1 SI (metric) units	4-6	
1.2 Similar/different characteristics	4	
P2.0 Classify	**8-10**	**18-22%**
2.1 Observable properties	5	
2.2 Serial order	5	
P3.0 Experiment	**13-15**	**29-33%**
3.2 Experimental design	9-11	
3.4 Hazards/practice safety	4	
P4.0 Interpret and Communicate	**12-14**	**27-31%**
4.2 Data tables/line/bar/trend and circle graphs	4-6	
4.3 Prediction based on data	4-6	
4.4 Explanations based on data	4-6	
Total Test	**45**[1]	**100%**

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Test Blueprint (Continued)

Content Standards and Objectives	Ideal Number of Items	Ideal Percentage of Items
C1.0 Properties of Matter and Energy	**16-18**	**39-44%**
1.1 Matter has physical properties	4-5	
1.2 Physical properties can be measured	4-5	
1.3 Energy can be transferred	4-5	
1.4 Potential/Kinetic Energy	4-5	
C2.0 Organisms and Environments	**10-13**	**24-32%**
2.1 Dependence upon community	5-7	
2.2 Individual organism and species survival	5-7	
C3.0 Structures of the Earth and the Solar System	**12-15**	**29-37%**
3.1 Properties of Soils	4-6	
3.2 Weather patterns	4-6	
3.3 Earth as a planet	4	
Total Test	**41[1,2]**	**100%**

[1] The actual number of items scored for a student may be slightly lower pending a review of item statistics.

[2] Four out of the 45 total items assess the "Safety" process standard for which there is no corresponding content standard.

- Percentages are approximations and may result in a sum other than 100 due to rounding.
- A minimum of 4 items is required to report results for an objective, and a minimum of 6 items is required to report a standard. While the actual number of items on the test may not match the blueprint exactly, each future test will move toward closer alignment with the ideal blueprint.
- The Oklahoma Academic Standards correspond to the PASS standards.

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Depth of Knowledge Assessed by Test Items

The Oklahoma Core Curriculum Tests will, as closely as possible, reflect the following "Depth of Knowledge" distribution of items.

Grade 5	
Depth of Knowledge	**Percent of Items**
Level 1—Recall and Reproduction	20-25%
Level 2—Skills and Concepts	65-70%
Level 3—Strategic Thinking	5-15%

Level 1 (Recall and Reproduction) is the recall of information such as a fact, definition, term, or a simple procedure, as well as performing a simple science process or procedure. Level 1 requires students to demonstrate a rote response, use a well-known formula, follow a set procedure (like a recipe), or perform a clearly defined series of steps. A "simple" procedure is well defined and typically involves only one step. Verbs such as "identify," "recall," "recognize," "use," "calculate," and "measure" generally represent cognitive work at the recall and reproduction level. Simple word problems that can be directly translated into and solved by a formula are considered Level 1. Verbs such as "describe" and "explain" could be classified at different DOK levels, depending on the complexity of what is to be described and explained.

A student answering a Level 1 item either knows the answer or does not; that is, the answer does not need to be "figured out" or "solved." In other words, if the knowledge necessary to answer an item automatically provides the answer to the item, the item is at Level 1. If the knowledge necessary to answer the items does not automatically provide the answer, the item is at least at Level 2.

Some examples that represent, but do not constitute all Level 1 performances are:

- Recall or recognize a fact, term, or property
- Represent in words or diagrams a scientific concept or relationship
- Provide or recognize a standard, scientific representation for simple phenomena
- Perform a routine procedure, such as measuring length

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Level 2 (Skills and Concepts) includes the engagement of some mental processing beyond recalling or reproducing a response. The content knowledge or process involved is more complex than in Level 1. Items require students to make some decisions as to how to approach the question or problem. Keywords that generally distinguish a Level 2 item include "classify," "organize," "estimate," "make observations," "collect and display data," and "compare data." These actions imply more than one step. For example, to compare data requires first identifying characteristics of the objects or phenomenon, and then grouping or ordering the objects. Level 2 activities include: making observations and collecting data; classifying, organizing, and comparing data; and organizing and displaying data in tables, graphs, and charts.

Some action verbs, such as "explain," "describe," or interpret" could be classified at different DOK levels, depending on the complexity of the action. For example, interpreting information from a simple graph, which requires reading information from the graph, is a Level 2. An item that requires interpretation from a complex graph, such as making decisions regarding features of the graph that need to be considered and how information from the graph can be aggregated, is at a Level 3.

Some examples that represent, but do not constitute all Level 2 performances are:

- Specify and explain the relationship between facts, terms, properties, or variables
- Describe and explain examples and non-examples of science concepts
- Select a procedure according to specified criteria and perform it
- Formulate a routine problem given data and conditions
- Organize, represent, and interpret data

Level 3 (Strategic and Extended Thinking) requires reasoning, planning, using evidence, and a higher level of thinking than the previous two levels. The cognitive demands of Level 3 are complex and abstract. The complexity does not result only from the fact that there could be multiple answers, a possibility for both Levels 1 and 2, but because the multi-step task requires more demanding reasoning. In most instances, requiring students to explain their thinking is at Level 3; requiring a very simple explanation or a word or two should be at Level 2. An activity that has more than one possible answer and requires students to justify the response they give would most likely be Level 3. Experimental designs in Level 3 typically involve more than one dependent variable. Other Level 3 activities include: drawing conclusions from observations; citing evidence and developing a logical argument for concepts; explaining phenomena in terms of concepts; and using concepts to solve non-routine problems.

Some examples that represent, but do not constitute all Level 3 performances are:

- Identify research questions and design investigations for a scientific problem
- Solve non-routine problems
- Develop a scientific model for a complex situation
- Form conclusions from experimental data

Note—The descriptions are adapted from *Review Background Information and Instructions, Standards and Assessment Alignment Analysis, CCSSO TILSA Alignment Study*, May 21-24, 2001, Version 2.0.

For an extended description of each Depth of Knowledge level, see the student assessment Web site at <www.ok.gov/sde>.

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Universal Test Design Considerations

Universal design, as applied to assessments, is a concept that allows the widest possible range of students to participate in assessments and may even reduce the need for accommodations and alternative assessments by expanding access to the tests themselves. In the Oklahoma Core Curriculum Tests, modifications have been made to some items that simplify and clarify instructions and that provide maximum readability, comprehensibility, and legibility. This includes such things as reduction of language load in content areas other than Reading, increased font size, fewer items per page, and boxed items to assist visual focus. In Science tests, the vocabulary level will be below the grade being tested except for content words. Grade 5 will be two grade levels below. These modifications are evident in the sample items included in this document.

Testing Schedules

The Grade 5 Science Test is meant to be administered in a separate session. Students may be given additional time if needed, but the additional time is to be given as an extension of the same science testing period.

Grade 5 Science

Test Session

Section 1

	Approximately:
Distributing books, reading directions	15 minutes
Administering the Science Test	30-40 minutes
Total:	45-55 minutes

Section 2

	Approximately:
Distributing books, reading directions	5 minutes
Administering the Science Test	45-55 minutes
Total:	50-60 minutes

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Multiple-Choice Item Guidelines

- All item stems clearly indicate what is expected in an item to help students focus on selecting a response.
- Each multiple-choice item has a stem (question, statement, or incomplete statement, and/or graphic component) and four answer (or completion) options, only one of which is correct.
- Multiple-choice item stems present a complete problem so that students know what to do before looking at the answer choices; students should not need to read all answer choices before knowing what is expected.
- Art incorporated within an item must be functional and assist students in determining the correct response.

In summary, test items assess whether students: understand relevant concepts and procedures; communicate their understandings effectively in content specific terms; approach problems; and develop viable solutions.

Stimulus Materials

Stimulus materials are the passages, graphs, models, figures, etc., that students must read and examine in order to respond to items. The following characteristics are necessary for stimulus materials:

1. When students are given information, data, or an experimental setup to evaluate, they should know the research question and the purpose of the research.
2. Tables, graphs, reading passages, and illustrations provide sufficient information for assessment of multiple standards.
3. Stimulus materials for a set of items may be a combination of multiple stimuli.
4. Information in stimulus materials is representative of concepts and principles described in Oklahoma Academic Standards.
5. For conceptual items, stimulus materials are necessary but not conceptually sufficient for student response.
6. There is a balance of graphic and textual stimulus materials within a test form. At least 50% of the items have appropriate pictorial and graphical representations. Graphs, tables, or figures are clearly associated with their intended items. Graphics appear either on the same page as the stimulus or on the facing page.
7. The stimuli avoid subject matter that might prompt emotional distress on the part of the students.
8. Permission to use stimuli from copyrighted material is obtained as necessary by the testing vendor.

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General Considerations

It is necessary to create test items that are reliable, fair, and targeted to the OAS standards listed on the following pages. There are some general considerations and procedures for effective item development. These considerations include, but are not limited to, the following:

1. Each test form contains items assessing standards and objectives listed in the Test Blueprint for the specific grade and content area. In the Oklahoma Academic Standards document, asterisks have been used to identify standards and objectives that must be assessed by the local school district.
2. Test items that assess each standard are not limited to one particular type of response format. Each item begins with a stem that asks a question or poses a clear problem. Stems may include incomplete sentences in order to reduce unnecessary repetition of text.
3. Test items attempt to focus on content that is authentic and that grade-level students can relate to and understand.
4. Test items are worded precisely and clearly. The more focused an item is, the more reliable and fair it will be, and the more likely all students will understand what is required of them.
5. All items are reviewed to eliminate language that is biased or is otherwise likely to disadvantage a particular group of students. That is, items do not display unfair representations of gender, race, ethnicity, disability, culture, or religion; nor do items contain elements that are offensive to any such groups.
6. All multiple-choice items, including the correct response and distractors, are similar in length and syntax. Students should not be able to rule out an incorrect answer or identify a correct response solely because it looks or sounds different from the other answer choices. Distractors are created so that students reason their way to the correct answer rather than simply identify incorrect responses because of a distractor's obviously inappropriate nature. Distractors should always be plausible (but incorrect) in the context of the item stem. Correct responses are reasonably distributed among A's, B's, C's, and D's. The distractors adopt the language and sense of the material in the selection. Test items focus on reading skills and comprehension strategies, avoiding measurement of the students' feelings or values.
7. Items deal with issues and details that are of consequence in the stimulus and central to students' understanding and interpretation of the stimulus.
8. To the greatest extent possible, no item or answer choice clues the correct answer to any other item. No item stem or answer choice provides clues to any other item's correct answer, nor is the same fact of the passage assessed more than once, including the same vocabulary or technical term.
9. Test items are tied closely and particularly to the stimuli from which they derive, so that the impact of outside (prior) knowledge, while never wholly avoidable, is minimized.
10. The responses "Both of the above," "All of the above," "None of the above," and "Neither of the above" are not used.

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11. Most stems are positively worded—avoiding the use of the word not. If a negative is required, the format is "All of the following . . . except."

12. The material presented is balanced, culturally diverse, well written, and interesting to students. The stimuli and items are presented fairly in order to gain a true picture of students' skills.

13. Across all forms, a balance of gender and active/passive roles by gender is maintained.

14. No resource materials or calculators may be used by students during the test.

15. Note of explanation: i.e. (*id est*—that is) only such items mentioned may be assessed. e.g. (*exempli gratia*—for example, for instance) items related to the content may be assessed.

Vocabulary

No single source is available to determine the reading level of various words. Therefore, the appropriateness and difficulty of a word is determined in various ways. Vocabulary words are checked in the following: *EDL Core Vocabularies in Reading, Mathematics, Science, and Social Studies*; *Basic Reading Vocabularies*; the *Living Word*; or other reliable readability sources. In addition to using the aforementioned printed resources to assist in creating vocabulary items, each vocabulary item must be approved by Oklahoma's Content Review Committee. The committee members, comprised of Oklahoma educators from across the state, review proposed vocabulary items for grade-level appropriateness. The Grade 5 Science Test will have a vocabulary level two grade levels below, except for science content words.

All items developed using these specifications are reviewed by Oklahoma educators and approved by the Oklahoma State Department of Education. The distribution of newly developed items is based on content and process alignment, difficulty, cognitive ability, percentage of art/graphics, and grade-level appropriateness as determined by an annual Item Development Plan approved by the Oklahoma State Department of Education.

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Overview of Item Specifications

For each OAS standard, item specifications are organized under the following headings:

- OAS Process Standard and OAS Process Objective or OAS Content Standard and OAS Content Objective
- Item Specifications
  a. Emphasis
  b. Stimulus Attributes
  c. Format
  d. Assessment Limits
  e. Content Objectives May Include
  f. Distractor Domain May Include
  g. Sample Test Item

The headings "OAS Process Standard" and "OAS Process Objective" or "OAS Content Standard" and "OAS Content Objective" state the standard and objective being measured as found in the fifth-grade science section of the Oklahoma Academic Standards document.

The heading "Item Specifications" highlights important points about item development and provides examples to facilitate understanding. All items will measure one process objective and one content objective, with the exception of items for process objective 3.4 which measures only safety knowledge and skills.

Note about the Item Specifications and Sample Test Items:

With the exception of content limits, the item specifications give suggestions of what might be included but do not provide an exhaustive list of what can be included. The sample test items are not intended to be definitive in nature or construction—the stimuli and the test items may differ from one test form to another, as may their presentations.

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Oklahoma Academic Standards

SCIENCE PROCESSES AND INQUIRY

Grade 5

Asterisks (*) have been used to identify standards and objectives that must be assessed by the local school district. All other skills may be assessed by the Oklahoma School Testing Program (OSTP).

OAS Process Standard 1: Observe and Measure—Observing is the first action taken by the learner to acquire new information about an object, organism, or event. Opportunities for observation are developed through the use of a variety of scientific tools. Measurement allows observations to be quantified. The student will accomplish these objectives to meet this process standard.

1. Observe and measure objects, organisms, and/or events (e.g., mass, length, time, volume, temperature) using the International System of Units (SI) (i.e., grams, milligrams, meters, millimeters, centimeters, kilometers, liters, milliliters, and degrees Celsius). Measure using tools (e.g., simple microscopes or magnifier, graduated cylinders, gram spring scales, metric rulers, metric balances and Celsius thermometers).

2. Compare and/or contrast similar and/or different characteristics (e.g., color, shape, size, texture, sound, position, change) in a given set of objects, organisms, or events.

OAS Process Standard 2: Classify—Classifying establishes order. Objects, organisms, and events are classified based on similarities, differences, and interrelationships. The student will accomplish these objectives to meet this process standard.

1. Classify a set of objects, organisms, and/or events using no more than three observable properties (e.g., dichotomous keys).

2. Arrange objects, organisms, and/or events in serial order (e.g., least to greatest, fastest to slowest).

OAS Process Standard 3: Experiment—Experimenting is a method of discovering information. It requires making observations and measurements to test ideas. The student will accomplish these objectives to meet this process standard.

*1. Ask questions about the world and formulate an orderly plan to investigate a question.

2. Evaluate the design of a scientific investigation. (e.g., order of investigation procedures, number of tested variables).

*3. Design and conduct a scientific investigation.

4. Recognize potential hazards and practice safety procedures in all science investigations.

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OAS Process Standard 4: Interpret and Communicate—Interpreting is the process of recognizing patterns in collected data by making inferences, predictions, or conclusions. Communicating is the process of describing, recording, and reporting experimental procedures and results to others. Communication may be oral, written, or mathematical and includes organizing ideas, using appropriate vocabulary, graphs, other visual representations, and mathematical equations. The student will accomplish these objectives to meet this process standard.

*1. Report data using tables, line, bar, trend, and/or simple circle graphs.

2. Interpret data tables, line, bar, trend, and/or simple circle graphs.

3. Make predictions based on patterns in experimental data.

4. Communicate the results of investigations and/or give explanations based on data.

OAS Process Standard 5: Inquiry—Inquiry can be defined as the skills necessary to carry out the process of scientific or systemic thinking. In order for inquiry to occur, students must have the opportunity to ask a question, formulate a procedure, and observe phenomena. The student will accomplish these objectives to meet this process standard.

*1. Use different ways to investigate questions and evaluate the fairness of the test.

*2. Use a variety of measurement tools and technology.

*3. Formulate a general statement to represent the data.

*4. Share results of an investigation in sufficient detail so that data may be combined with data from other students and analyzed further.

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PHYSICAL SCIENCE

Grade 5

OAS Content Standard 1: Properties of Matter and Energy—Describe characteristics of objects based on physical qualities such as size, shape, color, mass, temperature, and texture. Energy can produce changes in properties of objects such as changes in temperature. The student will engage in investigations that integrate the process standards and lead to the discovery of the following objectives:

1. Matter has physical properties that can be used for identification (e.g., color, texture, shape).
2. Physical properties of objects can be observed, described, and measured using tools such as simple microscopes, gram spring scales, metric rulers, metric balances, and Celsius thermometers.
3. Energy can be transferred in many ways (e.g., energy from the Sun to air, water, and metal).
4. Energy can be classified as either potential or kinetic.

LIFE SCIENCE

Grade 5

OAS Content Standard 2: Organisms and Environments—Organisms within an ecosystem are dependent on one another and the environment. The student will engage in investigations that integrate the process standards and lead to the discovery of the following objectives:

1. Organisms in an ecosystem depend on each other for food, shelter, and reproduction.
2. Changes in environmental conditions due to human interactions or natural phenomena can affect the survival of individual organisms and/or entire species.

EARTH/SPACE SCIENCE

Grade 5

OAS Content Standard 3: Structure of Earth and the Solar System—Interaction between air, water, rocks/soil, and all living things. The student will engage in investigations that integrate the process standards and lead to the discovery of the following objectives:

1. Soil consists of weathered rocks and decomposed organic material from dead plants, animals, and bacteria. Soils are often found in layers.
2. Weather exhibits daily and seasonal patterns (i.e., air temperature, basic cloud types—cumulus, cirrus, stratus, and nimbus, wind direction, wind speed, humidity, precipitation).
3. Earth is the third planet from the Sun in a system that includes the moon, the Sun, and seven other planets.

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Sample Test Items by Standard

OAS Process Standard:

Standard 1: Observe and Measure—Observing is the first action taken by the learner to acquire new information about an object, organism, or event. Opportunities for observation are developed through the use of a variety of scientific tools. Measurement allows observations to be quantified. The student will accomplish the objective to meet this process standard.

OAS Process Objective:

1. Observe and measure objects, organisms, and/or events (e.g., mass, length, time, volume, temperature) using the International System of Units (SI) (i.e., grams, milligrams, meters, millimeters, centimeters, kilometers, liters, milliliters, and degrees Celsius). Measure using tools (e.g., simple microscopes or magnifier, graduated cylinders, gram spring scales, metric rulers, metric balances and Celsius thermometers).

Item Specifications:

Emphasis:

- Recognize and select units of measurement and/or measure using SI units as appropriate.

Stimulus Attributes:

- Test items may include illustrations and descriptions.

Format: Assessable content includes the following:

- Identify appropriate type of SI units for measurements.
- Identify appropriate type of SI prefixes within a type of measurement.
- Identify accurate measurements using SI units.
- Identify appropriate types of measuring tools for specific measurements, including, but not limited to (i.e., triple beam balance, equal arm balance, double pan balance).
- Determine the correct unit of measurement for a particular object, organism, event, or the correct measurement tool.

Assessment Limits: Non-assessable content includes the following:

- Test items are limited to Systems International (SI) units listed in the objective above.
- Students will determine the correct unit of measurement for a particular object, organism, event, or the correct measurement tool.

Content Objectives May Include:

- Items may be written to assess any of the content objectives.

Distractor Domain May Include:

- Incorrect use of metric unit
- Incorrect metric measure

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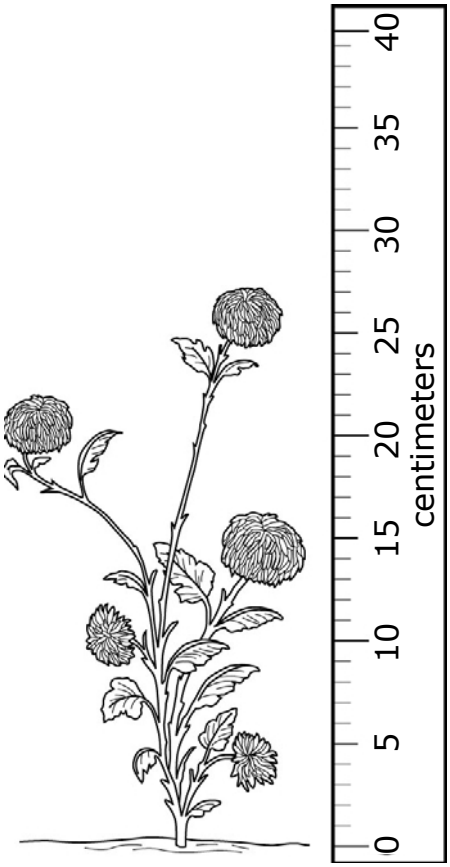
Oklahoma Academic Standards Sample Test Item:
OAS Process Objective: 1.1
OAS Content Objective: 1.2
Depth of Knowledge: 1
Correct Response: C



Which metric measurement would be the height of the plant?

A 17 centimeters

B 25 centimeters

C 27 centimeters

D 30 centimeters

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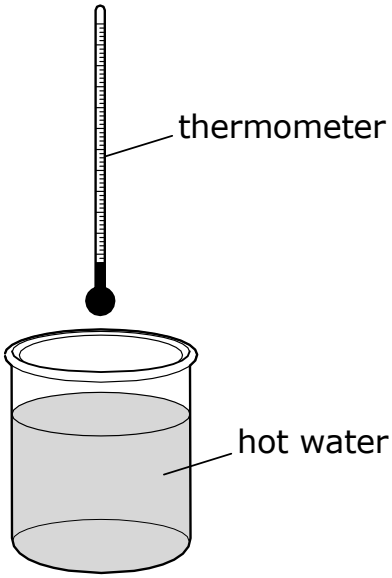
Oklahoma Academic Standards Sample Test Item:
OAS Process Objective: 1.1
OAS Content Objective: 1.3
Depth of Knowledge: 2
Correct Response: A

A student is about to place a thermometer in hot water.



Which three steps best describe how the thermometer measures the temperature of the hot water?

A 1. The energy from the hot water moves to the thermometer.
2. The liquid in the thermometer moves up.
3. The temperature of the water is measured in degrees Celsius.

B 1. The energy from the hot water moves to the thermometer.
2. The liquid in the thermometer moves down.
3. The temperature of the water is measured in milliliters.

C 1. The hot water absorbs energy from the thermometer.
2. The liquid in the thermometer moves up.
3. The temperature of the water is measured in milliliters.

D 1. The hot water absorbs energy from the thermometer.
2. The liquid in the thermometer moves down.
3. The temperature of the water is measured in degrees Celsius.

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Oklahoma Academic Standards Sample Test Item:
OAS Process Objective: 1.1
OAS Content Objective: 2.2
Depth of Knowledge: 3
Correct Response: A

A scientist would like to observe how a fish responds when a solid chemical is added to the fish's tank.

How should the scientist measure the solid chemical and what might the scientist learn from the experiment?

A

Chemical Measurement	What Might the Scientist Learn?
mass in grams	how changes to a fish's environment might affect its population

B

Chemical Measurement	What Might the Scientist Learn?
mass in grams	how an entire pond ecosystem is affected by a substance

C

Chemical Measurement	What Might the Scientist Learn?
Volume in liters	how changes to a fish's environment might affect its population

D

Chemical Measurement	What Might the Scientist Learn?
Volume in liters	how an entire pond ecosystem is affected by a substance

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OAS Process Standard:

Standard 1: Observe and Measure—Observing is the first action taken by the learner to acquire new information about an object, organism, or event. Opportunities for observation are developed through the use of a variety of scientific tools. Measurement allows observations to be quantified. The student will accomplish the objective to meet this process standard.

OAS Process Objective:

2. Compare and/or contrast similar and/or different characteristics (e.g., color, shape, size, texture, sound, position, change) in a given set of objects, organisms, or events.

Item Specifications:

Emphasis:

- Compare and contrast observable characteristics.

Stimulus Attributes:

- Test items may include illustrations, graphs, data tables, and/or flow charts.

Format: Assessable content includes the following:

- Use observable characteristics to compare and/or contrast similarities and/or differences in a given set of objects, organisms, and/or events.

Assessment Limits: Non-assessable content includes the following:

- Test items are limited to comparing and/or contrasting of similar and/or different characteristics. Students make comparisons between two sets of objects, organisms, or events in terms of similar or different characteristics.
- Students also make comparisons within a single set of objects, organisms, or events in terms of similar or different characteristics.
- Tools used may include: graduated cylinder, metric balance, Celsius thermometer, beaker, metric ruler, spring scale, hotplate, anemometer, stopwatch, microscope, hand lens, rain gauge, triple beam balance, and digital thermometer.

Content Objectives May Include:

- Items may be written to assess any of the content objectives.

Distractor Domain May Include:

- Characteristics that are shared
- Characteristics that are not shared

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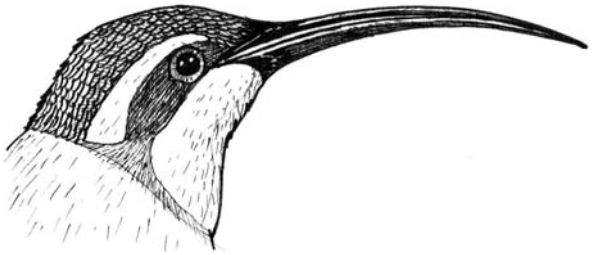
Oklahoma Academic Standards Sample Test Item:
OAS Process Objective: 1.2
OAS Content Objective: 2.1
Depth of Knowledge: 2
Correct Response: B

Bird Characteristics

Type of Bird	Main Diet	Feeding Habits
house finch	seeds	cracks open seeds with beak and eats the insides
ruby-throated hummingbird	flower nectar	puts beak into flower petals and drinks the nectar
scissortail flycatcher	flying insects	captures insects with beak while flying and swallows
screech owl	mice	captures mice with feet and tears them with beak



Based on the beak, which type of bird is <u>most likely</u> shown in the picture?

A house finch

B ruby-throated hummingbird

C scissortail flycatcher

D screech owl

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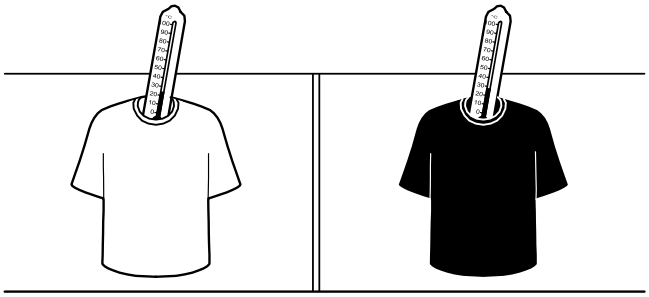
Oklahoma Academic Standards Sample Test Item:
OAS Process Objective: 1.2
OAS Content Objective: 1.3
Depth of Knowledge: 3
Correct Response: C

A teacher asks students the following question: "Does color affect the temperature of a material?" The students set up the following experiment.

- **place a white T-shirt and a black T-shirt on the sidewalk in direct sunlight**
- **insert a thermometer in the neck of each T-shirt**
- **measure the temperature using a thermometer every 5 minutes for 20 minutes**
- **record the data in the table**



Temperatures of T-shirts Over Time

Time (minutes)	Temperature (°C)	
	White T-shirt	Black T-shirt
0	22	22
5	22	23
10	23	24
15	23	26
20	23	28

Which statement <u>best</u> describes what happened during this experiment?

A Sunlight energy caused the temperature of each T-shirt to change equally.

B Sunlight energy decreased heat energy in the sidewalk under the T-shirts, which made them warmer.

C Energy from the Sun increased the temperature of the black T-shirt more than the white T-shirt.

D Energy from the sidewalk caused the white T-shirt to lose more heat energy than the black T-shirt.

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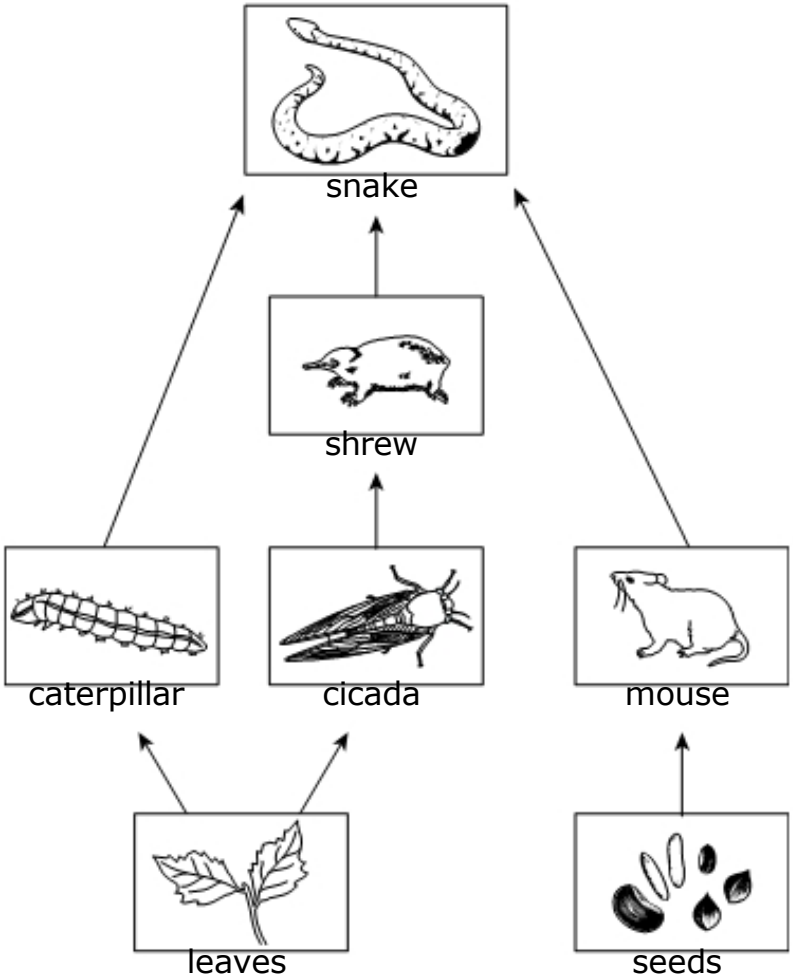
Oklahoma Academic Standards Sample Test Item:
OAS Process Objective: 1.2
OAS Content Objective: 2.1
Depth of Knowledge: 3
Correct Response: C

Food Web



Which statement <u>best</u> compares how two things in this food web are alike?

A The shrew and the mouse only need caterpillars to survive.

B The leaves and the seeds get their energy from minerals in the soil.

C The cicada and the mouse eat organisms that get their energy from the Sun.

D The snake and the caterpillar have the same diet because they have the same body shape.

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OAS Process Standard:

Standard 2: Classify—Classifying establishes order. Objects, organisms, and events are classified based on similarities, differences, and interrelationships. The student will accomplish the objective to meet this process standard.

OAS Process Objective:

1. Classify a set of objects, organisms, and/or events using no more than three observable properties (e.g., dichotomous keys).

Item Specifications:

Emphasis:

- Apply classification skills based on observations.
- Place objects, organisms, and/or events into a classification system using two or more observable properties.

Stimulus Attributes:

- Test items may include illustrations, data tables, graphs, and classification keys including dichotomous keys.

Format: Assessable content includes the following:

- Use a simple dichotomous key to place objects and organisms into a classification system.
- Identify similar and/or different characteristics used to classify objects, organisms, and/or events in a classification system.
- Test items may include one or more objects or organisms that the student must correctly place in a classification scheme based on two or more observable properties.

Assessment Limits: Non-assessable content includes the following:

- Test items assess only observable properties that are presented in the graphics or written descriptions.
- Non-observable properties are not assessed.

Content Objectives May Include:

- Items may be written to assess any of the content objectives.

Distractor Domain May Include:

- Objects or organisms that do not fit into the classification scheme in question.

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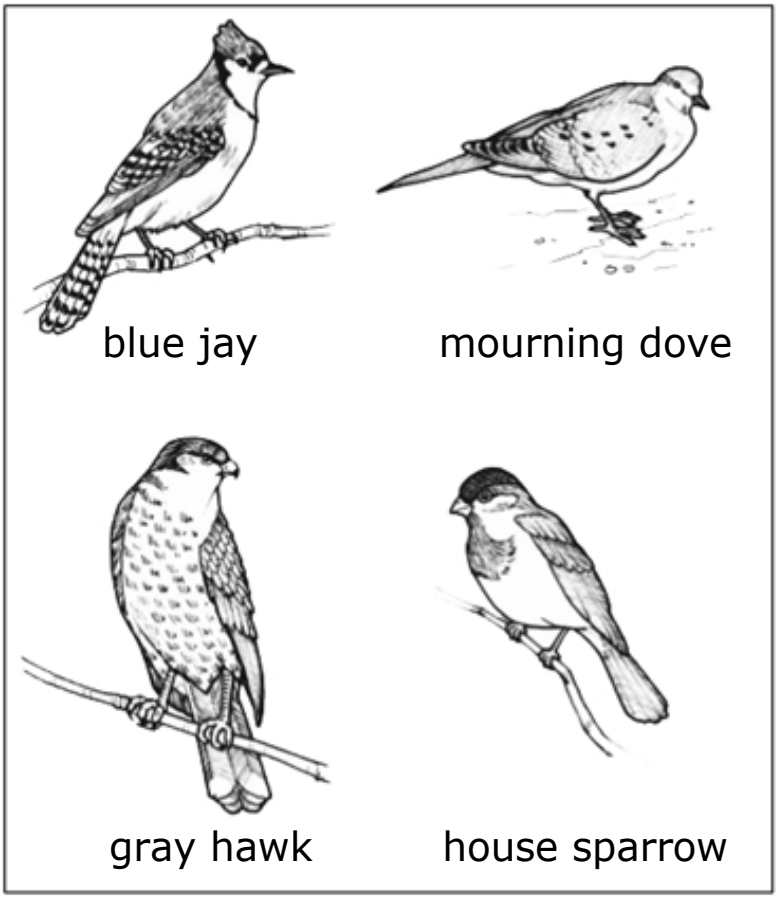
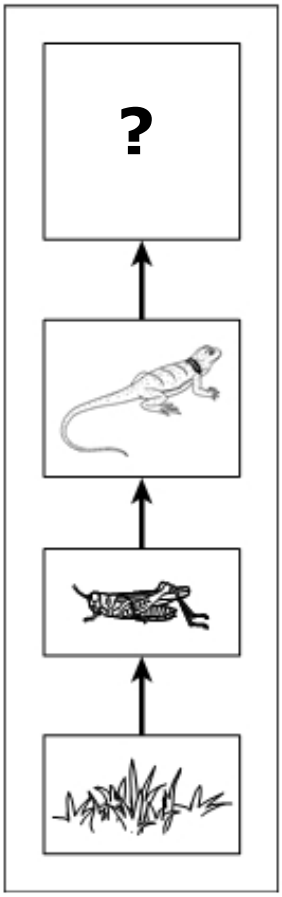
Oklahoma Academic Standards Sample Test Item:
OAS Process Objective: 2.1
OAS Content Objective: 2.1
Depth of Knowledge: 2
Correct Response: B

Birds that eat other animals have different body parts than those birds that do not eat other animals.

Birds



Food Chain



Which of the birds will <u>correctly</u> complete the food chain?

A blue jay
B gray hawk
C mourning dove
D house sparrow

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Oklahoma Academic Standards Sample Test Item:
OAS Process Objective: 2.1
OAS Content Objective 3.2
Depth of Knowledge: 2
Correct Response: A

Students are asked to identify the clouds they saw one afternoon. The students observed that the clouds were low in the sky and were light gray. The students could not see any blue sky through the clouds.

Identification Key

Line	Characteristics	Identification
1a	clouds are low in the sky	go to 2
1b	clouds are high in the sky	go to 3
2a	clouds are gray	go to 4
2b	clouds are white or gray and white	go to 5
3a	clouds are feathery	cirrus
4a	clouds are light gray and cover the sky like a blanket	stratus
4b	clouds are dark gray and hide the Sun; it is raining continuously	nimbus
5a	clouds are puffy like cotton balls	cumulus
5b	clouds are large, puffy, and tall like a tower; there may be a thunderstorm	cumulonimbus

Which cloud type was <u>most likely</u> observed by the students?

A stratus

B nimbus

C cumulus

D cumulonimbus

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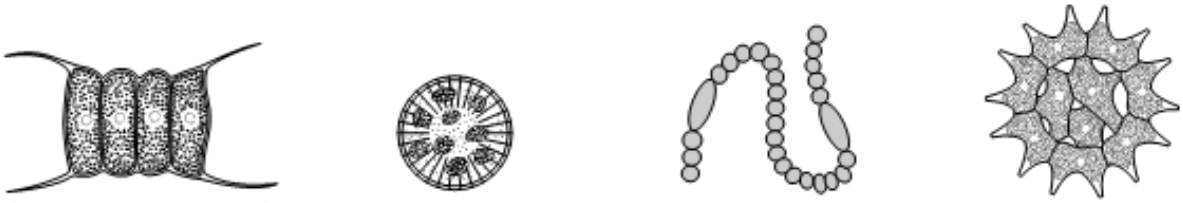
Oklahoma Academic Standards Sample Test Item:
OAS Process Objective: 2.1
OAS Content Objective: 1.1
Depth of Knowledge: 3
Correct Response: D

A student observed four unknown water plants.



unknown plant 1 | unknown plant 2 | unknown plant 3 | unknown plant 4

Dichotomous Key of Four Floating Water Plants

1a. Plant has a round shape	**Go to line 2**
1b. Plant does not have a round shape	**Go to line 3**
2a. Plant has a rough texture	***Pediastrum***
2b. Plant does not have a rough texture	***Cyclotella***
3a. Plant has parts that look like a chain	***Anabaena***
3b. Plant does not have parts that look like a chain	***Scenedesmus***

Using this dichotomous key, which is the <u>best</u> identification for unknown plant 1 and unknown plant 4?

A *Cylotella* and *Anabaena*

B *Pediastrum* and *Cyclotella*

C *Anabaena* and *Scenedesmus*

D *Scenedesmus* and *Pediastrum*

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OAS Process Standard:

Standard 2: Classify—Classifying establishes order. Objects, organisms, and events are classified based on similarities, differences, and interrelationships. The student will accomplish the objective to meet this process standard.

OAS Process Objective:

2. Arrange objects, organisms, and/or events in serial order (e.g., least to greatest, fastest to slowest).

Item Specifications:

Emphasis:

- Use given properties to select a serial order or determine proper placement in the order for objects, organisms, and/or events.

Stimulus Attributes:

- Test items may include illustrations, data tables, and graphs.

Format: Assessable content includes the following:

- Identify properties by which a set of objects, organisms, and/or events are ordered.
- Order a set of objects, organisms, and/or events.
- Underline key words in the stem (i.e., greatest, least, fewest, closest, slowest, fastest).
- Items may include a set of misordered objects, organisms, or events that students must reorder in the correct sequence.

Assessment Limits: Non-assessable content includes the following:

- Test items are limited to serial order.

Content Objectives May Include:

- Items may be written to assess any of the content objectives.

Distractor Domain May Include:

- Objects, organisms, events that are out of correct sequence.

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Oklahoma Academic Standards Sample Test Item:
OAS Process Objective: 2.2
OAS Content Objective: 2.1
Depth of Knowledge: 2
Correct Response: D

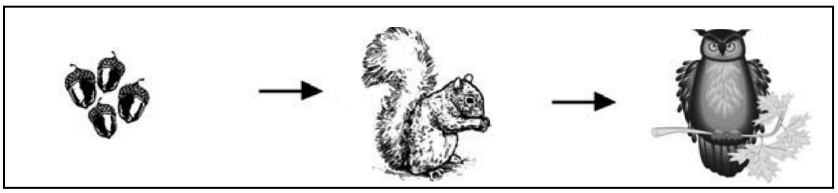
In what order do the owl, acorns, and squirrel form a food chain?

A

B

C

D



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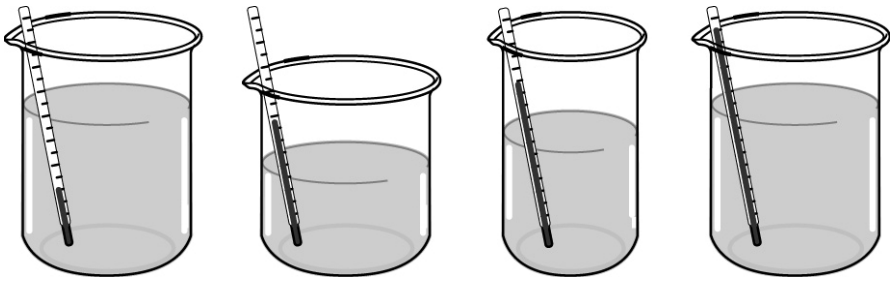
Oklahoma Academic Standards Sample Test Item:
OAS Process Objective: 2.2
OAS Content Objective: 1.2
Depth of Knowledge: 2
Correct Response: D

The picture shows an investigation with four beakers of liquid.



How are the beakers arranged?

A by the volume of the liquids

B by the width of the containers

C by the height of the containers

D by the temperatures of the liquids

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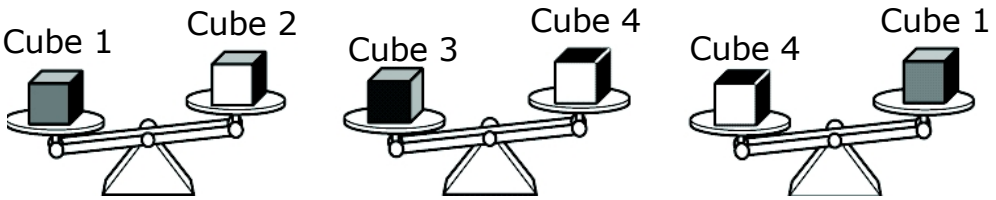
Oklahoma Academic Standards Sample Test Item:
OAS Process Objective: 2.2
OAS Content Objective: 1.1
Depth of Knowledge: 3
Correct Response: C

Students compared the masses of four different cubes. The balances below show their results.



Which cube has the <u>greatest</u> mass?

A Cube 1

B Cube 2

C Cube 3

D Cube 4

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OAS Process Standard:

Standard 3: Experiment—Experimenting is a method of discovering information. It requires making observations and measurements to test ideas. The student will accomplish the objective to meet this process standard.

OAS Process Objective:

2. Evaluate the design of a scientific investigation (e.g., order of investigation procedures, number of tested variables).

Item Specifications:

Emphasis:

- Sequence steps in logical progression and determine which steps are not needed or have been left out; identify correct and incorrect scientific procedures; identify number of tested variables; identify purpose of experiments.

Stimulus Attributes:

- Test items include a scenario of an experimental design and may include illustrations, graphs, and data tables.

Format: Assessable content includes the following:

- Determine the correct order for the steps of an experiment.
- Identify errors in experimental design.
- Identify appropriate graphical representations of data.
- Identify necessary and/or unnecessary steps in an experiment.
- Identify a testable hypothesis.
- Determine specific steps of an experiment.
- Recognize the relationship of cause and effect in results of an experiment.
- Determine number of tested variables in an experiment.
- Items may include identifying what is missing in an experimental procedure or correctly reordering the steps of a scientific investigation listed in an incorrect order.
- Use of appropriate equipment may include: graduated cylinder, metric balance, Celsius thermometer, beaker, metric ruler, spring scale, hotplate, anemometer, stopwatch, and rain gauge.

Assessment Limits: Non-assessable content includes the following:

- Test items are limited to determining what procedures are necessary and in what order they should be performed.
- Specialized equipment above grade level will not be used.

Content Objectives May Include:

- Items may be written to assess any of the content objectives.

Distractor Domain May Include:

- Incorrectly ordered steps to the scientific problem
- Inappropriate experimental procedures
- Incorrect purpose of an experiment

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Oklahoma Academic Standards Sample Test Item:
OAS Process Objective: 3.2
OAS Content Objective: 1.1
Depth of Knowledge: 2
Correct Response: D

Students conducted an investigation to identify the physical properties of a plant.

Which step is not necessary in their investigation?

A Observe the flower color of the plant.

B Describe the texture of the stem of the plant.

C Record how the lengths of the plant leaves change.

D Determine how much water the plant needs each day.

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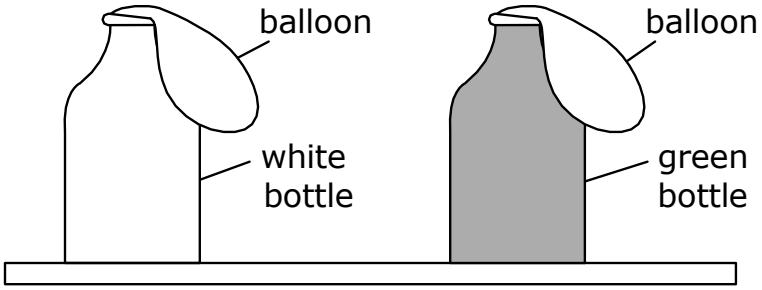
Oklahoma Academic Standards Sample Test Item:
OAS Process Objective: 3.2
OAS Content Objective: 1.3
Depth of Knowledge: 3
Correct Response: D

A teacher sets up a scientific investigation about energy transfer. The teacher asks students to give two possible next steps for this investigation.

Investigation Setup Materials



Possible Step 1	Possible Step 2
Place the white bottle on a windowsill, and place the green bottle outside in direct sunlight	Place both bottles outside at noon and record any changes every three minutes for 30 minutes.

Which possible step would be <u>best</u> for this energy transfer investigation and why?

A Step 1: to study how energy acts in different locations

B Step 2: to study how energy acts in different locations

C Step 1: to study how energy affects differently colored objects

D Step 2: to study how energy affects differently colored objects

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OAS Process Standard:

Standard 3: Experiment—Experimenting is a method of discovering information. It requires making observations and measurements to test ideas. The student will accomplish the objective to meet this process standard.

OAS Process Objective:

4. Recognize potential hazards and practice safety procedures in all science investigations.

Item Specifications:

Emphasis:

- Identify potential hazards in science activities.
- Be aware of unsafe practices and appropriate procedures in science investigations conducted in the laboratory and/or field setting.

Stimulus Attributes:

- Test items may include illustrations and/or verbal descriptions.

Format: Assessable content includes the following:

- Identify potential hazards in science activities.
- Identify appropriate safety equipment for science activities.
- Identify appropriate safety procedures in science activities.
- Items may ask students to select the appropriate safety practice to follow.

Assessment Limits: Non-assessable content includes the following:

- Test items are limited to hazards and safety procedures in science activities.
- Items may not include grade-appropriate situations or problems reflecting potential dangers related to above grade science activities.

Content Objectives May Include:

- Items for this objective test safety only. They do not assess content knowledge.

Distractor Domain May Include:

- Wrong hazard
- Not a safety concern
- Inappropriate safety procedure
- Not a safety procedure

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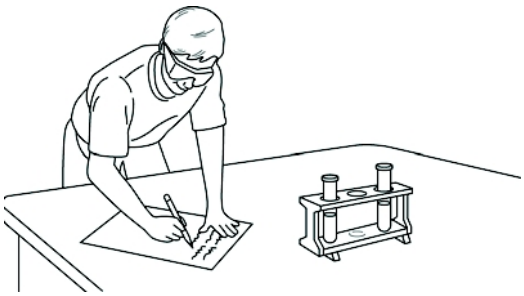
Oklahoma Academic Standards Sample Test Item:
OAS Process Objective: 3.4
Depth of Knowledge: 1
Correct Response: C

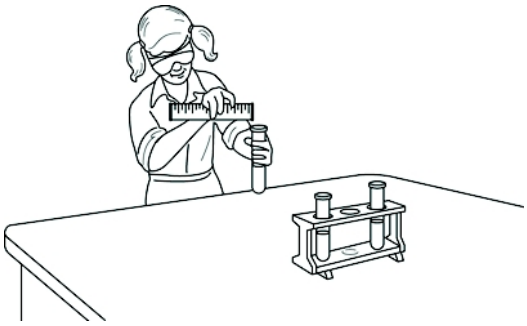
Four students are performing a science experiment.

Which picture shows a student being unsafe in the science laboratory?

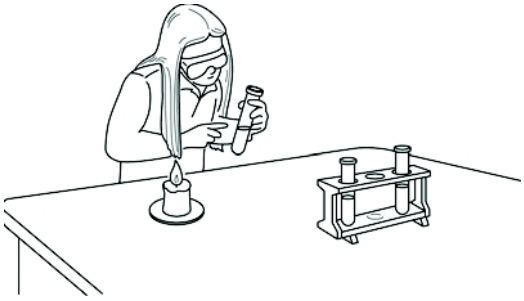
A



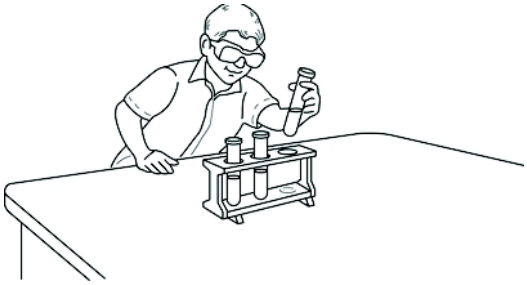
B



C



D



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Oklahoma Academic Standards Sample Test Item:
OAS Process Objective: 3.4
Depth of Knowledge: 1
Correct Response: A

Students are investigating an unknown liquid in a clear plastic cup.

Which action is most dangerous for the students?

A tasting the liquid

B observing the liquid through the cup

C feeling the cup to check for temperature changes

D smelling the liquid by waving their hands over the cup

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OAS Process Standard:

Standard 4: Interpret and Communicate—Interpreting is the process of recognizing patterns in collected data by making inferences, predictions, or conclusions. Communicating is the process of describing, recording, and reporting experimental procedures and results to others. Communication may be oral, written, or mathematical and includes organizing ideas, using appropriate vocabulary, graphs, other visual representations, and mathematical equations. The student will accomplish the objective to meet this process standard.

OAS Process Objective:

2. Interpret data tables, line, bar, trend, and/or simple circle graphs.

Item Specifications:

Emphasis:

- Apply critical thinking skills to interpret graphical data.

Stimulus Attributes:

- Test items may include data tables, line, bar, trend, and/or simple circle graphs.

Format: Assessable content includes the following:

- Recognize trends in data.
- Interpret graphical representations of data.
- Analyze graphical representations of data to determine missing data values.
- Distinguish relationships between multiple data sets.

Assessment Limits: Non-assessable content includes the following:

- Illustrations other than data tables, charts, or graphs cannot be used.

Content Objectives May Include:

- Items may be written to assess any of the content objectives.

Distractor Domain May Include:

- Quantitative errors due to incorrect interpretations of graphs
- Qualitative errors due to incorrect interpretations of graphs

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Oklahoma Academic Standards Sample Test Item:
OAS Process Objective: 4.2
OAS Content Objective: 3.2
Depth of Knowledge: 2
Correct Response: B

Students recorded the high and low air temperatures every day for five days.

Air Temperature Measurements Taken at an Elementary School

	Low Temperature (°F)	High Temperature (°F)
Monday	66	82
Tuesday	68	80
Wednesday	68	82
Thursday	64	78
Friday	66	84

On which day did the air temperature change the least?

A Monday

B Tuesday

C Wednesday

D Thursday

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Oklahoma Academic Standards Sample Test Item:
OAS Process Objective: 4.2
OAS Content Objective: 3.3
Depth of Knowledge: 2
Correct Response: C

Planet Information

Planet	Average Distance from the Sun (million kilometers)
Earth	149.6
Jupiter	778.6
Mars	227.9
Mercury	57.9
Neptune	4,495.1
Saturn	1,433.5
Uranus	2,872.5
Venus	108.2

Based on the information, which planets revolve once around the Sun in the shortest period of time?

A Earth and Neptune

B Jupiter and Venus

C Mercury and Earth

D Uranus and Mercury

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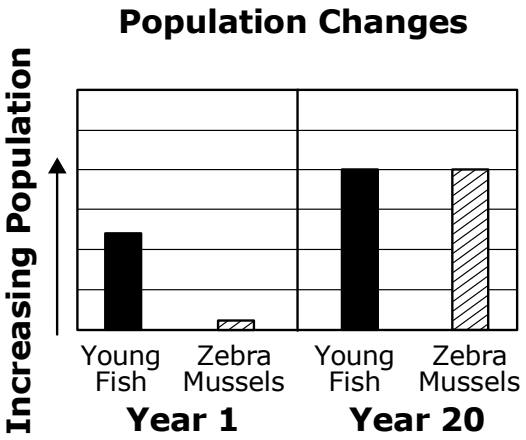
Oklahoma Academic Standards Sample Test Item:
OAS Process Objective: 4.2
OAS Content Objective: 2.1
Depth of Knowledge: 3
Correct Response: D

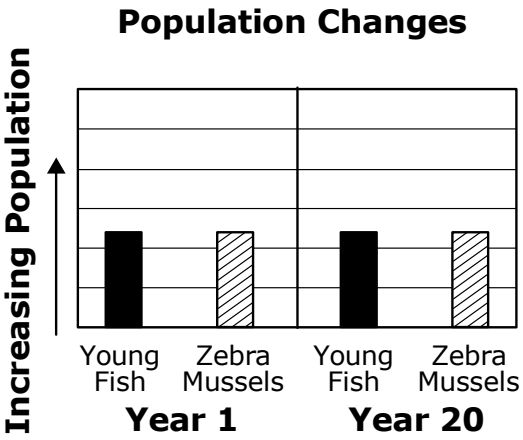
Zebra mussels are shelled animals introduced into Lake Michigan by humans. Zebra mussels compete with young fish for food. Researchers predicted the population of young fish one year after the zebra mussels were introduced and twenty years later.

Which graph shows how zebra mussels would most likely affect the population of young fish after a twenty year period?

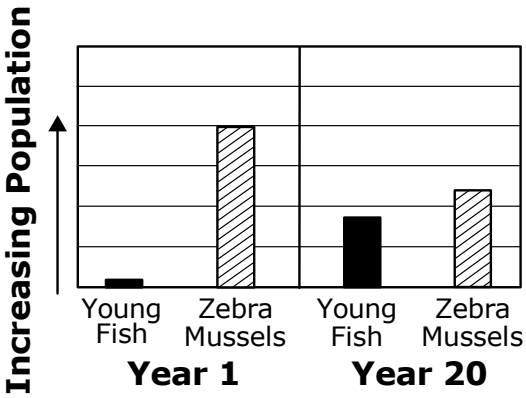
A



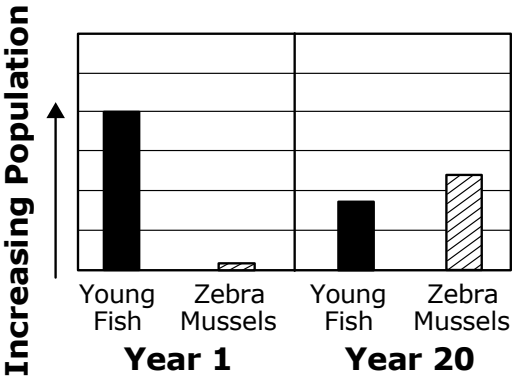
B



C



D



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OAS Process Standard:

Standard 4: Interpret and Communicate—Interpreting is the process of recognizing patterns in collected data by making inferences, predictions, or conclusions. Communicating is the process of describing, recording, and reporting experimental procedures and results to others. Communication may be oral, written, or mathematical and includes organizing ideas, using appropriate vocabulary, graphs, other visual representations, and mathematical equations. The student will accomplish the objective to meet this process standard.

OAS Process Objective:

3. Make predictions based on patterns in experimental data.

Item Specifications:

Emphasis:

- Demonstrate the ability to make predictions based on evidence within given data.

Stimulus Attributes:

- Test items may include data tables, graphs (including single-line, double-line, and line-of-best-fit), illustrations, or verbal descriptions.

Format: Assessable content includes the following:

- Use patterns and trends in data to make predictions.
- Students use data in a table, graph, or verbal description to make a prediction about an experiment or event.

Assessment Limits: Non-assessable content includes the following:

- Test items are limited to predictions based on patterns.

Content Objectives May Include:

- Items may be written to assess any of the content objectives.

Distractor Domain May Include:

- Logic errors
- Misreading of data

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Oklahoma Academic Standards Sample Test Item:
OAS Process Objective: 4.3
OAS Content Objective: 1.1
Depth of Knowledge: 2
Correct Response: A

Color and Streak of Five Minerals

Mineral	Color	Streak
anhydrite	colorless, white, gray, bluish, or violet	white
quartz	colorless, white, purple, or gray	white
graphite	black to silver	black-gray to brownish-gray
hematite	silver-gray, black, red, or brown	red or brown

Based on the data table, which is the most likely streak color of the mineral halite, which can be colorless, white, blue, purple, pink, or yellow?

A white

B black

C red

D brown

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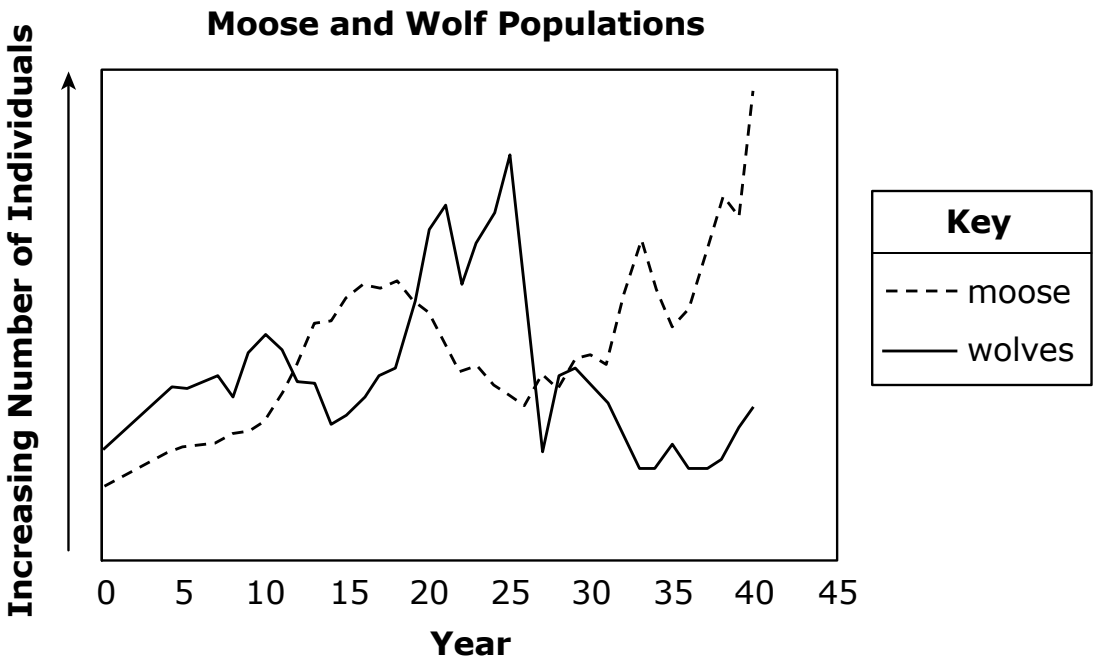
Oklahoma Academic Standards Sample Test Item:
OAS Process Objective: 4.3
OAS Content Objective: 2.1
Depth of Knowledge: 3
Correct Response: A

Scientists are researching moose and wolf populations over a period of 40 years.



Based on the pattern in the graph, which statement <u>best</u> predicts the moose and wolf populations from year 40 to year 45?

A The moose population will decrease because there will be more wolves feeding on them.

B The moose population will decrease because there will be fewer wolves feeding on them.

C The moose population will increase because there will be more wolves feeding on them.

D The moose population will increase because there will be fewer wolves feeding on them.

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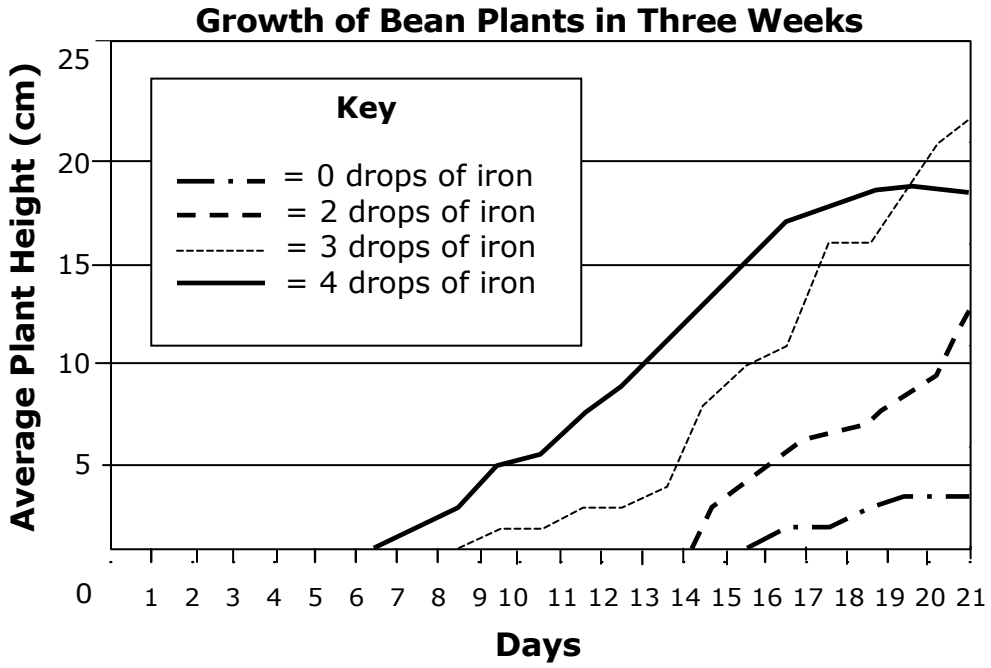
Oklahoma Academic Standards Sample Test Item:
OAS Process Objective: 4.3
OAS Content Objective: 2.2
Depth of Knowledge: 3
Correct Response: D

A farmer wants to improve the bean plants grown on the farm. The farmer adds different amounts of iron to the bean seeds and records the growth of the bean plants.



Which prediction is <u>best</u> if the farmer uses 8 drops of iron on the bean seeds?

A The bean plants will be taller than if they were given 4 drops of iron.

B The bean plants will be shorter than if they were given 2 drops of iron.

C The bean plants will begin growing later than if they were given 3 drops of iron.

D The bean plants will begin growing sooner than if they were given 0 drops of iron.

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OAS Process Standard:

Standard 4: Interpret and Communicate—Interpreting is the process of recognizing patterns in collected data by making inferences, predictions, or conclusions. Communicating is the process of describing, recording, and reporting experimental procedures and results to others. Communication may be oral, written, or mathematical and includes organizing ideas, using appropriate vocabulary, graphs, other visual representations, and mathematical equations. The student will accomplish the objective to meet this process standard.

OAS Process Objective:

4. Communicate the results of investigations and/or give explanations based on data.

Item Specifications:

Emphasis:

- Given experimental data, students will effectively communicate results of experiments or events and draw conclusions.

Stimulus Attributes:

- Test items may include illustrations, data tables, line, bar, trend, and/or simple circle graphs.

Format: Assessable content includes the following:

- Evaluate data to develop scientific explanations and/or conclusions.
- Items use graphs, data tables, drawings, or verbal descriptions of data and results that students interpret and communicate in various formats.

Assessment Limits: Non-assessable content includes the following:

- Test items are limited to communicating results of experiments or events and drawing conclusions.

Content Objectives May Include:

- Items may be written to assess any of the content objectives.

Distractor Domain May Include:

- Logic errors
- Misinterpretation of data
- Ineffective or inaccurate communication of results
- Incorrect conclusions

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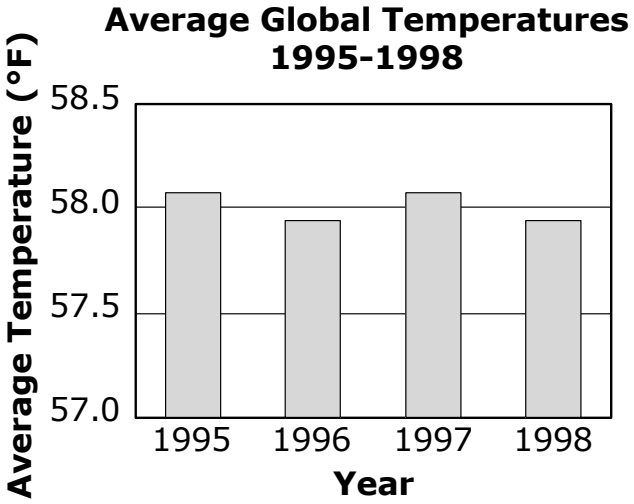
Oklahoma Academic Standards Sample Test Item:
OAS Process Objective: 4.4
OAS Content Objective: 3.2
Depth of Knowledge: 2
Correct Response: D

Scientists collected data on average global temperatures during four years.



Based on the graph, which <u>best</u> describes the average global temperature from 1995 to 1998?

A increasing

B decreasing

C staying the same

D decreasing and increasing

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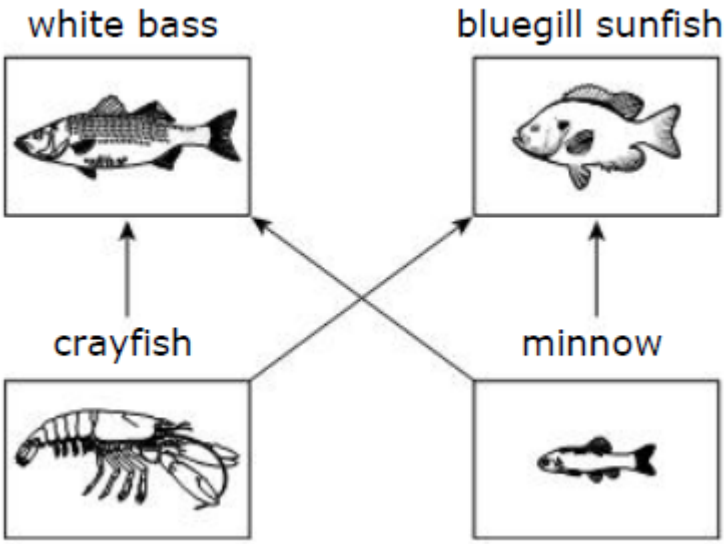
Oklahoma Academic Standards Sample Test Item:
OAS Process Objective: 4.4
OAS Content Objective: 2.1
Depth of Knowledge: 3
Correct Response: C

Two Types of fishes living together in a lake were counted for four years.



Yearly Count of White Bass and Bluegill Sunfish

Fishes	Year 1	Year 2	Year 3	Year 4
white bass	100	120	125	95
bluegill sunfish	100	80	75	105

Based on the food web and the data table, which statement <u>best</u> explains the changing numbers of white bass and bluegill sunfish in the lake?

A The white bass increased because they are eating the bluegill sunfish.

B The bluegill sunfish increased because they are eating the white bass.

C The white bass and the bluegill sunfish were competing for the same food sources, so their numbers increase and decrease.

D The bluegill sunfish and the white bass were both being eaten by crayfish and minnows, so their numbers increase and decrease.

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OAS Content Standard:

Standard 1: Properties of Matter and Energy—Describe characteristics of objects based on physical qualities such as size, shape, color, mass, temperature, and texture. Energy can produce changes in properties of objects such as changes in temperature. The student will engage in investigations that integrate the process standards and lead to the discovery of the following objective:

OAS Content Objective:

1. Matter has physical properties that can be used for identification (e.g., color, texture, shape).

Item Specifications:

Emphasis:

- All objects have physical properties.
- Physical properties can be used to identify, organize, and classify objects.
- Physical properties can be changed by physical means.
- Energy is required to produce some physical changes.
- The total amount of matter is the same before and after a physical change.

Stimulus Attributes:

- Test items may include grade-level appropriate text, illustrations, data tables, graphs, graphic organizers, and/or descriptions.

Format: Assessable content includes the following:

- Identify physical properties (e.g., size, mass, shape, color, texture, hardness, density, boiling point, melting point, and freezing point) for an object or group of objects.
- Identify the correct Systems International (SI) unit used to observe, measure, and/or describe a physical property.
- Recognize that the mass of an object is equal to the sum of its parts after a physical change.
- Classify objects based on the identification of physical properties.
- Compare physical properties and describe the materials from which objects are made (e.g., color, texture, and hardness).
- Compare rates of change in physical properties given data or graphs (e.g., rate of melting of ice and candy with the same amount of heat applied, rate of melting of ice at different room temperatures).
- Predict changes or absence of changes in physical properties of objects caused by physical processes (e.g., changes in state of matter caused by changes in temperature, changes in shape caused by breaking, total mass remains the same after a physical change, different rates of change in different objects or materials).
- Infer the cause of a change in a physical property, such as cutting, heating, melting, grinding, or polishing.
- Infer the source of energy for a given physical change.
- Analyze groups of objects by identifying their common physical properties.
- Items may include the physical properties of size, mass, shape, color, texture, hardness, density, and phase changes.

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Assessment Limits: Non-assessable content includes the following:

- Test items are limited to physical properties including states of matter.
- Calculations of physical properties, such as density, will not be assessed.
- Test items will not focus on students' ability to identify or compare the definitions of these physical properties.
- Test items will not include the recognition of the terms boiling point or melting point from phase change graphs or data tables.

Process Objectives May Include:

- Items may be written to assess any of the process objectives except for 3.4.

Distractor Domain May Include:

- Incorrect identification of physical properties
- Incorrect sources of energy for a given physical change
- Incorrect predictions from given information
- Incorrect comparisons of given materials
- Incorrect interpretation of given information
- Incorrect inferences from given information

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Oklahoma Academic Standards Sample Test Item:
OAS Content Objective: 1.1
OAS Process Objective: 4.2
Depth of Knowledge: 1
Correct Response: B

A student performed an investigation that measured the time needed to heat four different amounts of water to boiling using the same amount of heat.

Which physical property of the water affects the time needed to bring the water to boiling?

A density

B mass

C shape

D state of matter

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Oklahoma Academic Standards Sample Test Item:
OAS Content Objective: 1.1
OAS Process Objective: 4.2
Depth of Knowledge: 2
Correct Response: D

Students are investigating how to use properties to identify four unknown objects.

Investigation Information

Property	Object			
	W	**X**	**Y**	**Z**
Texture	smooth	rough	rough	rough
Color	silver	silver	yellow	yellow
Shape	square	circle	circle	triangle
Mass	10 g	10 g	10 g	10 g

Based on the investigation information, which set of properties, would <u>best</u> help the students identify the four unknown objects?

A texture and mass

B texture and shape

C texture, mass and color

D texture, shape, and color

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Oklahoma Academic Standards Sample Test Item:
OAS Content Objective: 1.1
OAS Process Objective: 4.4
Depth of Knowledge: 3
Correct Response: C

Scientists observed birds living in a forest area. The scientists recorded their observations in a chart.

Bird Observation Data

Type of Bird	Number of Birds	Location of Birds	Main Color of Feathers	Time
Cardinal	2	tree	red	sunset
Crow	2	ground	black	day
Snowy Owl	1	tree	white	night
Yellow Finch	5	tree	yellow	day

Which graph would <u>best</u> show the physical properties of these birds?

A a bar graph showing the number of birds and their locations

B a circle graph showing differences in the main colors of feathers

C a bar graph showing the number of birds and the main colors of feathers

D a circle graph showing differences in the times the birds were observed

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OAS Content Standard:

Standard 1: Properties of Matter and Energy—Describe characteristics of objects based on physical qualities such as size, shape, color, mass, temperature, and texture. Energy can produce changes in properties of objects such as changes in temperature. The student will engage in investigations that integrate the process standards and lead to the discovery of the following objective:

OAS Content Objective:

2. Physical properties of objects can be observed, described, and measured using tools such as simple microscopes, gram spring scales, metric rulers, metric balances, and Celsius thermometers.

Item Specifications:

Emphasis:

- Physical properties of objects can be observed, described, and measured using scientific tools.

Stimulus Attributes:

- Test items may include grade-level appropriate text, illustrations, data tables, graphs, graphic organizers, and/or descriptions.

Format: Assessable content includes the following:

- Identify tools to measure and/or observe physical properties (e.g., meter stick, metric ruler, metric balance, triple beam balance, double pan balance, equal arm balance, magnifying glass/ hand lens, microscope, thermometer, digital thermometer, graduated cylinder, test tube, spring scale, stopwatch) using Systems International (SI) units for an object or group of objects.
- Identify the correct measurement of a physical property on a grade-level appropriate tool.
- Identify the physical property measured by a given tool.
- Compare and contrast physical properties collected through measurements and/or observations (e.g., color, texture, shape, size, sound, and position).
- Classify or group objects, organisms, and/or events based on measurements and/or observations of physical properties.
- Arrange objects, organisms, and/or events in serial order based on measurements and/or observations of physical properties.
- Evaluate the appropriateness of tools used in the collection of data for a scientific investigation.
- Make predictions based on patterns in experimental data collected using grade-level appropriate tools.
- Communicate or analyze the results of an investigation of physical properties.
- Make inferences that are supported by observations and/or measurements of physical properties.
- Analyze objects or groups of objects by measuring and/or observing their common physical properties using grade-level appropriate tools.

Assessment Limits: Non-assessable content includes the following:

- Test items are limited to grade-level appropriate physical properties of matter (e.g., mass, volume, length, temperature, hardness, color, shape) and scientific tools (e.g., metric ruler, metric balance, simple microscope, Celsius thermometer, spring scale, magnifying glass/hand lens, graduated cylinder).
- Items will not include the identification of tools used to determine the density or hardness of an object.

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- Items will not require the student to calculate the density of an object or a conversion of temperature (i.e., from Celsius to Fahrenheit or Fahrenheit to Celsius).

Process Objectives May Include:
- Items may be written to assess any of the process objectives except for 3.4.

Distractor Domain May Include:
- Incorrect measurements and/or appropriate metric units of physical properties
- Incorrect scientific tools used to measure given physical properties
- Incorrect property that can be measured by a given tool
- Incorrect comparisons of the physical properties of objects
- Incorrect classification or grouping of objects or events from given information
- Incorrect arrangement of objects into a serial order based on physical properties
- Incorrect evaluation of a scientific investigation
- Predictions of physical properties not supported by given observations or data
- Results not supported by given observations or data
- Inferences, analyses, or conclusions not supported by given observations or data

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Oklahoma Academic Standards Sample Test Item:
OAS Content Objective: 1.2
OAS Process Objective: 1.1
Depth of Knowledge: 1
Correct Response: B

Which is the best unit to measure the mass of an ice cube?

A Celsius

B Grams

C Liters

D Meters

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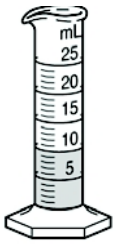
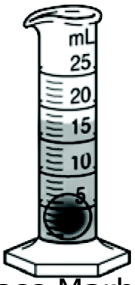
Oklahoma Academic Standards Sample Test Item:
OAS Content Objective: 1.2
OAS Process Objective: 1.2
Depth of Knowledge: 2
Correct Response: D

Four different objects are placed in this graduated cylinder, one at a time, to measure the volume of each object.



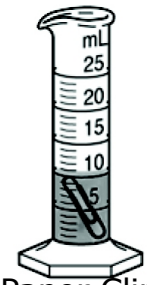
Which object has the greatest volume?

A



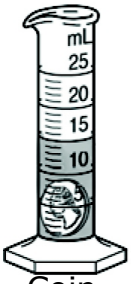
Glass Marble

B



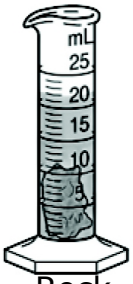
Paper Clip

C



Coin

D



Rock

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Oklahoma Academic Standards Sample Test Item:
OAS Content Objective: 1.2
OAS Process Objective 4.3
Depth of Knowledge: 3
Correct Response: C

A student observes that gas bubbles rise higher in a column of water as the water gets warmer. The student measures the temperature of the water and the height of the bubbles in the column.

Investigation Data

Temperature (°C)	Bubble Height in Column (cm)
4	2
10	4
22	7
31	9
43	**?**

What is the most likely height of the bubbles at 43 °C and what tool did the student use to measure the bubble height in the column?

A The height will be 7 cm and is measured with a ruler.

B The height will be 7 cm and is measured with a thermometer.

C The height will be 12 cm and is measured with a ruler.

D The height will be 12 cm and is measured with a thermometer.

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OAS Content Standard:

Standard 1: Properties of Matter and Energy—Describe characteristics of objects based on physical qualities such as size, shape, color, mass, temperature, and texture. Energy can produce changes in properties of objects such as changes in temperature. The student will engage in investigations that integrate the process standards and lead to the discovery of the following objective:

OAS Content Objective:

3. Energy can be transferred in many ways (e.g., energy from the Sun to air, water, and metal).

Item Specifications:

Emphasis:

- Energy can be transferred from one material to another. Energy can be changed from one form to another (e.g., electricity to heat, light to electricity, potential to kinetic, kinetic to potential).
- Energy changes can be measured (e.g., increases in heat energy increase temperature, increases in sound energy increase loudness, increases in light energy increase brightness).
- Some substances are better able to transfer energy than others and are known as conductors (e.g., metals are good conductors of heat and electricity).
- Substances that transfer no or very little energy are called insulators (e.g., wood and cotton fabrics are poor conductors of heat and electricity).

Stimulus Attributes:

- Test items may include grade-level appropriate text, illustrations, data tables, graphs, graphic organizers, and/or descriptions.

Format: Assessable content includes the following:

- Recognize, observe, and/or measure the transfer of energy in a system.
- Identify correct measures of change in energy using Systems International (SI) units.
- Compare and contrast the transfer of energy through different materials (e.g., conductors, insulators).
- Classify or group a set of materials based on their ability to transfer a given form of energy.
- Arrange objects and/or events in serial order based on the transfer of energy.
- Evaluate the design of a scientific investigation exploring energy transfer.
- Interpret data in tables, line, bar, trend, and/or simple circle graphs that show evidence of energy transfer.
- Predict energy transfer based on patterns in given data (e.g., speed of energy transfer in different sizes of copper wire, variable metal mixtures in cooking pans).
- Communicate the results of energy transfer investigations.
- Draw conclusions and/or identify correct explanations based on data collected.

Assessment Limits: Non-assessable content includes the following:

- Items are limited to grade-level appropriate forms of energy (e.g., heat, light, sound, motion, and electrical), energy transformations (e.g., electrical to heat), and the effects of changes in the amount of energy.
- Items will not include identifying or classifying different forms of heat energy (i.e., radiation, convection, and conduction) or chemical energy.

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- Items will not include the kinetic molecular theory (e.g., molecules move more rapidly in heated substances).

Process Objectives May Include:
- Items may be written to assess any of the process objectives except for 3.4.

Distractor Domain May Include:
- Incorrect observation or measurement of energy transfer within a system.
- Incorrect measurements of changes in energy.
- Incorrect comparison of the transfer of energy through different materials.
- Incorrect classification or grouping of materials based on provided information.
- Incorrect serial order of objects and/or events based on transfer of energy.
- Incorrect evaluation of a scientific investigation examining the transfer of energy.
- Incorrect interpretation of data in tables, line, bar, trend, and/or simple circle graphs.
- Incorrect prediction of energy transfer based on provided information.
- Incorrect conclusion and/or explanation based on given data.

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Oklahoma Academic Standards Sample Test Item:
OAS Content Objective: 1.3
OAS Process Objective: 4.4
Depth of Knowledge: 1
Correct Response: B

Students placed a metal spoon and a wooden spoon into a glass of hot water. They waited five minutes and touched the spoon handles.

What did the students most likely observe?

A The metal spoon changed color.

B The metal spoon became hotter.

C The wooden spoon became colder.

D The wooden spoon changed shape.

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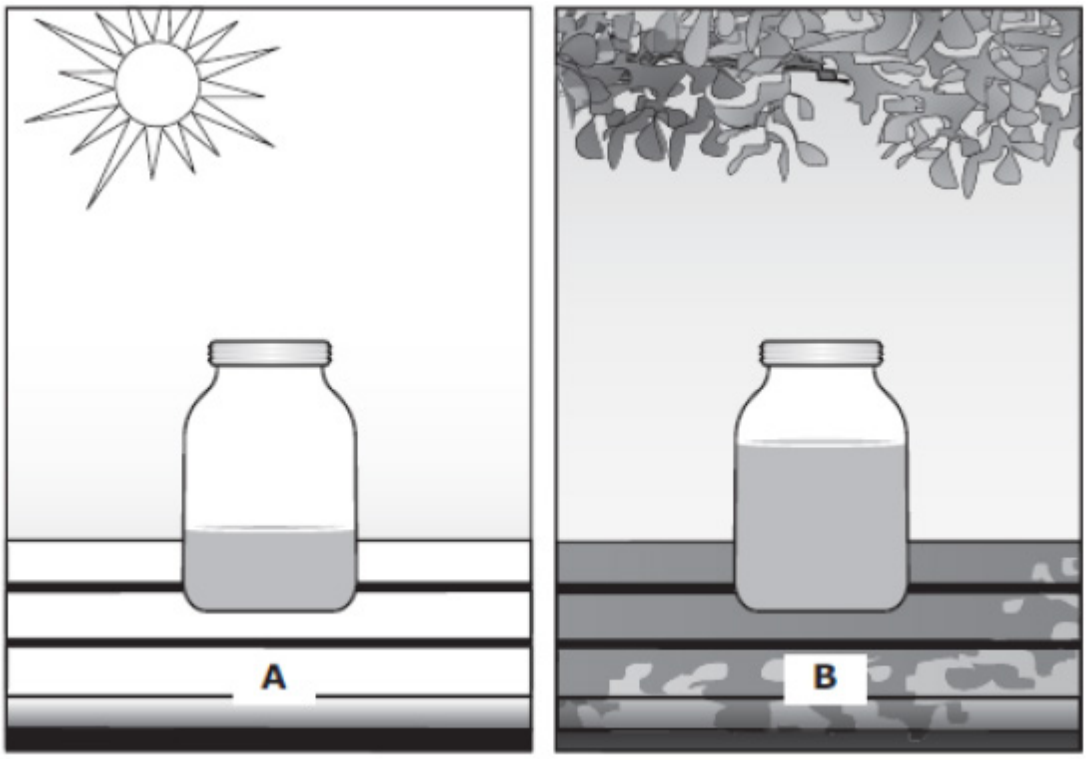
Oklahoma Academic Standards Sample Test Item:
OAS Content Objective: 1.3
OAS Process Objective: 1.2
Depth of Knowledge: 2
Correct Response: B

A student placed screens on the top of two full jars of water, then placed one jar in the shade and the other jar in the sun. After three days, the student observed the two jars shown below.



Which observation did the student make, and why is the energy transfer in jar A different from the energy transfer in jar B?

A Jar B has more water because more energy is transferred to the water.

B Jar A has less water because more energy is transferred to the water.

C Jar B has more water because more energy is transferred from the water.

D Jar A has less water because more energy is transferred from the water.

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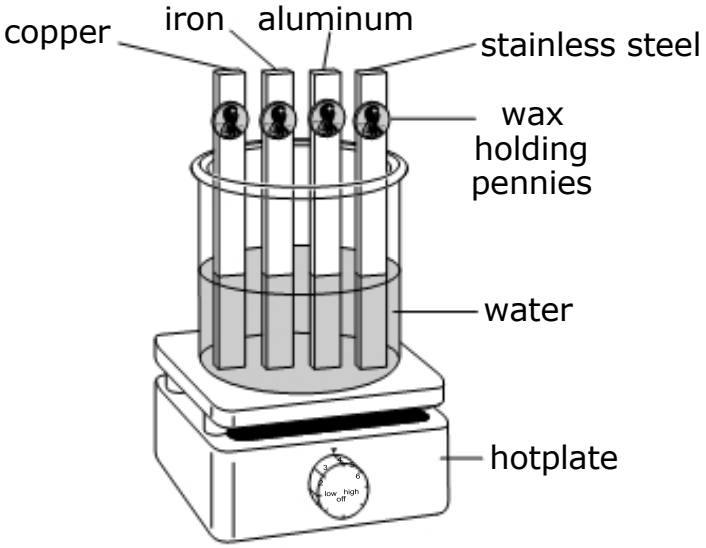
Oklahoma Academic Standards Sample Test Item:
OAS Content Objective: 1.3
OAS Process Objective: 4.4
Depth of Knowledge: 3
Correct Response: B

Four pennies were attached to the pieces of metal shown by using wax. The water in the beaker was heated using a hotplate. The data table shows the order in which the pennies fell into the water.

Heat Conduction Experiment Set-up



Order that the Pennies Fell Into the Water

Order	Metal
first	copper
second	aluminum
third	iron
fourth	stainless steel

Which statement <u>best</u> explains the results of this activity?

A The iron transfers more heat energy from the air than the other metals.

B The copper transfers heat energy from the water faster than the other metals.

C The heat from the water transferred to the air instead of heating the aluminum.

D The heat from the stainless steel transferred to the water instead of heating the wax and the penny.

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OAS Content Standard:

Standard 1: Properties of Matter and Energy—Describe characteristics of objects based on physical qualities such as size, shape, color, mass, temperature, and texture. Energy can produce changes in properties of objects such as changes in temperature. The student will engage in investigations that integrate the process standards and lead to the discovery of the following objectives:

OAS Content Objective:

4. Energy can be classified as either potential or kinetic.

Item Specifications:

Emphasis:

- Recognize, observe, and/or measure characteristics of an object in order to classify its energy as either potential or kinetic.

Stimulus Attributes:

- Test items may include grade-level appropriate text, illustrations, data tables, graphs, graphic organizers, Venn diagrams, and/or descriptions.

Format: Assessable content includes the following:

- Recognize, observe that potential energy is energy of an object's position or condition (e.g., gravitational, elastic, chemical, electrical, heat).
- Recognize, observe that kinetic energy is energy of an object's motion.
- Recognize that kinetic and potential energy can be changed into other types of energy (e.g. heat).
- Predict where an object's kinetic or potential energy may be at its largest/smallest in relation to the object's position. (e.g., pendulum, roller coaster, series of hills).
- Relate the Law of Conservation of Energy (Energy can never be created nor destroyed, but it can change forms) to the energy change which occurs when an object moves or changes position.
- Grade level appropriate math calculations of no more than 2 steps or 3 digits.

Assessment Limits: Non-assessable content includes the following:

- Calculating elastic potential or kinetic energy used for work.
- Concepts related to the Law of Conservation of energy not specifically listed above.
- Forms of potential energy, (e.g., Nuclear, magnetic energy) which are not specifically mentioned above.
- Calculation using 1/2 mv squared (kinetic energy in classical form) or 1/2 kx squared or Fd., Newton = Fxd.
- Identify the appropriate and correct SI units for measuring energy (e.g., Joules, J or other energy units).

Process Objectives May Include:

- Items may be written to assess any of the process objectives except for 3.4.

Distractor Domain May Include:

- Incorrect observation or measurement of potential or kinetic energy within a system or model.
- Incorrect comparison of the transfer of energy through a series of actions.

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- Incorrect classification or grouping of characteristics based on provided information.
- Incorrect order of objects and/or events based on the characteristics of potential and kinetic energy.
- Incorrect evaluation of a scientific investigation examining the external frame of reference in relation to potential or kinetic energy.
- Incorrect interpretation of data tables, line, bar, and/or simple models.
- Incorrect prediction of energy grouping based on the provided information.
- Incorrect conclusion and/or explanation based on given data.

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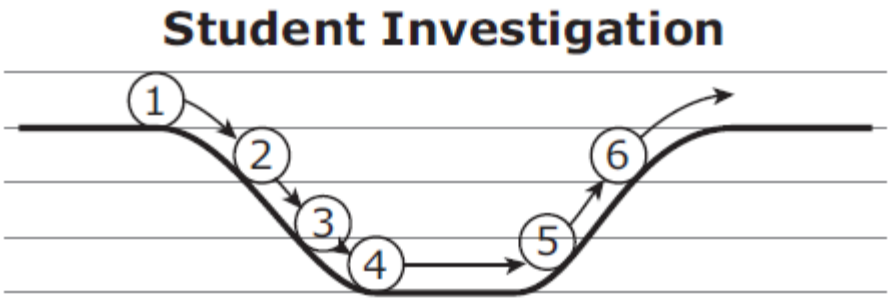
Oklahoma Academic Standards Sample Test Item:
OAS Content Objective: 1.4
OAS Process Objective: 1.2
Depth of Knowledge: 2
Correct Response: D

Students observe a marble as it rolls into a tough and back up the other side.



At which two points in the diagram does the marble have the same amount of potential energy?

A 1 and 6

B 3 and 5

C 4 and 5

D 2 and 6

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OAS Content Standard:

Standard 2: Organisms and Environments—Organisms within an ecosystem are dependent on one another and the environment. The student will engage in investigations that integrate the process standards and lead to the discovery of the following objectives:

OAS Content Objective:

1. Organisms in an ecosystem depend on each other for food, shelter, and reproduction.

Item Specifications:

Emphasis:

- Ecosystems include food chains and food webs.
- Organisms are part of food chains, energy pyramids, and food webs.
- In a community, organisms can be classified as producers, consumers, and decomposers.
- Relationships exist between consumers, producers, and decomposers within an ecosystem.
- Producers are able to use energy (light or chemical) to help them make their own foods.
- Consumers need to consume other organisms to obtain their energy.
- Decomposers are organisms that get their energy from dead plant or animal material.
- Predators and prey relationships affect populations in an ecosystem.
- Organisms rely on other organisms to provide needs other than food energy (e.g., shelter, an area for nests, dispersal of seeds).

Stimulus Attributes:

- Test items may include grade-level appropriate text, illustrations, data tables, graphs, graphic organizers, and/or descriptions.
- Organisms likely to be unfamiliar to students at this grade level will be described and/or pictured.

Format: Assessable content includes the following:

- Complete a food chain, energy pyramid, and/or food web.
- Explain the effect of changes to a food web or chain.
- Apply knowledge of how energy is transferred in different food web or chain scenarios.
- Interpret a model illustrating the direction of energy flow through a food web or chain.
- Identify and/or compare the role of organisms in a given community as producers, consumers, or decomposers.
- Predict outcomes based on changes in populations and organism relationships.
- Evaluate the design of a scientific investigation examining the relationships between populations and/or organisms in a community.
- Predict outcomes based on changes in populations and organism relationships.
- Predict interactions among organisms in a given situation or by using given data.
- Analyze the interactions of organisms in a community and/or populations based on data.
- Classify or group organisms and/or populations based on how they meet their needs (e.g., habitat, reproduction).

Assessment Limits: Non-assessable content includes the following:

- Items are limited to grade-level appropriate organisms and their interactions (e.g., producers, consumers, decomposers; organisms dependent on other organisms for seed dispersal or nest sites).
- Items will not include identifying levels of consumers (e.g., primary, secondary, and/or tertiary) or calculating energy transfer.

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- Explain the effect of changes in the environment upon consumers, producers and/or decomposers.

Process Objectives May Include:
- Items may be written to assess any of the process objectives except for 3.4.

Distractor Domain May Include:
- Incorrect completion of food chains.
- Incorrect identification of the role of given organisms.
- Incorrect comparison of organisms in a given community
- Incorrect classification or grouping of organisms based on how they meet their needs.
- Energy flow through a food web/chain in the wrong direction.
- Incorrect predictions of changes in a community based on given information
- Incorrect predictions of organism interactions based on given data or situations
- Incorrect analysis of the interactions of organisms

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Oklahoma Academic Standards Sample Test Item:
OAS Content Objective: 2.1
OAS Process Objective 3.2
Depth of Knowledge: 2
Correct Response: D

A student conducts an experiment to determine which species of bird is most common at the bird feeder in his yard.

Which of these must be included in the design of the experiment in order for the student to collect reliable data?

A use more than one type of bird seed

B move the feeder to different locations

C fill the feeder with seed at different times of day

D make observations at the same time of day for many days

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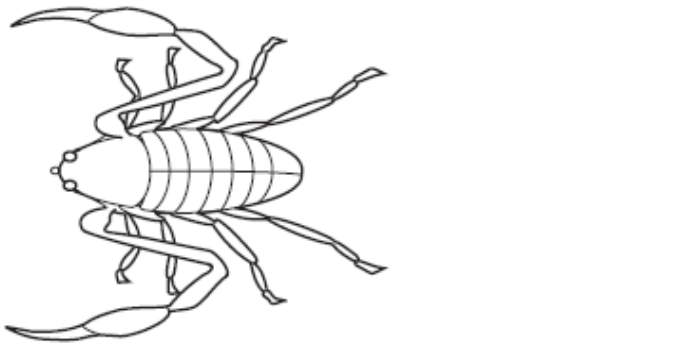
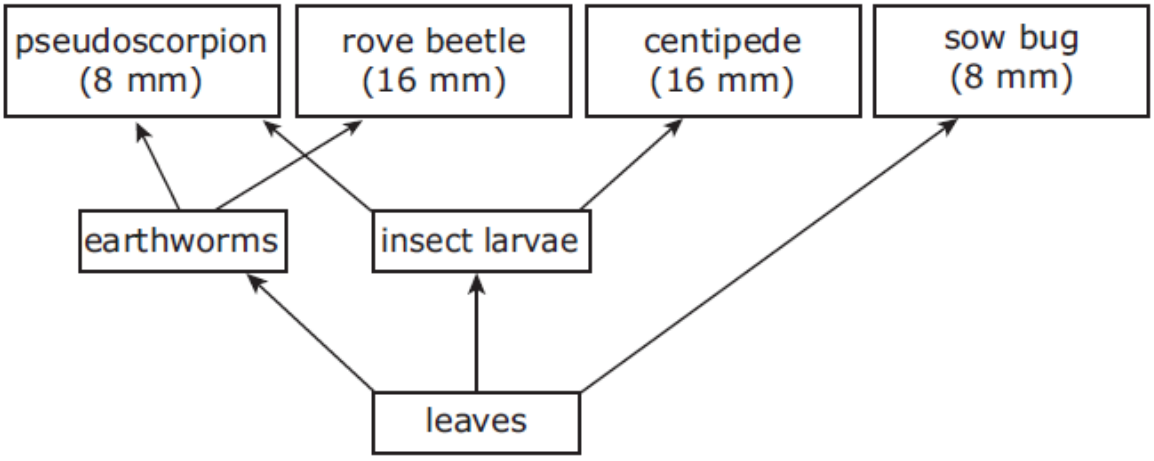
Oklahoma Academic Standards Sample Test Item:
OAS Content Objective: 2.1
OAS Process Objective: 2.1
Depth of Knowledge: 2
Correct Response: A

A student read a description of an organism. The student then looked at a food web showing organisms often found in leaf piles.



The organism was found in a leaf pile eating insect larvae.

Leaf Pile Food Web



Which organism was <u>most likely</u> described?

A pseudoscorpion

B rove beetle

C centipede

D sow bug

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Oklahoma Academic Standards Sample Test Item:
OAS Content Objective: 2.1
OAS Process Objective: 4.4
Depth of Knowledge: 3
Correct Response: D

Scientists have observed that blue jay birds feed on insects.

Average Insect Diet of Blue Jay Birds

Type of Insect Eaten	Percentage (%)
lacewing	33
grasshopper	27
moth	23
other insects	16
monarch butterfly	less than 1
viceroy butterfly	less than 1

Monarch butterfly

Viceroy butterfly

The scientists want to learn why blue jay birds are not observed eating many butterflies. They learn that monarch butterflies taste bad to the blue jay birds. They also learn that viceroy butterflies taste good to blue jay birds.

Which statement <u>best</u> explains why viceroy butterflies are only a small part of the blue jay birds' insect diet?

A Blue jay birds like to eat insects that cannot fly, so they will not eat viceroy butterflies.

B Blue jay birds like to eat a lot of lacewings, so they are not hungry enough to eat viceroy butterflies.

C Blue jay birds avoid eating moths, so they avoid eating viceroy butterflies too.

D Blue jay birds avoid eating viceroy butterflies because they look like monarch butterflies.

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OAS Content Standard:

Standard 2: Organisms and Environments—Organisms within an ecosystem are dependent on one another and the environment. The student will engage in investigations that integrate the process standards and lead to the discovery of the following objective:

OAS Content Objective:

2. Changes in environmental conditions due to human interactions or natural phenomena can affect the survival of individual organisms and/or entire species.

Item Specifications:

Emphasis:

- Earth's resources can be natural (non-renewable) or man-made (renewable).
- Be able to identify which of Earth's resources are considered renewable and which are considered to be non-renewable resources, and what criteria are used to make this determination.
- The practices of recycling, reusing, and reducing help to conserve Earth's limited resources.
- Be able to explain different approaches on how individuals can conserve Earth's resources (e.g., recycling, reusing, reducing).
- Understand how a change or changes in environmental conditions can affect the survival of organisms, populations, entire species, and/or ecosystems.
- Math calculations of no more than 2 steps or 2 digits, unless the number is 100.

Stimulus Attributes:

- Test items may include grade-level appropriate text, illustrations, data tables, graphs, graphic organizers, and/or descriptions.

Format: Assessable content includes the following:

- Explain that reducing the use of resources applies to things like electricity, paper, wood, metal, etc.
- Explain that reusing resources applies to using items for an additional purpose that it was not initially made for.
- Explain that recycling resources applies to using part or all of a material to manufacture another product.
- Compare and contrast why some materials are considered renewable and others non-renewable.
- Compare and contrast the difference between natural and man-made products.
- Renewable/non-renewable note: Natural vs. man-made and renewable vs. non-renewable. Not all natural resources are non-renewable.
- Compare and contrast advantages and disadvantages of resource conservation.
- Observe and/or measure positive or negative changes in environmental conditions resulting from human interactions and/or natural phenomena (e.g., food supply, air quality, water quality, habitats).
- Predict the survival of different organisms based on given changes in environmental conditions.
- Compare human interactions and/or natural phenomena that affect the survival of organisms.
- Sequence changes in environmental conditions due to human interactions or natural phenomena.
- Evaluate the design of a scientific investigation examining a change in environmental conditions and/or the effects on the survival of organisms.
- Predict the effects of changes in environmental conditions that result from human interactions and/or natural phenomena.
- Communicate the results of an investigation examining the concept of environmental change.
- Predict the effect or effects of given changes in environmental conditions on organisms.

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Assessment Limits: Non-assessable content includes the following:

- Test items are limited to grade-level appropriate human interactions and/or natural phenomena (e.g., polluting activities by humans, clean-up activities by humans, earthquakes, tornados, hurricanes, floods).
- Ecosystems and/or organisms likely to be unfamiliar to students at this grade level will be described and/or pictured.
- Math calculations of no more than 2 steps or 2 digits, unless the number is 100.

Process Objectives May Include:

- Items may be written to assess any of the process objectives except for 3.4.

Distractor Domain May Include:

- Incorrect observation and/or measure of changes in environmental conditions
- Misconceptions; common errors students make
- Incorrect prediction of the survival of organisms in given situations
- Incorrect comparisons among given human interactions and/or natural phenomena that affect the survival of organisms
- Incorrect classification or grouping of organisms based on the effects of a change in environmental conditions
- Incorrect sequence of events in environmental conditions
- Incorrect evaluation of the design of a scientific investigation
- Incorrect prediction of the effects of changes in environmental conditions
- Incorrect communication of the results of an investigation
- Incorrect prediction of the effect of changes in environmental conditions on organisms
- Incorrect identification of types of classification of conservation of Earth's resources
- Incorrect explanations of natural and/or man-made resources
- Incorrect identification/comparisons of man-made and natural products

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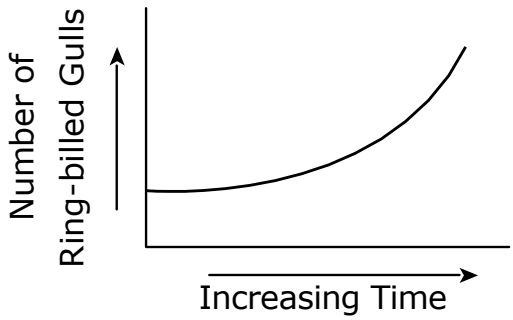
Oklahoma Academic Standards Sample Test Item:
OAS Content Objective: 2.2
OAS Process Objective: 4.2
Depth of Knowledge: 2
Correct Response: D

In recent years, the number of ring-billed gulls that migrate to Oklahoma during the winter has changed.

Ring-billed Gulls in Oklahoma



Based on the graph, which statement <u>best</u> explains this change in ring-billed gulls?

A Their numbers are decreasing because weather conditions have been better for many years.

B Their numbers are increasing because weather conditions have been worse for many years.

C Their numbers are decreasing because they are unable to find food from human-made sources like landfills.

D Their numbers are increasing because they are able to get more food from human-made sources like landfills.

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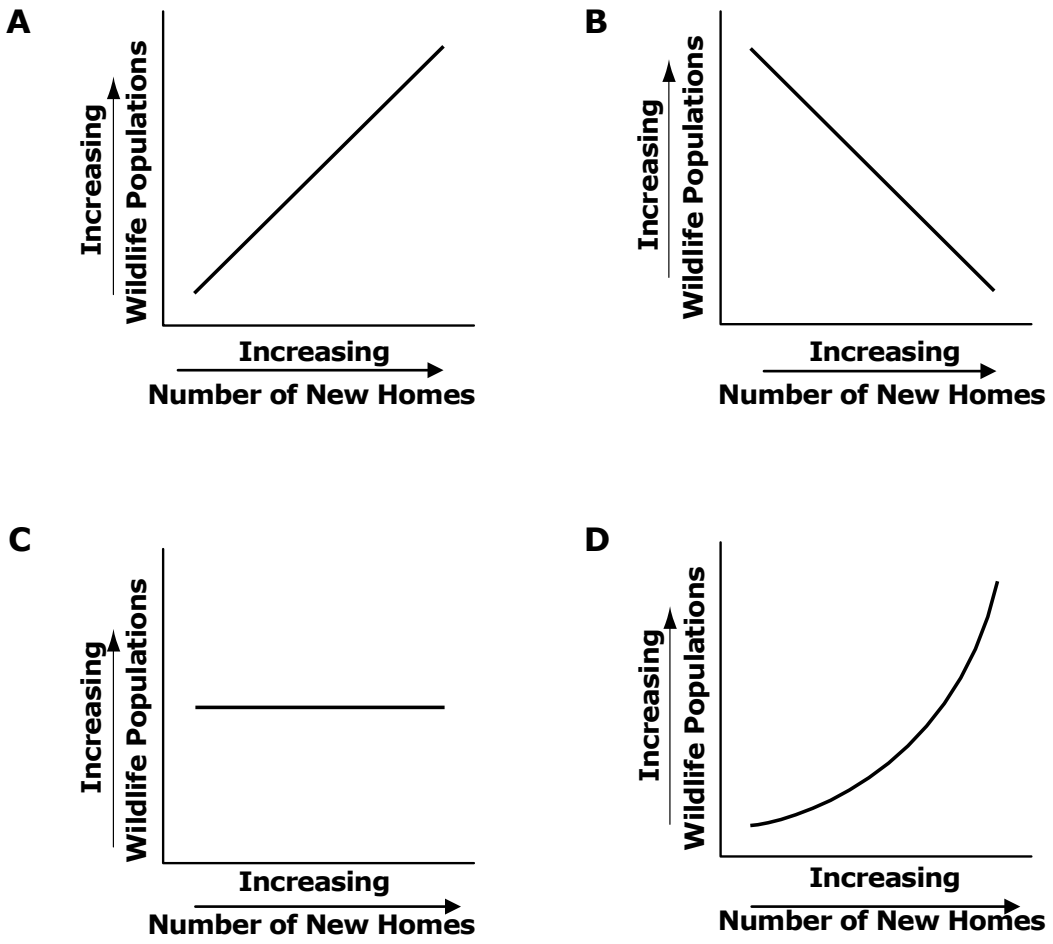
Oklahoma Academic Standards Sample Test Item:
OAS Content Objective: 2.2
OAS Process Objective: 4.2
Depth of Knowledge: 3
Correct Response: B

Many wildlife populations decrease in size when their habitats are changed for the development of human homes.

Which graph best shows this relationship?



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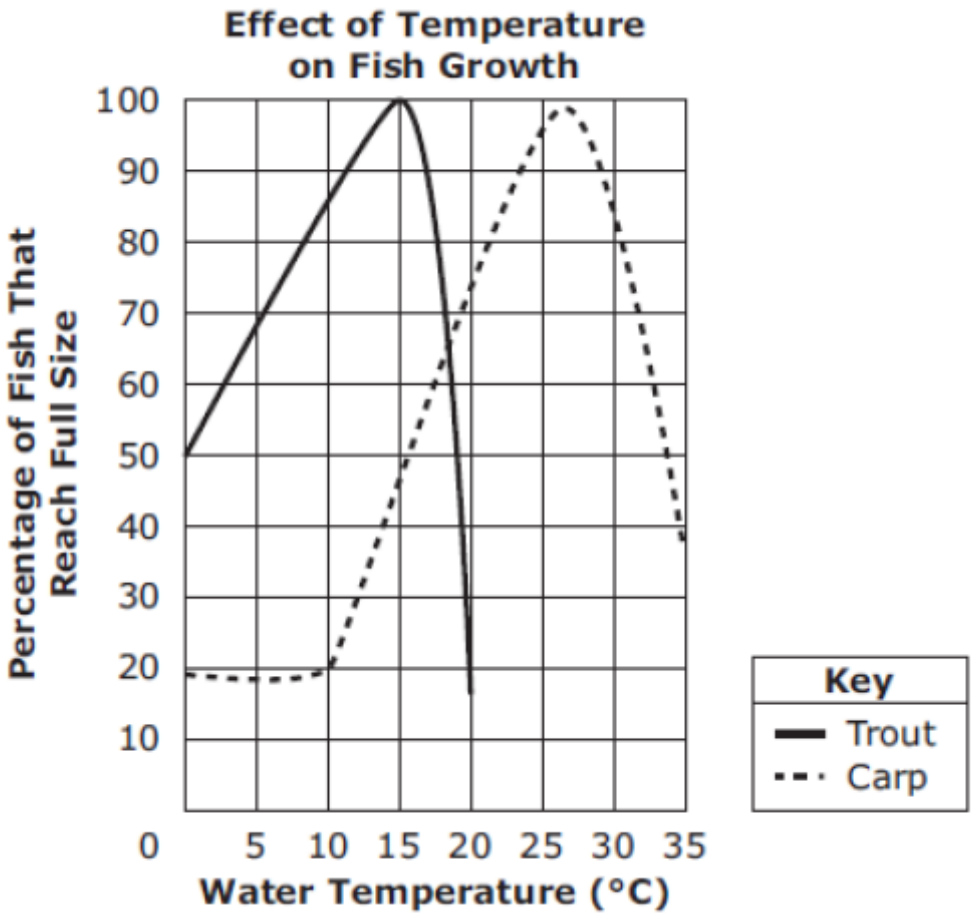
Oklahoma Academic Standards Sample Test Item:
OAS Content Objective: 2.2
OAS Process Objective: 4.2
Depth of Knowledge: 3
Correct Response: D

Water from a nearby lake cools a coal power plant. The power plant increases the average water temperature in the lake from 15 degrees Celsius (°C) to 25° C.



Is the resource being used to generate electricity renewable or nonrenewable, and how does the water temperature change affect fish in the lake?

A renewable; carp population increases

B renewable; more carp grow to full size

C nonrenewable; carp population increases

D nonrenewable; more carp grow to full size

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OAS Content Standard:

Standard 3: Structure of Earth and the Solar System—Interaction between air, water, rock/soil, and all living things. The student will engage in investigations that integrate the process standards and lead to the discovery of the following objectives:

OAS Content Objective:

1. Soil consists of weathered rocks and decomposed organic material from dead plants, animals, and bacteria. Soils are often found in layers.

Item Specifications:

Emphasis:

- Recognize and identify soil composition and characteristics in order to classify soil types.

Stimulus Attributes:

- Test items may include grade-level appropriate text, illustrations, data tables, graphs, graphic organizers, Venn diagrams, and/or descriptions.

Format: Assessable content includes the following:

- Identify the different materials needed to make soil.
- Explain processes needed to make soil.
- Describe the importance of soil types for plant growth.
- Describe how different soil types have different abilities to hold water.
- Explain why water passes through different soil types at different rates (e.g. porosity, particle sizes).
- Compare and contrast different soil types and their properties.

Assessment Limits: Non-assessable content includes the following:

- Test items do not include understanding of different soil horizons.
- Test items do not include soil color for identifying soil types.

Process Objectives May Include:

- Items may be written to assess any of the process objectives except for 3.4.

Distractor Domain May Include:

- Incorrect identification of soil parts.
- Incorrect understanding of soil porosity.
- Incorrect explanations on how soil is made.
- Incorrect identification and explanation of soil types.

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Oklahoma Academic Standards Sample Test Item:
OAS Content Objective: 3.1
OAS Process Objective 2.2
Depth of Knowledge: 1
Correct Response: A

A student used different sizes of mesh to sift the particles of silt, clay, sand and pebbles in a soil sample.

Which of these orders the soil particles from largest to smallest?

A pebbles, sand, silt, clay

B pebbles, sand, clay, silt

C silt, clay, sand, pebbles

D clay, silt, sand, pebbles

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Oklahoma Academic Standards Sample Test Item:
OAS Content Objective: 3.1
OAS Process Objective 1.2
Depth of Knowledge: 2
Correct Response: A

A student collected soil samples from four different places and compared the characteristics.

Soil Sample Data

Soil	Particle Size	Soil Color
W	mixture of small, medium and large	dark brown
X	mostly large	light brown
Y	mixture of small, medium and large	greyish-brown
Z	mostly small	reddish-brown

Based on the data, which soil <u>most likely</u> has the most organic matter for growing plants?

A Soil W

B Soil X

C Soil Y

D Soil Z

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OAS Content Standard:

Standard 3: Structure of Earth and the Solar System—Interaction between air, water, rock/soil, and all living things. The student will engage in investigations that integrate the process standards and lead to the discovery of the following objectives:

OAS Content Objective:

2. Weather exhibits daily and seasonal patterns (i.e., air temperature, basic cloud types - cumulus, cirrus, stratus, and nimbus, wind direction, wind speed, humidity, precipitation).

Item Specifications:

Emphasis:

- Earth is a dynamic system and its weather conditions have predictable daily and seasonal patterns that can be measured with specific measuring tools.
- Weather measurement tools include thermometer, barometer, anemometer, and rain gauge.
- Weather maps are used to display current weather and weather predictions.
- Recognize basic weather map symbols and properly read a simple weather forecast map.
- Be able to predict changing weather conditions based on the movement of high and low pressure systems and warm and cold fronts.
- Different cloud types are common under different weather conditions (i.e., cirrus, cumulus, stratus, nimbus, cumulonimbus).

Stimulus Attributes:

- Test items may include grade-level appropriate text, illustrations, data tables, graphs, graphic organizers, cloud charts and cloud dichotomous keys and/or descriptions.

Format: Assessable content includes the following:

- Identify tools and units (English system and/or metric system) used to measure and/or observe weather conditions (e.g., anemometer, barometer, rain gauge, meter stick, thermometer, weather vane).
- Identify the correct measurement on a grade-level appropriate tool and units commonly used to report these measurements.
- Compare and/or classify daily and/or seasonal weather patterns (e.g., air temperature, wind speed, wind direction, rainfall, snowfall, basic cloud types).
- Sequence daily and/or seasonal weather patterns from given information.
- Predict weather conditions based on given basic cloud types, seasonal weather patterns, air temperature, wind speed, wind direction, and/or precipitation.
- Determine whether a weather map is actual collected data or forecast data.
- Identify map symbols (cold front, warm front, low/high pressure, isobars etc.).
- Determine the motion of a front (e.g., where the sawtooth/bumps are placed indicate direction).
- Predict types of weather changes that occur after a cold front/warm front passes (e.g., cooler/warmer temps, rainfall/no rainfall, stronger/weaker winds, change in wind direction).
- Identify the types of clouds to expect as a cold front/warm front moves over and past a location.
- Predict temperature trends based on wind direction (e.g., north winds, should the temperatures increase or decrease at a location)
- Explain the difference between a watch/warning.
- Identify the county they live in.
- Identify and explain what their actions should be if their county is under a watch/warning.
- Compare and contrast seasonal patterns in northern and southern hemispheres.

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Assessment Limits: Non-assessable content includes the following:

- Test items are limited to grade-level appropriate weather conditions and seasonal patterns.
- Test items are limited to grade-level appropriate weather map and symbols.
- SI units will be used on all items for measuring and recording with the exception of air temperature expressed on weather maps, then degrees Fahrenheit can be used.

Process Objectives May Include:

- Items may be written to assess any of the process objectives except for 3.4.

Distractor Domain May Include:

- Incorrect tool identified for measuring given weather conditions
- Incorrect observation and/or measurement of weather conditions, daily weather patterns, and/or seasonal weather patterns
- Incorrect comparison of daily and/or seasonal weather patterns
- Incorrect classification of daily and/or seasonal weather patterns
- Incorrect sequence of given daily and/or seasonal weather patterns
- Incorrect predictions of weather conditions based on given information
- Incorrect identification of map symbols
- Incorrect results and/or explanation of daily and/or seasonal weather patterns
- Incorrect identification of front movement
- Incorrect weather predictions
- Incorrect identification of the types of clouds associated with different types of fronts
- Misinterpretation of data on a weather map
- Incorrect explanations for a watch or a warning
- Incorrect explanation on what their actions should be if their county is under a watch/warning

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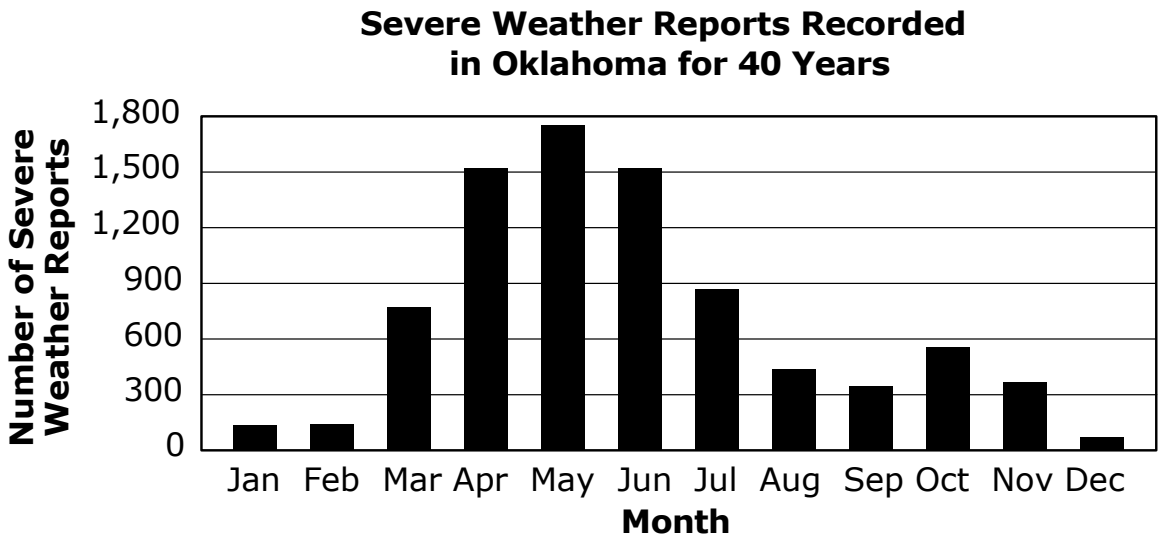
Oklahoma Academic Standards Sample Test Item:
OAS Content Objective: 3.2
OAS Process Objective: 4.2
Depth of Knowledge: 2
Correct Response: A



Which statement <u>best</u> describes the data shown in this graph?

A Weather conditions follow a pattern based on the change in seasons.

B Daily weather conditions change when the amount of rainfall changes.

C Daily weather conditions stay the same when wind direction stays the same.

D Weather conditions do not follow a pattern based on the change in air temperature.

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Oklahoma Academic Standards Sample Test Item:
OAS Content Objective: 3.2
OAS Process Objective: 4.4
Depth of Knowledge: 3
Correct Response: D

Students in a science class studied a map of the central United States. They also studied a data table that had average monthly air temperature information for Tulsa, Oklahoma, and Omaha, Nebraska.

Average Monthly Air Temperature Information

Average Monthly High Air Temperatures (°F)												
City	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Tulsa	46	53	62	72	80	88	94	93	84	74	60	50
Omaha	32	38	51	64	73	82	86	84	76	65	48	35
Average Monthly Low Air Temperatures (°F)												
Tulsa	26	31	40	50	59	68	73	71	63	51	39	30
Omaha	13	19	29	40	51	61	66	64	55	43	29	17

Which statement <u>best</u> explains this data?

A Omaha is cooler than Tulsa in the winter because Omaha is located farther south.

B June is the hottest month of the year in both cities because that is when summer begins.

C December is the coldest month of the year in both cities because that is when winter begins.

D Tulsa has higher average temperatures than Omaha year round because Tulsa is located farther south.

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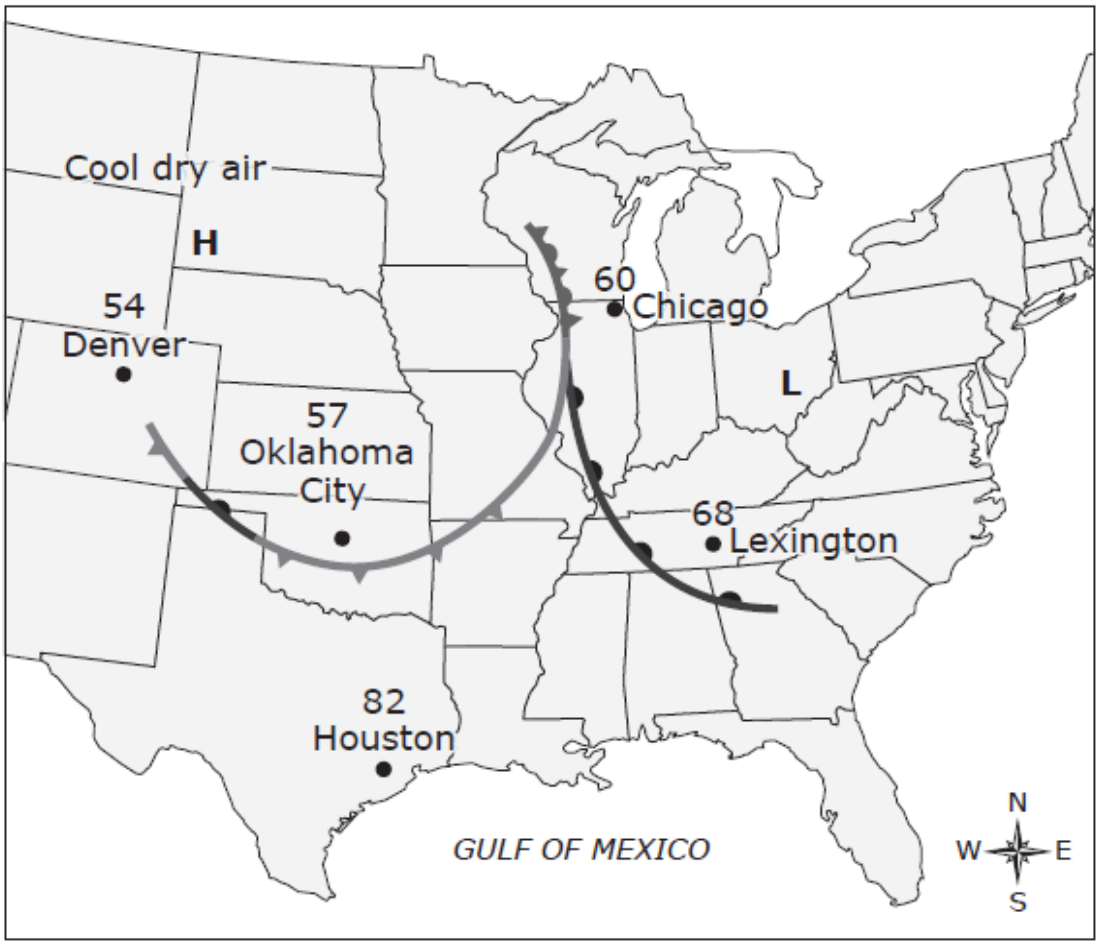
Oklahoma Academic Standards Sample Test Item:
OAS Content Objective: 3.2
OAS Process Objective 1.1
Depth of Knowledge: 3
Correct Response: C

A student was examining the weather map shown to learn about the weather conditions in Oklahoma City.

Weather Map



Which weather conditions are identified for Oklahoma City?

A clear and windy with no rain and cool temperatures

B clear and calm with no rain and warm temperatures

C cloudy and windy with possible rain and cool temperatures

D cloudy and calm with possible rain and warm temperatures

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OAS Content Standard:

Standard 3: Structure of Earth and the Solar System—Interaction between air, water, rock/soil, and all living things. The student will engage in investigations that integrate the process standards and lead to the discovery of the following objectives:

OAS Content Objective:

3. Earth is the third planet from the Sun in a system that includes the moon, the Sun, and seven other planets.

Item Specifications:

Emphasis:

- The solar system is arranged in a predictable order.
- The solar system includes Earth, the moon, other planets and their moons, asteroids, meteoroids, comets, and the Sun.
- Most objects in the solar system are in regular and predictable motion (e.g., phases of the moon).
- These motions result in our days, nights, years, eclipses, and the apparent motions of other objects in the sky.
- The Earth rotates on its axis while making revolutions around the Sun.
- Objects in the Solar System have individual characteristics (e.g., distance from Sun, number of moons, temperature of object).

Stimulus Attributes:

- Test items may include grade-level appropriate text, illustrations, data tables, graphs, graphic organizers, and/or descriptions.

Format: Assessable content includes the following:

- Evaluate a description of a model of the solar system and/or its parts.
- Predict simple phases of the moon based on observations and/or data (i.e., new, 1st quarter, full, 3rd quarter).
- Recognize appropriate units of dimensions of objects in our solar system (i.e., km, astronomical units).
- Observe and/or describe objects in our solar system (e.g., relative size, number of moons, ring system, rocky/gaseous planets, inner/outer planets, relative temperature differences).
- Classify or compare objects in our solar system.
- Arrange objects in our solar system based on given criteria.
- Evaluate the design of a scientific investigation that examines objects in our solar system.
- Communicate the results of and/or give explanations based on data in an investigation examining objects in our solar system (e.g., explain why the surface temperature on one planet is greater than that of another planet).
- Predict conditions on and/or locations of objects in our solar system based on experimental data (e.g., predict the surface temperature of an unknown planet given the surface temperatures of surrounding planets).
- Recognize the relationship between the seasons and Earth's tilt in the Northern and Southern Hemispheres.
- The tilt of Earth plays a direct role in the seasonal patterns.

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Assessment Limits: Non-assessable content includes the following:

- Test items are limited to grade-level appropriate parts of the solar system including the planets and their moons, asteroids, meteoroids, comets, and the Sun.
- Items will not include the identification of specific measurements or distances in the solar system.

Process Objectives May Include:

- Items may be written to assess any of the process objectives except for 3.4.

Distractor Domain May Include:

- Incorrect arrangement of objects in our solar system
- Incorrect evaluation of a scientific investigation
- Incorrect evaluation or description of a given model
- Incorrect prediction of conditions and/or locations of objects in our solar system
- Incorrect prediction of phases of the moon
- Incorrect results or explanations of results of an investigation
- Incorrect units for dimensions of objects in our solar system
- Incorrect observations or descriptions of objects in our solar system
- Incorrect classification or comparisons of objects in our solar system
- Incorrect arrangement of objects in our solar system
- Incorrect evaluation of a scientific investigation
- Incorrect evaluation or description of a given model
- Incorrect prediction of conditions and/or locations of objects in our solar system
- Incorrect relationship between the season and Earth's tilt in either hemisphere

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Oklahoma Academic Standards Sample Test Item:
OAS Content Objective: 3.3
OAS Process Objective: 2.2
Depth of Knowledge: 1
Correct Response: A

Which data table shows the correct sequence of planets in our solar system?

A **Planet Data**

Planet closest to the Sun	Mercury
	Venus
	Earth
	Mars
	Jupiter
	Saturn
Planet farthest to the Sun	Uranus
	Neptune

B **Planet Data**

Planet closest to the Sun	Jupiter
	Neptune
	Uranus
	Saturn
	Mars
	Mercury
Planet farthest to the Sun	Venus
	Earth

C **Planet Data**

Planet closest to the Sun	Earth
	Venus
	Mercury
	Mars
	Saturn
	Uranus
Planet farthest to the Sun	Neptune
	Jupiter

D **Planet Data**

Planet closest to the Sun	Neptune
	Uranus
	Saturn
	Jupiter
	Mars
	Earth
Planet farthest to the Sun	Venus
	Mercury

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Oklahoma Academic Standards Sample Test Item:
OAS Content Objective: 3.3
OAS Process Objective: 4.3
Depth of Knowledge: 2
Correct Response: C

Planet Data

Planet	Average Distance from the Sun (million kilometers)	Average Surface Temperature (°C)
Mercury	58	167
Mars	228	-65
Saturn	1,434	-140
Neptune	4,495	-200

Which value is the best prediction of the average surface temperature of Earth?

A less than -200°C

B greater than 167°C

C between -65°C and 167°C

D between -140°C and -65°C

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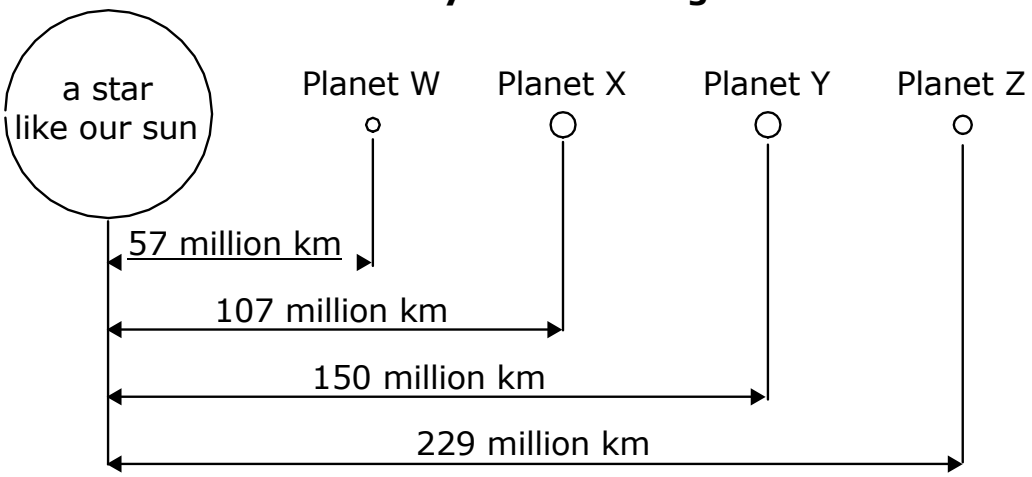
Oklahoma Academic Standards Sample Test Item:
OAS Content Objective: 3.3
OAS Process Objective: 4.2
Depth of Knowledge: 3
Correct Response: C

Solar System Drawing



Number of Moons Orbiting Planets

Student	Planet	Number of Moons
Jana	W	1
Fred	W	2
Gaile	Y	1
Malcom	Y	2

Using the drawing and data table, which student identified a planet that is <u>most</u> similar to Earth?

A Jana

B Fred

C Gaile

D Malcom

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