BENCHMARK: SC.8.N.1.1 Define a problem from the eighth grade curriculum using appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions. (Also assesses SC.6.N.1.1, SC.6.N.1.3, SC.7.N.1.1, SC.7.N.1.3, SC.7.N.1.4, SC.8.N.1.3, and SC.8.N.1.4.) SC.8.N.1.1 Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions. SC.6.N.1.3 Explain the difference between an experiment and other types of scientific investigation, and explain the relative benefits and limitations of each. SC.7.N.1.1 Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions. SC.7.N.1.3 Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and explain that not all scientific knowledge is derived from experimentation. SC.7.N.1.4 Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment. SC.8.N.1.3 Use phrases such as “results support” or “fail to support” in science, understanding that science does not offer conclusive ‘proof’ of a knowledge claim. SC.8.N.1.4 Explain how hypotheses are valuable if they lead to further investigations, even if they turn out not to be supported by the data.

**BENCHMARK SIGNAL WORDS AND SAMPLE ITEMS**

<table>
<thead>
<tr>
<th>SIGNAL WORDS</th>
<th>SAMPLE ITEMS</th>
<th>SAMPLE ITEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluate</td>
<td>Jenny was conducting an experiment in her science lab and had to mix several chemicals. She wrote down the first three chemicals she added, but she was then interrupted and forgot to write down the last two chemicals that were part of the solution. What impact will this have on her results?</td>
<td>A. Her teacher will value the results of her experiment regardless of her notes.</td>
</tr>
<tr>
<td>Identify</td>
<td></td>
<td>B. The results of her experiment will be valid as long as she gets the expected results.</td>
</tr>
<tr>
<td>Interpret</td>
<td></td>
<td>C. If her records are not accurate, then her results will be inconclusive and unreliable. *</td>
</tr>
<tr>
<td>Distinguish</td>
<td></td>
<td>D. If she doesn’t write every step down, her results will not be the same when she repeats the investigation.</td>
</tr>
<tr>
<td>Explain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analyze</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**HIGH ORDER QUESTION STEMS**

- Can you distinguish between ____?  
- Compare and contrast_______ to _______.  
- What if_______?  
- What happens when_______?  
- Why did_______ happen?  
- What can you find out about_______?  
- What do you already know about_______?  
- What conclusion can you draw about_______?

**STUDENT SCALE QUESTIONS**

- How have I used this benchmark in my reading/math?  
- How did the benchmark help me better understand ______?  
- Where is my learning on the scale?  
- I can teach someone else.  
- I can do it on my own.  
- I understand, but have questions.

**TEST ITEM SPECIFICATION NOTES**

**Clarification**

The student will:

- Evaluate a scientific investigation using evidence of scientific thinking and/or problem solving.  
- Identify test variables (independent variables) and/or outcome variables (dependent variables) in a given scientific investigation.  
- Interpret and/or analyze data to make predictions and/or defend conclusions.  
- Distinguish between an experiment and other types of scientific investigations where variables cannot be controlled.  
- Explain how hypotheses are valuable.

**Content Limits**

- Items addressing hypotheses will not assess whether the hypothesis is supported by data.  
- Items will not address or assess replication, repetition, or the difference between replication and repetition.  
- Items will not assess the reason for differences in data across groups that are investigating the same problem.  

**Stimulus Attributes**

- Scenarios in items will be limited to those familiar to a middle-school student rather than global situations.  
- The term test variable should be followed by (independent variable) and the term outcome variable should be followed by (dependent variable).

**Response Attributes**

- The term test variable should be followed by (independent variable) and the term outcome variable should be followed by (dependent variable).

**Prior Knowledge**

- Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.3.N.1.1, SC.3.N.1.3, SC.4.N.1.1, SC.4.N.1.6, SC.5.N.1.1, SC.5.N.1.2, SC.5.N.1.4, and SC.5.N.1.5.

**5 E MODEL COMPONENTS**

**Engage**

- Demonstrations  
- Reading text  
- Free Write  
- Analyze Graphic Organizer  
- KWL  
- Brainstorming/Thinking Maps

**Explore**

- Perform an Investigation  
- Read Authentic Resources to Collect  
- Information Shared  
- Solve a Problem  
- Construct a Model

**Explain**

- Student Analysis & Explanation  
- Supporting Ideas with Evidence  
- Structure Questioning  
- Reading and Discussion  
- Teacher Explanation  
- Thinking Skill

**Extend**

- Problem Solving  
- Decision making  
- Experimental Inquiry

**Evaluate**

- Rubric  
- Mini Assessment  
- Journal Entry  
- Portfolio

**THINKING MAPS CORRELATION**

- Cognitive Process: Defining the essential question because _______.  
- After completing _________, the evidence from _______. It is the control and serves as the basis for comparison.  
- Jenny was conducting an experiment in her science lab and had to mix several chemicals. She wrote down the first three chemicals she added, but she was then interrupted and forgot to write down the last two chemicals that were part of the solution. What impact will this have on her results?  
- A. Her teacher will value the results of her experiment regardless of her notes.  
- B. The results of her experiment will be valid as long as she gets the expected results.  
- C. If her records are not accurate, then her results will be inconclusive and unreliable. *  
- D. If she doesn’t write every step down, her results will not be the same when she repeats the investigation.

**STUDENT SUMMATIVE WRITING TASK**

After completing _________, the evidence from the lesson that helps me understand _______ relates to the essential question because _______.
MIDDLE SCHOOL BENCHMARK TASK CARD:  STANDARD  Big Idea 1 :  The Practice of Science  DOK: MODERATE

BENCHMARK:  SC.7.N.1.2: DIFFERENTIATE REPPLICATION (BY OTHERS) FROM REPETITION (MULTIPLE TRIALS).  (ALSO ASSESSES SC.6.N.1.2, SC.6.N.1.4, AND SC.8.N.1.2.) SC.6.N.1.2 Explain why scientific investigations should be replicable.  SC.6.N.1.4 Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.  SC.8.N.1.2 Design and conduct a study using repeated trials and replication.

BENCHMARK SIGNAL WORDS AND SAMPLE ITEM

<table>
<thead>
<tr>
<th>SIGNAL WORDS</th>
<th>SAMPLE ITEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Differentiate</td>
<td>The following statements were taken from the procedures of four different investigations</td>
</tr>
<tr>
<td>Explain</td>
<td></td>
</tr>
<tr>
<td>Compare</td>
<td></td>
</tr>
<tr>
<td>Contrast</td>
<td></td>
</tr>
<tr>
<td>Evaluate</td>
<td></td>
</tr>
</tbody>
</table>

The statement from which investigation is an example of repetition?

A. Investigation 1  
B. Investigation 2  
C. Investigation 3  
D. Investigation 4 *

HIGH ORDER QUESTION STEMS

- Can you distinguish between _____ and _____?  
- Compare and contrast________ to ______.  
- What if _____?  
- What happens when_____?  
- Why did ______ happen?  
- What can you find out about ______?  
- Can you predict the outcome if_____?  
- What judgment can you make about_______?

STUDENT SCALE QUESTIONS

- How have I used this benchmark in my reading/math?  
- How did the benchmark help me better understand ______?  
- Where is my learning on the scale?  
- I can teach someone else.  
- _____ I can do it on my own.  
- _____ I understand, but have questions.

TEST ITEM SPECIFICATION NOTES

Clarification  
The student will:  
- Differentiate between replication and repetition.  
- Explain why scientific investigations should be replicable.  
- Compare methods and/or results obtained in a scientific investigation.  
- Evaluate the use of repeated trials or replication in a scientific investigation.

Prior Knowledge:  
- Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.3.N.1.2, SC.3.N.1.5, SC.4.N.1.2, SC.4.N.1.5, SC.5.N.1.3, and SC.5.N.2.2.

STUDENT SUMMATIVE WRITING TASK

After completing__________, the evidence from the lesson that helps me understand and answer the essential question is ____________. This relates to the essential question because ______________________.

THINKING MAPS CORRELATION

Cognitive Process: Compare/Contrast  
Product: Double Bubble Map

Cognitive Process: Defining  
Product: Circle Map/ Frame

Cognitive Process: Cause and Effect  
Product: Multi-Flow

5 MODEL COMPONENTS

Engage  
- Demonstrations  
- Reading text  
- Free Write  
- Analyze Graphic Organizer  
- KWL  
- Brainstorming/Thinking Maps

Explore  
- Perform an Investigation  
- Read Authentic Resources to Collect  
- Information Shared  
- Solve a Problem  
- Construct a Model

Explain  
- Student Analysis & Explanation  
- Supporting ideas with Evidence  
- Structure Questioning  
- Reading and Discussion  
- Teacher Explanation  
- Thinking Skill

Extend  
- Problem Solving  
- Decision making  
- Experimental Inquiry

Evaluate  
- Rubric  
- Mini Assessment  
- Journal Entry  
- Portfolio
MIDDLE SCHOOL BENCHMARK TASK CARD:  STANDARD: BIG IDEA 1: The Practice Of Science  DOK: MODERATE

BENCHMARK: SC.7.N.1.5: Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics. (Also assesses SC.7.N.3.2, SC.8.N.1.5, and SC.8.E.5.10.) SC.7.N.3.2 Identify the benefits and limitations of the use of scientific models. SC.8.N.1.5 Analyze the methods used to develop a scientific explanation as seen in different fields of science. SC.8.E.5.10 Assess how technology is essential to science for such purposes as access to outer space and other remote locations, sample collection, measurement, data collection and storage, computation, and communication of information.

<table>
<thead>
<tr>
<th>SIGNAL WORDS</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Describe</td>
<td>Two types of models that can be used to show details of the structures of cells are shown below.</td>
</tr>
<tr>
<td>Identify</td>
<td></td>
</tr>
<tr>
<td>Analyze</td>
<td></td>
</tr>
<tr>
<td>Investigate</td>
<td></td>
</tr>
<tr>
<td>Explore</td>
<td></td>
</tr>
</tbody>
</table>

Which of the following describes a limitation of the drawing but NOT the clay model?

A. It does not represent the main parts of a cell.  
B. It does not contain the correct number of nuclei.  
C. It cannot represent a living cell, since a true cell is three-dimensional.  
D. It cannot represent a living cell, since the cytoplasm should be in constant motion.

**HIGH ORDER QUESTION STEMS**

- Can you design a model of______?  
- Compare and contrast__________ to ________.  
- What if______?  
- What would happen when,______?  
- Why did______happen?  
- What can you find out about_______?  
- What do you already know about____?  
- What conclusion can you draw about____?  

**STUDENT SCALE QUESTIONS**

- How have I used this benchmark in my reading/math?  
- How did the benchmark help me better understand_______?  
- Where is my learning on the scale?  
- I can teach someone else.  
- I can do it on my own.  
- I understand, but have questions.  

**TEST ITEM SPECIFICATION NOTES**

**Clarification**

The student will:

- Describe and/or analyze common methods and/or models used in different fields of study.  
- Identify the benefits and/or limitations of the use of scientific models.  
- Identify how technology is essential to science.

**Content Limits**

- Items assessing technology will focus on the role of technology in science as opposed to specific technologies.

**Prior Knowledge**

- Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.3.N.3.2, SC.3.N.3.3, SC.4.N.3.1, and SC.6.N.3.4.

**THinking Maps Correlation**

**Cognitive Process:** Classifying  
**Product:** Tree Map

**Cognitive Process:** Defining  
**Product:** Circle Map/Frame

**Cognitive Process:** See Relationships  
**Product:** Bridge Map
Evaluate

- Rubric
- Mini Assessment
- Journal Entry
- Portfolio

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<tr>
<td>Explain</td>
<td>Scientific knowledge may change as new evidence or information is discovered. Which of the following would NOT be a result of new scientific research and information?</td>
</tr>
<tr>
<td>Identify</td>
<td>A. Binomial nomenclature is assigned to a recently identified plant species.</td>
</tr>
<tr>
<td>Predictions</td>
<td>B. An endangered monkey species is put in a reserve for protection from extinction.</td>
</tr>
<tr>
<td>Investigate</td>
<td>C. A newly discovered chemical element will be added to the periodic table of the elements.</td>
</tr>
<tr>
<td>Explore</td>
<td>D. A nonnative plant species will begin to reproduce rapidly after being introduced into a swamp ecosystem. *</td>
</tr>
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</table>

### High Order Question Stems

- Can you distinguish between ____?
- Compare and contrast _____ to ____...?
- What if _____?
- What would happen when _____?
- Why did this happen _____?
- What can you find out about _____?
- What do you already know about this ____?

### MIDDLE SCHOOL BENCHMARK TASK CARD: STANDARD Big Idea 2: The Characteristics Of Scientific Knowledge DOK: MODERATE

#### BENCHMARK: SC.6.N.2.2 EXPLAIN THAT SCIENTIFIC KNOWLEDGE IS DURABLE BECAUSE IT IS OPEN TO CHANGE AS NEW EVIDENCE OR INTERPRETATIONS ARE ENCOUNTERED. (ALSO ASSESSES SC.7.N.1.6, SC.7.N.1.7, SC.7.N.2.1, AND SC.8.N.1.6.)

SC.7.N.1.6 Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based. SC.7.N.1.7 Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community. SC.7.N.2.1 Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered. SC.8.N.1.6 Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence.

#### SIGNAL WORDS

- Explain
- Identify
- Predictions
- Investigate
- Explore

#### SAMPLE ITEM

Scientific knowledge may change as new evidence or information is discovered. Which of the following would NOT be a result of new scientific research and information?

- A. Binomial nomenclature is assigned to a recently identified plant species.
- B. An endangered monkey species is put in a reserve for protection from extinction.
- C. A newly discovered chemical element will be added to the periodic table of the elements.
- D. A nonnative plant species will begin to reproduce rapidly after being introduced into a swamp ecosystem. *

#### High Order Question Stems

- Can you distinguish between ____?
- Compare and contrast _____ to ____...?
- What if _____?
- What would happen when _____?
- Why did this happen _____?
- What can you find out about _____?
- What do you already know about this ____?

#### 5 E Model Components

**Engage**

- Demonstrations
- Reading text
- Free Write
- Analyze Graphic Organizer
- KWL
- Brainstorming/Thinking Maps

**Explore**

- Perform an Investigation
- Read Authentic Resources to Collect
- Information Shared
- Solve a Problem
- Construct a Model

**Explain**

- Student Analysis & Explanation
- Supporting ideas with Evidence
- Structure Questioning
- Reading and Discussion
- Teacher Explanation
- Thinking Skill

**Extend**

- Problem Solving
- Decision making
- Experimental Inquiry

**Evaluate**

- Rubric
- Mini Assessment
- Journal Entry
- Portfolio

### Benchmark Signal Words and Sample Item

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### Student Scale Questions

<table>
<thead>
<tr>
<th>STIMULUS</th>
<th>UNDERSTAND</th>
<th>CAN DO IT ON MY OWN</th>
<th>CAN TEACH SOMEONE ELSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC.5.N.1.6</td>
<td>A.</td>
<td>B.</td>
<td>C.</td>
</tr>
<tr>
<td>SC.6.N.1.6</td>
<td>A.</td>
<td>B.</td>
<td>C.</td>
</tr>
<tr>
<td>SC.7.N.1.6</td>
<td>A.</td>
<td>B.</td>
<td>C.</td>
</tr>
<tr>
<td>SC.8.N.1.6</td>
<td>A.</td>
<td>B.</td>
<td>C.</td>
</tr>
</tbody>
</table>

### Test Item Specification Notes

**Clarification**

The student will:

- Explain that scientific knowledge may change as new evidence is discovered or new scientific interpretations are formed.
- Explain that scientific explanations are based on empirical evidence, logical reasoning, predictions, and modeling.
- Identify instances in the history of science in which scientific knowledge has changed as a result of new evidence.

**Content Limits**

- Items will not require identification of the scientist(s) and/or details associated with a particular event/discovery.
- Items will not use the term "durable."  

**Stimulus Attributes**

- Scenarios referring to empirical evidence will use the term evidence.
- The phrase "natural event" should be used rather than "natural phenomenon."

**Prior Knowledge**

- Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.3.N.1.7, SC.4.N.1.3, SC.4.N.1.7, SC.5.N.1.5, SC.5.N.1.6, and SC.5.N.2.1.
**MIDDLE SCHOOL BENCHMARK TASK CARD:**  
**STANDARD** Big Idea 3 : The Role Of Theories, Laws, Hypothesis And Models  
**DOK: HIGH**

**BENCHMARK:** SC.7.N.3.1: RECOGNIZE AND EXPLAIN THE DIFFERENCE BETWEEN THEORIES AND LAWS AND GIVE SEVERAL EXAMPLES OF SCIENTIFIC THEORIES AND THE EVIDENCE THAT SUPPORTS THEM.  
**(ALSO ASSESSES** SC.6.N.3.1 AND SC.8.N.3.2.)

SC.6.N.3.1 Recognize and explain that a scientific theory is a well-supported and widely accepted explanation of nature and is not simply a claim posed by an individual. Thus, the use of the term theory in science is very different than how it is used in everyday life.  
SC.8.N.3.2 Explain why theories may be modified but are rarely discarded.

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</thead>
<tbody>
<tr>
<td>Explain</td>
<td>A timeline of some models of atoms throughout history is shown below. These models have contributed to the formation of the atomic theory.</td>
</tr>
<tr>
<td>Identify</td>
<td>Which statement best summarizes the development of the atomic theory over time?</td>
</tr>
<tr>
<td>Compare</td>
<td>A. Advancements in atomic models proved the atomic theory was accurate.</td>
</tr>
<tr>
<td>Contrast</td>
<td>B. The discovery of new evidence resulted in changes to the atomic theory.</td>
</tr>
<tr>
<td>Justify</td>
<td>C. With the discovery of every new element, the atomic theory was modified.</td>
</tr>
<tr>
<td>Apply</td>
<td>D. Changes in atomic models showed that the atomic theory was based on opinion.</td>
</tr>
</tbody>
</table>

**HIGH ORDER QUESTION STEMS**
- Can you distinguish between ____?
- Using scientific theory of ____ how can we recognize______?
- Compare and contrast______ to _____.
- What if ____?
- What happen when ____?
- Why did this happen______?
- What can you find out about_____?
- What do you already know about____?

**STUDENT SCALE QUESTIONS**
- How have I used this benchmark in my reading/math?
- How did the benchmark help me better understand _____?
- Where is my learning on the scale?
- I can teach someone else.
- I can do it on my own.
- I understand, but have questions.

**TEST ITEM SPECIFICATION NOTES**

- **Clarification**
  - The student will:
    - Explain the difference between theories and laws
    - Identify examples of theories and/or laws.
    - Explain why theories may be modified but are rarely discarded.

- **Content Limits**
  - Items addressing scientific theories and/or laws are limited to those found in the middle school science benchmarks, such as law of universal gravitation, law of superposition, theory of plate tectonics, atomic theory, law of conservation of mass, law of conservation of energy, cell theory, and the scientific theory of evolution.

- **Prior Knowledge**
  - Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.6.N.3.2 and SC.6.N.3.3.

- **STUDENT SUMMATIVE WRITING TASK**
  - After completing___________, the evidence from the lesson that helps me understand and answer the essential question is ______________. This relates to the essential question because ____________________.

**THINKING MAPS CORRELATION**

<table>
<thead>
<tr>
<th>Cognitive Process: Classifying</th>
<th>Cognitive Process: Defining</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product: Tree Map</td>
<td>Product: Circle Map/ Frame</td>
</tr>
</tbody>
</table>

| Cognitive Process: Comparing and Contrasting  |
| Product: Double Bubble Map |

**5 E MODEL COMPONENTS**

- **Engage**
  - Demonstrations
  - Reading text
  - Free Write
  - Analyze Graphic Organizer
  - KWL
  - Brainstorming/Thinking Maps

- **Explore**
  - Perform an Investigation
  - Read Authentic Resources to Collect
  - Information Shared
  - Solve a Problem
  - Construct a Model

- **Explain**
  - Student Analysis & Explanation
  - Supporting ideas with Evidence
  - Structure Questioning
  - Reading and Discussion
  - Teacher Explanation
  - Thinking Skill

- **Extend**
  - Problem Solving
  - Decision making
  - Experimental Inquiry

- **Evaluate**
  - Rubric
  - Mini Assessment
  - Journal Entry
  - Portfolio
MIDDLE SCHOOL BENCHMARK TASK CARD: **STANDARD:** Big Idea 5: Earth In Space And Time  **DOK:** HIGH

**BENCHMARK:** SC. 8.E.5.3: DISTINGUISH THE HIERARCHICAL RELATIONSHIPS BETWEEN PLANETS AND OTHER ASTRONOMICAL BODIES RELATIVE TO SOLAR SYSTEM, GALAXY, AND UNIVERSE, INCLUDING DISTANCE, SIZE, AND COMPOSITION. (ALSO ASSESSES SC.8.E.5.1 AND SC.8.E.5.2) SC.8.E.5.1 Recognize that there are enormous distances between objects in space and apply our knowledge of light and space travel to understand this distance. SC.8.E.5.2 Recognize that the universe contains many billions of galaxies and that each galaxy contains many billions of stars.

**BENCHMARK SIGNAL WORDS AND SAMPLE ITEMS**

<table>
<thead>
<tr>
<th>SIGNAL WORDS</th>
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</thead>
<tbody>
<tr>
<td>Compare</td>
<td>The points labeled on the chart below represent the approximate size of Earth, the Milky Way, the Moon, and the Sun. The approximate size of the solar system is also shown.</td>
</tr>
<tr>
<td>Contrast</td>
<td>X</td>
</tr>
<tr>
<td>Describe</td>
<td>Y</td>
</tr>
<tr>
<td>Investigate</td>
<td>Z</td>
</tr>
<tr>
<td>Explore</td>
<td>W</td>
</tr>
</tbody>
</table>

**HIGH ORDER QUESTION STEMS**

- Can you distinguish between ____?
- What would result if____?
- Compare and contrast_______ to _______.
- What if______?
- What happens when______?
- Why did this happen______?
- What can you find out about______?
- Why did you or did not support____?

**STUDENT SUMMATIVE WRITING TASK**

After completing___________, the evidence from the lesson that helps me understand and answer the essential question is ____________. This relates to the essential question because ____________________.

**THINKING MAPS CORRELATION**

**Cognitive Process:** Compare/Contrast

**Product:** Double Bubble Map

**Cognitive Process:** Classifying

**Product:** Tree Map

**Cognitive Process:** Defining

**Product:** Circle Map/ Frame

**5 E MODEL COMPONENTS**

**Engage**
- Demonstrations
- Reading text
- Free Write
- Analyze Graphic Organizer
- KWL
- Brainstorming/Thinking Maps

**Explore**
- Perform an Investigation
- Read Authentic Resources to Collect
- Information Shared
- Solve a Problem
- Construct a Model

**Explain**
- Student Analysis & Explanation
- Supporting ideas with Evidence
- Structure Questioning
- Reading and Discussion
- Teacher Explanation
- Thinking Skill

**Extend**
- Problem Solving
- Decision making
- Experimental Inquiry

**Evaluate**
- Rubric
- Mini Assessment
- Journal Entry
- Portfolio

**Clarification**

The student will:
- Compare and/or contrast the relative distance, relative size, and general composition of astronomical bodies in the universe.
- Describe distances between objects in space in the context of light and space travel.
- Describe that the universe contains billions of galaxies and stars.

**Content Limits**
- Items assessing astronomical bodies are limited to planets, stars, moons, asteroids, nebulae, galaxies, dwarf planets, and comets.
- Items will not assess the order of the planets from the Sun in our solar system in isolation.
- Items will not require memorization of quantitative astronomical data.
- Items will not assess the specific chemical composition of astronomical bodies.
- Items will not require calculations but may require comparison or use of quantitative data, including tables.

**Stimulus Attributes:**
- Distances will be given in units of astronomical units (AU) or light-years.

**Response Attributes:**
- Distances will be given in units of astronomical units (AU) or light-years.

**Prior Knowledge**
- Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.5.E.5.1, SC.5.E.5.2, and SC.5.E.5.3.
Evaluate

Extend

Explain

Engage

SC.8.E.5.6 Create models of solar properties including: rotation, structure of the Sun, convection, sunspots, solar flares, and prominences.

MIDDLE SCHOOL BENCHMARK TASK CARD: STANDARD Big Idea 5: Earth in Space and Time DOK: MODERATE

BENCHMARK: SC.8.E.5.5 Describe and classify specific physical properties of stars: apparent magnitude (brightness), temperature (color), size, and luminosity (absolute brightness). (Also assesses SC.8.E.5.6.)

SIGNAL WORDS

Describe
Evaluate
Classify
Explain
Explore
Examine

SAMPLE ITEMS

One physical property of a star is apparent magnitude. Which of the following is used in determining the apparent magnitude of a star?

A. the constellation the star is in
B. the distance the star is from Earth *
C. the number of times the star rotates
D. the number of prominences the star makes

Jacob is reading about the luminosity, or absolute brightness, of a star. The luminosity of a star is determined by a combination of the star's physical properties. Which of the following correctly describes the relationship between the luminosity of two stars that are the same temperature?

A. The star with the greater radius will have a higher luminosity
B. The star with the smaller radius will have a higher luminosity
C. The stars' luminosities will depend on how close they are to the Sun
D. The stars will have the same luminosity, since their temperatures are the same.

STUDENT SCALE QUESTIONS

Where is my learning on the scale?
I understand __________?
I can do it on my own.
I can teach someone else.

TEST ITEM SPECIFICATION NOTES

Clarification
The student will:
- Describe and/or classify physical properties of stars: apparent magnitude, temperature (color), size, and absolute brightness.
- Evaluate models of solar properties and/or explain solar characteristics, including rotation, structure of the Sun, sunspots, solar flares, and prominences.

Content Limits:
- Items addressing stars will focus on main sequence stars and their properties.
- Items will not assess stages of stellar evolution.
- Items will not assess the specific chemical composition of stars.

Stimulus Attributes:
- Distances will be given in units of astronomical units (AU) or light-years.
- The phrase absolute brightness should be used rather than luminosity.

Response Attributes:
- Distances will be given in units of astronomical units (AU) or light-years.

Prior Knowledge:
- Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.3.E.5.1, SC.3.E.5.2, SC.3.E.5.3, and SC.5.E.5.1.
MIDDLE SCHOOL BENCHMARK TASK CARD:  
**STANDARD** Big Idea 5: Earth in Space and Time  
**DOK:** MODERATE

**BENCHMARK:** SC.8.E.5.7 Compare and contrast the properties of objects in the solar system including the Sun, planets, and moons to those of Earth, such as gravitational force, distance from the Sun, speed, movement, temperature, and atmospheric conditions.  
(ALSO ASSESSES SC.8.E.5.4 and SC.8.E.5.8)

SC.8.E.5.4 Explore the Law of Universal Gravitation by explaining the role that gravity plays in the formation of planets, stars, and solar systems and in determining their motions. SC.8.E.5.8 Compare various historical models of the Solar System, including geocentric and heliocentric.

### BENCHMARK SIGNAL WORDS AND SAMPLE ITEMS

<table>
<thead>
<tr>
<th>SIGNAL WORDS</th>
<th>SAMPLE ITEMS</th>
<th>SAMPLE ITEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compare</td>
<td>Based on the position of the planets relative to the Sun, what can you predict about the difference in temperatures between Mars and Neptune?</td>
<td></td>
</tr>
</tbody>
</table>
| Contrast     | A. Neptune is much hotter than Mars.  
| Identify     | B. Neptune is much colder than Mars. |
| Explain      | C. Mars and Neptune are both very similar in temperature. |
| Examine      | D. Mars may be hotter or colder than Neptune, depending on its tilt. |

**HIGH ORDER QUESTION STEMS**

- How was this similar to _____?
- Can you group by characteristics such as_____?
- How would you compare and contrast______ to _____?
- What if _____?
- Why did _____ happen?
- What can you find out about _____?
- What do you already know about _____?
- What are differences existing between _____?

**STUDENT SCALE QUESTIONS**

- How have I used this benchmark in my reading/math?
- How did the benchmark help me better understand ______?
- Where is my learning on the scale?
- I can teach someone else.
- I can do it on my own.
- I understand, but have questions.

**TEST ITEM SPECIFICATION NOTES**

- **Clarification:** The student will:
  - Compare and/or contrast the characteristics of objects in the Solar System.
  - Identify and/or explain the role that gravity plays in the formation and motion of planets, stars, and solar systems.
  - Compare and/or contrast various historical models of the Solar System.

- **Content Limits:**
  - Items will not require the use of the formula for the Law of Universal Gravitation or the gravitational constant.
  - Items may assess the presence, absence, and/or relative thickness of planetary atmospheres, but not the chemical composition of the atmosphere.

**SAMPLE ITEMS**

#### SC.8.E.5.7

- **A.** Mercury rotates faster than Earth does.
- **B.** Mercury has a smaller mass than Earth has.
- **C.** Mercury is much closer to the Sun than Earth is.
- **D.** Mercury has a thinner atmosphere than Earth has.

**STUDENT SUMMATIVE WRITING TASK**

After completing ________, the evidence from the lesson that helps me understand and answer the essential question because _________.

**THINKING MAPS CORRELATION**

- **Cognitive Process:** Classifying  
  **Product:** Tree Map

- **Cognitive Process:** Defining  
  **Product:** Circle Map/Frame

- **Cognitive Process:** Comparing and Contrast  
  **Product:** Double Bubble Map

**5 E MODEL COMPONENTS**

- **Engage**  
  - Demonstrations  
  - Reading Text  
  - Free Write  
  - Analyze Graphic Organizer  
  - KWL  
  - Brainstorming/Thinking Maps

- **Explore**  
  - Perform an Investigation  
  - Read Authentic Resources to Collect  
  - Information Shared  
  - Solve a Problem  
  - Construct a Model

- **Explain**  
  - Student Analysis & Explanation  
  - Supporting ideas with Evidence  
  - Structure Questioning  
  - Reading and Discussion  
  - Teacher Explanation  
  - Thinking Skill

- **Extend**  
  - Problem Solving  
  - Decision Making  
  - Experimental Inquiry

- **Evaluate**  
  - Rubric  
  - Mini Assessment  
  - Journal Entry  
  - Portfolio

**Stimulus Attributes:**

- Distances will be given in units of astronomical units (AU) or light-years.

**Response Attributes:**

- Distances will be given in units of astronomical units (AU) or light-years.

**Prior Knowledge:**

- Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.3.E.5.4, SC.5.E.5.2, and SC.5.E.5.3.
**MIDDLE SCHOOL BENCHMARK TASK CARD:  STANDARD Big Idea 5 :  Earth in Space and Time  DOK: HIGH**

**BENCHMARK: SC.8.E.5.9 EXPLAIN THE IMPACT OF OBJECTS IN SPACE ON EACH OTHER INCLUDING: 1. THE SUN ON THE EARTH INCLUDING SEASONS AND GRAVITATIONAL ATTRACTION 2. THE MOON ON THE EARTH, INCLUDING PHASES, TIDES, AND ECLIPSES, AND THE RELATIVE POSITION OF EACH BODY.**

**BENCHMARK SIGNAL WORDS AND SAMPLE ITEMS**

<table>
<thead>
<tr>
<th>SIGNAL WORDS</th>
<th>SAMPLE ITEMS</th>
<th>SAMPLE ITEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explain</td>
<td>The water level at the beach changes during the day. What causes the different water levels.</td>
<td>What causes the phases of the Moon?</td>
</tr>
<tr>
<td>Investigate</td>
<td>A. Earth's revolution</td>
<td>A. the tilt of Earth on its axis</td>
</tr>
<tr>
<td>Effect</td>
<td>B. the Moon’s rotation</td>
<td>B. Earth’s shadow being cast on the Moon</td>
</tr>
<tr>
<td>Cause</td>
<td>C. Earth’s magnetic field</td>
<td>C. the relative positions of the Sun, Moon, and Earth*</td>
</tr>
<tr>
<td>Infer</td>
<td>D. the Moon’s gravitational pull</td>
<td>D. the elliptical orbit that Earth travels around the Sun</td>
</tr>
</tbody>
</table>

**HIGH ORDER QUESTION STEMS**

- Can you write in your own words _____?
- What factors would change if _____?
- What if _____?
- What happen when _____?
- Why did _____ happen?
- What can you find out about _____?
- What do you already know about _____?
- Can you explain what must have happened when _____?

**STUDENT SCALE QUESTIONS**

- How have I used this benchmark in my reading/math?
- How did the benchmark help me better understand ______?
- Where is my learning on the scale?
  - I can teach someone else.
  - I can do it on my own.
  - I understand, but have questions.

**TEST ITEM SPECIFICATION NOTES**

**Clarification**

The student will:

- Explain the effect of astronomical bodies on each other including the Sun’s and/or the Moon’s effects on Earth.

**Content Limits:**

- Items addressing eclipses should be assessed at the conceptual level and will not assess specific vocabulary associated with eclipses, such as umbra and penumbra.

**Response Attributes:**

- Options may be in the form of labeled illustrations

**Prior Knowledge:**

- Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.4.E.5.1, SC.4.E.5.2, SC.4.E.5.3, and SC.4.E.5.4.

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**STUDENT SUMMATIVE WRITING TASK**

After completing ________ , the evidence from the lesson that helps me understand and answer the essential question is ________. This relates to the essential question because ____________________.

**THINKING MAPS CORRELATION**

- Cognitive Process: Classifying
  - Product: Tree Map

- Cognitive Process: Defining
  - Product: Circle Map/ Frame

- Cognitive Process: Cause and Effect
  - Product: Multi-Flow

**5 E MODEL COMPONENTS**

- Engage: Demonstrations, Reading text, Free Write, Analyze Graphic Organizer, KWL
- Explore: Perform an Investigation, Read Authentic Resources to Collect, Solve a Problem, Construct a Model
- Explain: Student Analysis & Explanation, Supporting ideas with Evidence, Structure Questioning, Reading and Discussion, Teacher Explanation, Thinking Skill
- Extend: Problem Solving, Decision making, Experimental Inquiry
- Evaluate: Rubric, Mini Assessment, Journal Entry, Portfolio
MIDDLE SCHOOL BENCHMARK TASK CARD: **STANDARD** Big Idea 6 : **Earth Structures**  **DOK**: **HIGH**

**BENCHMARK**: SC.7.E.6.2 **IDENTIFY THE PATTERNS WITHIN THE ROCK CYCLE AND RELATE THEM TO SURFACE EVENTS (WEATHERING AND EROSION) AND SUBSURFACE EVENTS (PLATE TECTONICS AND MOUNTAIN BUILDING).** (ALSO ASSESSES SC.6.E.6.1, SC.6.E.6.2, AND SC.7.E.6.6.) SC.6.E.6.1 Describe and give examples of ways in which Earth’s surface is built up and torn down by physical and chemical weathering, erosion, and deposition. SC.6.E.6.2 Recognize that there are a variety of different landforms on Earth’s surface such as coastlines, dunes, rivers, mountains, glaciers, deltas, and lakes and relate these landforms as they apply to Florida. SC.7.E.6.6 Identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air and water quality, changing the flow of water.

**BENCHMARK SIGNAL WORDS AND SAMPLE ITEMS**

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Identify</td>
<td>Deforestation occurs when large areas of trees are cut down. Which of the following impacts on the environment would result from deforestation?</td>
</tr>
</tbody>
</table>
| Describe     | A. increased erosion *  
               | B. colder temperatures  
               | C. excess ground moisture  
               | D. greater oxygen production |
| Compare      | As Franklin is walking to school, he notices a new neighborhood being built. The first thing the builders do is remove all of the trees. Which of the following effects would result from this action? |
| Contrast     | A. an increase in soil erosion*  
               | B. a creation of new plant species  
               | C. a reduction in levels of pollution  
               | D. a growth in the variety of animals |

**HIGH ORDER QUESTION STEMS**

- Can you distinguish between _____ and _____?
- Compare and contrast ____ to ____.
- What if _____?
- What happens when _____?
- Why did it happen _____?
- What can you find out about _____?
- What do you already know about _____?
- What differences exist between _____?
- What questions would you ask of _____?
- What events could have happened _____?

**STUDENT SCALE QUESTIONS**

After completing _______, the evidence from the lesson that helps me understand and answer the essential question is ________. This relates to the essential question because _________.

**TEST ITEM SPECIFICATION NOTES**

- **Clarification**
  - The student will:
    - Identify and/or describe steps of the rock cycle and relate them to surface and subsurface events.
    - Describe and/or explain how Earth’s surface is built up and torn down through the processes of physical and chemical weathering, erosion, and deposition.
    - Identify different types of landforms commonly found on Earth.
    - Describe similarities and/or differences among landforms found in Florida and those found outside of Florida.
    - Identify and/or describe the impact that humans have had on Earth.

- **Content Limits**
  - Items may use the context of plate tectonics to assess the rock cycle but will not directly assess plate tectonics.
  - Items will not assess the role of plate tectonics in landform formation.
  - Items may assess the features of karst topography, such as aquifers, caverns, and/or sinkholes, but will not use the term karst topography.

- **Prior Knowledge**

**5 E MODEL COMPONENTS**

- **Engage**
  - Demonstrations
  - Reading text
  - Free Write
  - Analyze Graphic Organizer
  - KWL
  - Brainstorming/Thinking Maps

- **Explore**
  - Perform an Investigation
  - Read Authentic Resources to Collect
  - Information Shared
  - Solve a Problem
  - Construct a Model

- **Explain**
  - Student Analysis & Explanation
  - Supporting ideas with Evidence
  - Structure Questioning
  - Reading and Discussion
  - Teacher Explanation
  - Thinking Skill

- **Extend**
  - Problem Solving
  - Decision making
  - Experimental Inquiry

- **Evaluate**
  - Rubric
  - Mini Assessment
  - Journal Entry
  - Portfolio
Big Idea 6: Earth Structures

DOK: HIGH

SC.7.E.6.4 Explain and give examples of how physical evidence supports scientific theories that Earth has evolved over geologic time due to natural processes. (Also assesses SC.7.E.6.3.) SC.7.E.6.3 Identify current methods for measuring the age of Earth and its parts, including the law of superposition and radioactive dating.

**Benchmark Signal Words and Sample Items**

<table>
<thead>
<tr>
<th>Signal Words</th>
<th>Sample Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify</td>
<td>The oldest rock formation identified on Earth is found on the shoreline of Hudson Bay in Canada. This rock formed 4.28 billion years ago. What information does a scientist need to more accurately determine the age of a rock?</td>
</tr>
</tbody>
</table>
| Describe     | A. the percentage of each mineral that makes up the rock  
B. the thickness of younger rock layers that cover the rock  
C. the amount of each radioactive element present in the rock  
D. the amount of weathering present on the surface of the rock |
| Explain      | Cory is explaining the principle of superposition to his friend. Which of the following is the best explanation Cory could give? |
| Investigate  | A. "Layers of rock are usually made of completely different substances."  
B. "In an area of undisturbed rock, the oldest layers of rock will be on the bottom."  
C. "The age of rocks can be determined by the ratio of radioactive isotopes present."  
D. "To estimate the age of rocks accurately, use fossils embedded in the rock layers." |

**High Order Question Stems**

| What is the significance of ____?  
| Which would best ____?  
| What if ____?  
| Do you know another instance where ____?  
| Why did this happen ____?  
| What events could have happened ____?  
| What do you already know about ____?  
| Why did ____ changes occur? |

**Student Scale Questions**

| How have I used this benchmark in my reading/math?  
| How did the benchmark help me better understand ____?  
| Where is my learning on the scale?  
| Can I teach someone else?  
| Can I do it on my own?  
| Can I understand, but have questions? |

**Test Item Specification Notes**

Clarification

The student will:

- Identify examples of and/or explain physical evidence that supports scientific theories that Earth has evolved over geologic time due to natural processes.
- Identify and/or describe current scientific methods for measuring the age of Earth and its parts.

Content Limits:

- Items may address fossil records but should not require knowledge or recognition of specific organisms.
- Items may address folding and faulting as related to the law of superposition.
- Items assessing radioactive dating will be limited to a conceptual level. Items will not require calculations or address half-life.
- Items addressing geologic time will not require specific knowledge of eras, periods, or epochs.

Prior Knowledge:

- This benchmark grouping is foundational. These concepts have not been introduced in the NGSSS prior to this grade-level grouping.
**MIDDLE SCHOOL BENCHMARK TASK CARD: STANDARD**

**Big Idea:** Earth Structures

**DOK: MODERATE**

**BENCHMARK: SC.7.E.6.5**

EXPLORE THE SCIENTIFIC THEORY OF PLATE TECTONICS BY DESCRIBING HOW THE MOVEMENT OF EARTH’S CRUSTAL PLATES CAUSES BOTH SLOW AND RAPID CHANGES IN EARTH’S SURFACE, INCLUDING VOLCANIC ERUPTIONS, EARTHQUAKES, AND MOUNTAIN BUILDING. (ALSO ASSESSES SC.7.E.6.1 AND SC.7.E.6.7.) SC.7.E.6.1 Describe the layers of the solid Earth, including the lithosphere, the hot convecting mantle, and the dense metallic liquid and solid cores. SC.7.E.6.7 Recognize that heat flow and movement of material within Earth causes earthquakes and volcanic eruptions, and creates mountains and ocean basins.

**BENCHMARK SIGNAL WORDS AND SAMPLE ITEMS**

<table>
<thead>
<tr>
<th>SIGNAL WORDS</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Describe</td>
<td>Which of the following best describes Earth’s crust, according to the theory of plate tectonics?</td>
<td>A. entirely, completely still</td>
</tr>
<tr>
<td>Identify</td>
<td>B. occasionally, rapidly moving</td>
<td></td>
</tr>
<tr>
<td>Infer</td>
<td>C. constantly, gradually moving*</td>
<td></td>
</tr>
<tr>
<td>Illustrate</td>
<td>D. consistently, suddenly moving</td>
<td></td>
</tr>
<tr>
<td>Example</td>
<td>Interactions between layers of Earth cause convection currents to move crustal plates. The diagram below shows four layers of Earth.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><img src="image_url" alt="Earth’s Layers Diagram" /></td>
<td></td>
</tr>
<tr>
<td></td>
<td>In which layer of Earth are the convection currents that directly result in tectonic plate motion found?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A. 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B. 2*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C. 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>D. 4</td>
<td></td>
</tr>
</tbody>
</table>

**HIGH ORDER QUESTION STEMS**

- What are some of the problems of ___?
- Compare and contrast _______ to _______.
- What if _____?
- What happens when _____?
- Why did ______ happen?
- What can you find out about ________?
- What do you already know about ________?
- Can you provide an example of ________?
- Using the scientific theory of ______, how can we recognize ________?
- Design a model to ________.

**STUDENT SCALE QUESTIONS**

- How have I used this benchmark in my reading/math?
- How did the benchmark help me better understand ________?
- Where is my learning on the scale?
- ___ I can teach someone else.
- ___ I can do it on my own.
- ___ I understand, but have questions.

**THINKING MAPS CORRELATION**

**Cognitive Process:** Classifying
**Product:** Tree Map

**THINKING MAPS CORRELATION**

**Cognitive Process:** Defining
**Product:** Circle Map w/ Frame

**THINKING MAPS CORRELATION**

**Cognitive Process:** Sequencing
**Product:** Flow Map

**STUDENT SUMMATIVE WRITING TASK**

After completing ________, the evidence from the lesson that helps me understand and answer the essential question is ________. This relates to the essential question because ____________________.

**Clarification**

**The student will:**
- Describe the scientific theory of plate tectonics and/or how the movement of Earth’s crustal plates and the flow of heat and material cause various geologic events to occur.
- Identify and/or describe the layers of Earth.

**Content Limits:**
- Items will not assess types of volcanoes but may assess different causes of volcano formation.
- Items will not assess types of earthquake waves.
- Items may assess density differences between layers of Earth but will not assess density differences as they relate to plate tectonics.
- Items assessing the layers of Earth are limited to the crust, the lithosphere, the hot convecting mantle, the outer (liquid) core, and the inner (solid) core.

**Prior Knowledge:**
- This benchmark grouping is foundational. These concepts have not been introduced in the NGSSS prior to this grade-level grouping.
MIDDLE SCHOOL BENCHMARK TASK CARD: STANDARD Big Idea 7: Earth Systems and Patterns DOK: HIGH

BENCHMARK: SC.6.E.7.4 Differentiate and show interactions among the geosphere, hydrosphere, cryosphere, atmosphere, and biosphere. (Also assesses SC.6.E.7.2, SC.6.E.7.3, SC.6.E.7.6, and SC.6.E.7.9) SC.6.E.7.2 Investigate and apply how the cycling of water between the atmosphere and hydrosphere has an effect on weather patterns and climate. SC.6.E.7.3 Describe how global patterns such as the jet stream and ocean currents influence local weather in measurable terms such as temperature, air pressure, wind direction and speed, and humidity and precipitation. SC.6.E.7.6 Differentiate between weather and climate. SC.6.E.7.9 Describe how the composition and structure of the atmosphere protects life and insulates the planet.

### Benchmark Signal Words and Sample Item

<table>
<thead>
<tr>
<th>SIGNAL WORDS</th>
<th>SAMPLE ITEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Differentiate</td>
<td>The climate of an area can be different from its weather. Which of the following statements describes the climate of an area?</td>
</tr>
<tr>
<td>Explain</td>
<td></td>
</tr>
<tr>
<td>Describe</td>
<td></td>
</tr>
<tr>
<td>Compare</td>
<td></td>
</tr>
<tr>
<td>Contrast</td>
<td></td>
</tr>
</tbody>
</table>

### High Order Question Stems

- Can you distinguish between ____ and ____?
- How was this similar to ____?
- What if ____?
- What would happen if ____?
- Why did this happen ____?
- What can you find out about ____?
- What do you already know about ____?
- Would this information be useful if you had a ____?
- Why did ____ changes occur?

### Student Scale Questions

- After completing ________, the evidence from the lesson that helps me understand and answer the essential question is ________. This relates to the lesson that helps me understand and answer ________.

### Test Item Specification Notes

**Clarification**

The student will:

- Differentiate and/or explain interactions among the geosphere, hydrosphere, cryosphere, atmosphere, and biosphere.
- Describe and/or explain how the cycling of water and global patterns influence local weather and climate.
- Differentiate between weather and climate.
- Describe the composition and structure of the atmosphere and/or how the atmosphere protects life and insulates the planet.

**Content Limits:**

- Items will not assess atmospheres of planets other than Earth.
- Items may assess atmospheric conditions and their resulting weather phenomena, such as hurricanes, tornadoes, lightning, fronts, and precipitation.
- Items will not assess auroras.
- Items will not assess the causes of global warming or the ozone hole but may assess their effects.
- Items may assess the layers of the atmosphere and/or the function of each.
- Items should not assess the water cycle in isolation.

**Stimulus Attributes:**

- Items assessing the jet stream, the Gulf Stream, or other winds and/or currents must include a map showing these patterns.
- Temperature should be shown in degrees Fahrenheit.
- Items will not assess atmospheres of planets other than Earth.
- Temperature should be shown in degrees Celsius followed by the equivalent degrees Fahrenheit temperature in parentheses.

**Response Attributes:**

- Temperature should be shown in degrees Celsius followed by the equivalent degrees Fahrenheit temperature in parentheses.

**Prior Knowledge:**

**MIDDLE SCHOOL BENCHMARK TASK CARD: STANDARD Big Idea 7: Earth Systems and Patterns DOK: HIGH**

**BENCHMARK:** SC.6.E.7.5 **EXPLAIN HOW ENERGY PROVIDED BY THE SUN INFLUENCES GLOBAL PATTERNS OF ATMOSPHERIC MOVEMENT AND THE TEMPERATURE DIFFERENCES BETWEEN AIR, WATER, AND LAND.** *(ALSO ASSESSES SC.6.E.7.1)*

**Differentiate among radiation, conduction, and convection, the three mechanisms by which heat is transferred through Earth’s systems.**

**SAMPLE ITEM**

The arrows in the picture below show several ways heat is transferred from the Sun as it strikes sand on the surface of a beach.

![Diagram showing heat transfer](image)

Which arrow shows convection?

A. 1  
B. 2  
C. 3  
D. 4 *

**HIGH ORDER QUESTION STEMS**

- Can you distinguish between _____?
- Compare and contrast________ to _______?
- What if the pattern continues, _____?
- What would happen when _____?
- Why did this happen______?
- What can you find out about________?
- What do you already know about _____?
- What are some of the problems with _____?

**STUDENT SCALE QUESTIONS**

- How have I used this benchmark in my reading/math?
- How did the benchmark help me better understand _______?
- Where is my learning on the scale?
- Can I teach someone else.
  - I can do it on my own.
  - I understand, but have questions.

**TEST ITEM SPECIFICATION NOTES**

- **Clarification**
  - The student will:
  - Explain how energy provided by the Sun influences global patterns of atmospheric movement and/or the temperature differences among air, water, and land.
  - Differentiate among radiation, conduction, and convection in Earth’s systems.

- **Content Limits:**
  - Items may assess causes of wind and wind patterns but will not assess knowledge of the Coriolis Effect.
  - Items assessing radiation, conduction, and/or convection should be in the context of the atmosphere, geosphere, and hydrosphere on Earth.

- **Stimulus Attributes:**
  - Temperature should be shown in degrees Celsius, followed by the equivalent degrees Fahrenheit temperature in parentheses.

- **Response Attributes:**
  - Temperature should be shown in degrees Celsius, followed by the equivalent degrees Fahrenheit temperature in parentheses.

- **Prior Knowledge:**
  - Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.3.E.6.1.
**MIDDLE SCHOOL BENCHMARK TASK CARD: **  STANDARD Big Idea 8 : Properties of Matter DOK: MODERATE

**BENCHMARK:** SC.8.P.8.4 Classify and compare substances on the basis of characteristic physical properties that can be demonstrated or measured; for example, density, thermal or electrical conductivity, solubility, magnetic properties, melting and boiling points, and know that these properties are independent of the amount of the sample. (Also assesses SC.8.P.8.3.)  SC.8.P.8.3 Explore and describe the densities of various materials through measurement of their masses and volumes.

<table>
<thead>
<tr>
<th>SIGNAL WORDS</th>
<th>SAMPLE ITEMS</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Classify</td>
<td>Which of the following best explains why silicon dioxide is a solid at room temperature, but water is a liquid?</td>
<td>Matthew has six cubes of different materials. Each cube has a mass of 10 grams (g). Matthew sorts the cubes into two groups using one physical property.</td>
</tr>
<tr>
<td>Explain</td>
<td>A. Silicon dioxide is soluble in water.</td>
<td>GROUPS OF DIFFERENT MATERIALS</td>
</tr>
<tr>
<td>Describe</td>
<td>B. Water has a higher density than silicon dioxide.</td>
<td>Group 1 Cubes  Group 2 Cubes</td>
</tr>
<tr>
<td>Compare</td>
<td>C. Silicon dioxide has a higher melting point than water*.</td>
<td>Aluminum  Glass</td>
</tr>
<tr>
<td>Contrast</td>
<td>D. Water conducts electricity, but silicon dioxide does not.</td>
<td>Copper  Plastic</td>
</tr>
<tr>
<td>Calculate</td>
<td>Which physical property did Matthew most likely use to sort the cubes into two groups?</td>
<td>Steel  Wood</td>
</tr>
</tbody>
</table>

**HIGH ORDER QUESTION STEMS**

- What factors would change if ______?  
- Compare and contrast ______ to ______.
- What if ______?  
- What would happen when ______?  
- Why did ______ happen?  
- What do you already know about ______?  
- Do you know another instance where ______?  
- From the information given, can you develop a set of instructions about ______?  

**STUDENT SCALE QUESTIONS**

- How have I used this benchmark in my reading/math?  
- How did the benchmark help me better understand ______?  
- Where is my learning on the scale?  
- Can I teach someone else?  
- Can I do it on my own?  
- I understand, but have questions.  
- I can do it on my own.

**STUDENT SUMMATIVE WRITING TASK**

After completing ________, the evidence from the lesson that helps me understand and answer the essential question is ________. This relates to the essential question because ________.  

**THINKING MAPS CORRELATION**

- Cognitive Process: Comparing and Contrasting  
  Product: Double Bubble Map  
  - Cognitive Process: Defining  
    Product: Circle Maps/Frame  
  - Cognitive Process: Classifying  
    Product: Tree Map

**TEST ITEM SPECIFICATION NOTES**

**Clarification**

- The student will:
  - Classify and/or compare substances on the basis of their physical properties and/or explain that these properties are independent of the amount of the sample.
  - Describe density and/or calculate and compare the densities of various materials using the materials’ masses and volumes.

**Content Limits:**

- Items may require use of the density formula to calculate density, mass, or volume when comparing substances.
- Items that assess conductivity, solubility, or magnetic properties will be at a conceptual level only. Items will not require calculations for these topics.
- Items addressing solubility may include the terms solvent, solute, and saturation. Items may assess the concept of saturation.
- Items will not require memorization of the specific melting points and/or boiling points of substances.

**Stimulus Attributes:**

- Temperature will only be shown in degrees Celsius (°C). Scenarios requiring calculation of density must include the density equation.

**Prior Knowledge:**


SC.8.P.8.1 Explore the scientific theory of atoms (also known as atomic theory) by using models to explain the motion of particles in solids, liquids, and gases. SC.8.P.8.6 Recognize that elements are grouped in the periodic table according to similarities of their properties. SC.8.P.8.7 Explore the scientific theory of atoms (also known as atomic theory) by recognizing that atoms are the smallest unit of an element and are composed of subatomic particles (electrons surrounding a nucleus containing protons and neutrons). SC.8.P.8.8 Identify basic examples of and compare and classify the properties of compounds, including acids, bases, and salts. SC.8.P.8.9 Distinguish among mixtures (including solutions) and pure substances.

### BENCHMARK SIGNAL WORDS AND SAMPLE ITEMS

<table>
<thead>
<tr>
<th>SIGNAL WORDS</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Describe</td>
<td>Lithium (Li), Sodium (Na), Potassium (K), Rubidium (Rb), Cesium (Cs), and Francium (Fr) are in the same column in the periodic table. Why are these elements in the same column in the periodic table?</td>
<td>Which of the following statements regarding matter is true?</td>
</tr>
<tr>
<td>Explain</td>
<td>A. They are the same size. B. They react with each other. C. They have similar properties. D. They have the same number of protons.</td>
<td>A. Atoms can combine to form compounds.* B. The elements make up the building blocks of all matter. C. Every atom will bond in order to achieve a stable neutron-proton ratio. D. There are more than 100 naturally occurring elements that make up all matter.</td>
</tr>
<tr>
<td>Identify</td>
<td>Cognitive Process: Classifying Product: Tree Map</td>
<td></td>
</tr>
<tr>
<td>Compare</td>
<td>Cognitive Process: Seeing Relationships Product: Bridge Map</td>
<td></td>
</tr>
<tr>
<td>Contrast</td>
<td>Cognitive Process: Comparing and Contrasting Product: Double Bubble Map</td>
<td></td>
</tr>
<tr>
<td>Differentiate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Classify</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### HIGH ORDER QUESTIONSTEMS

- Can you distinguish between _____?
- Compare and contrast_______ to ______.
- Why did ______ change? What would happen when ______?
- Why did this happen? Can you explain what must have happened when ______?
- What do you already know about ____?
- Can you provide an example of what you mean______?
- Do you believe_____?

### STUDENT SCALE QUESTIONS

- How have I used this benchmark in my reading/math?
- How did the benchmark help me better understand _____?
- Where is my learning on the scale?
- I can do it on my own.
- I understand, but have questions.
- I can teach someone else.

### TEST ITEM SPECIFICATION NOTES

**Clarification**

The student will:

- Describe how elements combine in a multitude of ways to produce compounds that make up all living and nonliving things.
- Describe the motion of particles in solids, liquids, and/or gases.
- Explain that elements are grouped in the periodic table according to similarities of their properties.
- Explain that atoms are the smallest unit of an element and are composed of subatomic particles.
- Identify common examples of acids, bases, and/or salts.
- Compare, contrast, and/or classify the properties of compounds, including acids and bases.
- Differentiate among pure substances, mixtures, and solutions.

**Content Limits:**

- Items referring to elements are limited to the elements 1–57 and 72–89.
- Items referring to subatomic particles will only assess protons, neutrons, and electrons.
- Items will not assess chemical bonding.
- Items may assess a conceptual understanding of the pH scale. Items will not require knowledge of the pH of specific substances.
- Items addressing the properties of acids and bases are limited to pH.
- Items assessing mixtures and solutions may include components in different states of matter (e.g., gas dissolved in liquid).
- Items assessing periodic trends must be at the conceptual level.
- Items will not assess valence electrons or electron configurations.

**Prior Knowledge:**

- Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.5.P.8.2 and SC.5.P.8.3.
**MIDDLE SCHOOL BENCHMARK TASK CARD:** **STANDARD** Big Idea 9: Changes in Matter DOK: MODERATE


**STUDENT SUMMATIVE WRITING TASK**

After completing __________, the evidence from the lesson that helps me understand and answer the essential question is __________. This relates to the essential question because ____________.

**THINKING MAPS CORRELATION**

**5 E MODEL COMPONENTS**

Engage
- Demonstrations
- Reading text
- Free Write
- Analyze Graphic Organizer
- KWL
- Brainstorming/Thinking Maps

Explore
- Perform an Investigation
- Read Authentic Resources to Collect
- Information Shared
- Solve a Problem
- Construct a Model

Explain
- Student Analysis & Explanation
- Supporting Ideas with Evidence
- Structure Questioning
- Reading and Discussion
- Teacher Explanation
- Thinking Skill

Extend
- Problem Solving
- Decision making
- Experimental Inquiry

Evaluate
- Rubric
- Mini Assessment
- Journal Entry
- Portfolio

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<table>
<thead>
<tr>
<th>SIGNAL WORDS</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Differentiate</td>
<td>When a candle is lit, the wick burns, the wax melts, the candle changes shape, and the air around the candle heats up. Which of the following is an example of a chemical change?</td>
<td>Which of the following is an example of a chemical change?</td>
</tr>
<tr>
<td>Explain</td>
<td>A. the wick burning *</td>
<td>A. evaporating</td>
</tr>
<tr>
<td>Describe</td>
<td>B. the wax melting</td>
<td>B. melting</td>
</tr>
<tr>
<td>Illustrate</td>
<td>C. the candle changing shape</td>
<td>C. oxidizing *</td>
</tr>
<tr>
<td>Explore</td>
<td>D. the air around the candle heating up</td>
<td>D. tearing</td>
</tr>
<tr>
<td>Investigate</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
MIDDLE SCHOOL BENCHMARK TASK CARD: STANDARD Big Idea 10: Forms of Energy  DOK: LOW

BENCHMARK: SC.7.P.10.1 ILLUSTRATE THAT THE SUN’S ENERGY ARRIVES AS RADIATION WITH A WIDE RANGE OF WAVELENGTHS, INCLUDING INFRARED, VISIBLE, AND ULTRAVIOLET, AND THAT WHITE LIGHT IS MADE UP OF A SPECTRUM OF MANY DIFFERENT COLORS. (ALSO ASSESSES SC.8.E.5.11.) SC.8.E.5.11 Identify and compare characteristics of the electromagnetic spectrum such as wavelength, frequency, use, and hazards and recognize its application to an understanding of planetary images and satellite photographs.

BENCHMARK SIGNAL WORDS AND SAMPLE ITEMS

- Identify
- Compare
- Contrast
- Classify
- Illustrate
- Apply

Josie is making a chart to show some of the ways electromagnetic waves can be used. Which of the following should she NOT include on her chart?

A. A radar is used by a satellite to map the ocean floor
B. A telescope uses gamma rays to detect distant galaxies
C. A battery is used to store electricity from a wind generator*
D. A navigation system uses radio waves to determine position

Sunlight is composed of energy that is visible to humans and energy that is not visible to humans. Which statement describes how the visible energy from the Sun is different from the nonvisible energy?

A. It travels at a different speed.
B. It travels a different distance
C. It has different wavelengths*
D. It has different amplitudes

### HIGH ORDER QUESTION STEMS

- How would you compare… to _____?
- Compare and contrast_______ to ______.
- What is the significance of _____?
- What would probably happen when _____?
- What would happen if _____?
- What can you find out about_______?
- What do you already know about_____?
- Can you group by characteristics such as______?
- What can you correctly conclude____?

###STUDENT SCALE QUESTIONS

- How have I used this benchmark in my reading/math?
- How did the benchmark help me better understand __________?
- Where is my learning on the scale?
  - __ I can teach someone else.
  - ___ I understand, but have questions.
  - ___ I can do it on my own.

###TEST ITEM SPECIFICATION NOTES

Clarification
The student will:
- Identify, compare and/or contrast the variety of types of radiation present in radiation from the Sun.
- Identify and/or compare characteristics of the electromagnetic spectrum.
- Identify common uses and/or applications of electromagnetic waves.

Content Limits:
- Items may assess relative order of frequencies and wavelengths in the electromagnetic spectrum but will not require memorization of specific frequencies and wavelengths of electromagnetic radiation.
- Items will not address hazards of electromagnetic radiation.
- Items will address only electromagnetic waves and the electromagnetic spectrum.
- Items will not require calculations.

Prior Knowledge:
- This benchmark grouping is foundational. These concepts have not been introduced in the NGSSS prior to this grade-level grouping.

###THINKING MAPS CORRELATION

Cognitive Process: Classifying
Product: Tree Map

Cognitive Process: Defining
Product: Circle Map/ Frame

Cognitive Process: Comparing and Contrasting
Product: Double Bubble

5 E MODEL COMPONENTS

Engage
- Demonstrations
- Reading text
- Free Write
- Analyze Graphic Organizer
- KWL
- Brainstorming/Thinking Maps

Explore
- Perform an Investigation
- Read Authentic Resources to Collect
- Information Shared
- Solve a Problem
- Construct a Model

Explain
- Student Analysis & Explanation
- Supporting ideas with Evidence
- Structure Questioning
- Reading and Discussion
- Teacher Explanation
- Thinking Skill

Extend
- Problem Solving
- Decision making
- Experimental Inquiry

Evaluate
- Rubric
- Mini Assessment
- Journal Entry
- Portfolio
MIDDLE SCHOOL BENCHMARK TASK CARD: STANDARD Big Idea 10 : Forms of Energy  DOK: LOW

BENCHMARK: SC.7.P.10.3 RECOGNIZE THAT LIGHT WAVES, SOUND WAVES, AND OTHER WAVES MOVE AT DIFFERENT SPEEDS IN DIFFERENT MATERIALS.  (ALSO ASSESSES SC.7.P.10.2.)  SC.7.P.10.1 Observe and explain that light can be reflected, refracted, and/or absorbed.

**BENCHMARK SIGNAL WORDS AND SAMPLE ITEMS**

<table>
<thead>
<tr>
<th>SIGNAL WORDS</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Describe</td>
<td>The diagram below demonstrates how a magnifying lens can make a penny appear larger. What property of the magnifying lens is most responsible for allowing it to magnify the penny?</td>
<td><strong>Elizabeth is tapping her pencil on a glass of water to make a sound. Through which of the following would a sound wave travel the fastest?</strong></td>
</tr>
<tr>
<td>Explain</td>
<td>A. It can reflect light.</td>
<td>A. the glass*</td>
</tr>
<tr>
<td>Investigate</td>
<td>B. It can refract light.</td>
<td></td>
</tr>
<tr>
<td>Identify</td>
<td>C. It can increase the intensity of light.</td>
<td></td>
</tr>
<tr>
<td>Explore</td>
<td>D. It can increase the wavelength of light.</td>
<td></td>
</tr>
</tbody>
</table>

**HIGH ORDER QUESTION STEMS**

- Describe what happens when____?
- Can you write in your own words____?
- What if____?
- What happen when,____?
- Why did ______ happen?
- What can you find out about______?
- What do you already know about____?
- What factors would change if____?
- What evidence is most compelling to you?
- From the information given, can you develop a set of instructions about____?
- Can you design a_____to_____?

**STUDENT SCALE QUESTIONS**

- How have I used this benchmark in my reading/math?
- How did the benchmark help me better understand________?
- Where is my learning on the scale?
- I can teach someone else.
- I can do it on my own.
- I understand, but have questions.

**TEST ITEM SPECIFICATION NOTES**

- The student will:
  - Describe and/or explain that waves move at different speeds through different materials.
  - Explain that light waves can be reflected, refracted, and/or absorbed.

- Content Limits:
  - Items may assess the general relative order of wave speed in different phases but will not assess the motion of the particles in the substance.
  - Items may assess pitch as related to frequency.
  - Items will not assess color as related to wavelength.
  - Items will not assess electromagnetic waves traveling in a vacuum.
  - Items will not require calculations of wave speed through different materials.
  - Items may address water waves but not in the context of water waves at the beach.
  - Items will not assess the interaction of multiple waves.

**PRIOR KNOWLEDGE**

**Middle School Benchmark Task Card: Standard Big Idea 11: Energy Transfer and Transformations DOK: Moderate**

**Benchmark: SC.7.P.11.2 Investigate and Describe the Transformation of Energy from One Form to Another.**
*(Also assesses SC.6.P.11.1 and SC.7.P.11.3)*

SC.6.P.11.1 Explore the Law of Conservation of Energy by differentiating between potential and kinetic energy. Identify situations where kinetic energy is transformed into potential energy and vice versa. SC.7.P.11.3 Cite evidence to explain that energy cannot be created nor destroyed, only changed from one form to another.

<table>
<thead>
<tr>
<th>Signal Words</th>
<th>Sample Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify</td>
<td>Emma constructed a simple motor. When connected correctly, the coil of copper wire spins.</td>
</tr>
<tr>
<td>Differentiate</td>
<td></td>
</tr>
<tr>
<td>Describe</td>
<td></td>
</tr>
<tr>
<td>Explain</td>
<td></td>
</tr>
<tr>
<td>Investigate</td>
<td></td>
</tr>
</tbody>
</table>

**Which of the following best describes the energy transformation that takes place between the paper clips and the spinning coil?**

A. Chemical energy transforms into electrical energy  
B. Mechanical energy transforms into electrical energy  
C. Electrical energy transforms into mechanical energy  
D. Mechanical energy transforms into chemical energy

**High Order Question Stems**
- Can you distinguish between ____?  
- Compare and contrast ____ to _____.  
- Why did ____ changes occur?  
- What happen when ____?  
- Why did ____ happen?  
- What was the problem with ____?  
- What do you already know about ____?  
- Do you know another instance where ____?

**Student Scale Questions**
- How have I used this benchmark in my reading/math?  
- How did the benchmark help me better understand ____?  
- Where is my learning on the scale?  
- I can teach someone else.  
- I can do it on my own.  
- I understand, but have questions.

**Student Summative Writing Task**

After completing _______, the evidence from the lesson that helps me understand and answer the essential question is __________. This relates to the essential question because ____________________.

**Thinking Maps Correlation**

- **Cognitive Process: Classifying**  
  **Product: Tree Map**

- **Cognitive Process: Comparing and Contrasting**  
  **Product: Double Bubble Map**

- **Cognitive Process: See Relationships**  
  **Product: Bridge Map**

**Clarification**

The student will:
- Identify and/or describe the transformation of energy from one form to another.  
- Differentiate between potential and kinetic energy.  
- Identify and/or explain situations where energy is transformed between kinetic energy and potential energy.  
- Identify and/or describe examples of the Law of Conservation of Energy.

**Content Limits:**
- Items will not assess transformations involving nuclear energy.  
- Items may address a maximum of five energy transformations.  
- Items will not require calculations.  
- Items assessing energy transformations will not be placed in a life science context.

**Prior Knowledge:**
- Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.3.P.11.2 and SC.5.P.10.4.
**Middle School Benchmark Task Card: Standard Big Idea 11: Energy Transfer and Transformations DOK: Moderate**

**Benchmark:** SC.7.P.11.4 Observe and describe that heat flows in predictable ways, moving from warmer objects to cooler ones until they reach the same temperature. *(Also assesses SC.7.P.11.1.)* SC.7.P.11.1 Recognize that adding heat to or removing heat from a system may result in a temperature change and possibly a change of state.

### Benchmark Signal Words and Sample Item

<table>
<thead>
<tr>
<th>Signal Words</th>
<th>Sample Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Describe</td>
<td>Mrs. Aldaco added a copper (Cu) cube that is at room temperature and an aluminum (Al) cube that she just removed from the freezer to a beaker of boiling water.</td>
</tr>
<tr>
<td>Explain</td>
<td></td>
</tr>
<tr>
<td>Investigate</td>
<td></td>
</tr>
<tr>
<td>Compare</td>
<td></td>
</tr>
<tr>
<td>Contrast</td>
<td></td>
</tr>
</tbody>
</table>

She left the cubes in the water for three hours. Which of the following describes a heat flow that took place during those three hours?

- A. from the aluminum cube to the beaker
- B. from the copper cube to the boiling water
- C. from the aluminum cube to the copper cube
- D. from the boiling water to the aluminum cube

### High Order Question Stems

- What factors would you change if ____?
- Compare and contrast _____ to _____.
- What do you think will happen _____?
- What happen when _____?
- Why did _____ happen?
- Could this have happen in ________?
- What do you already know about _____?
- Can you create new and unusual uses for ____?

### Student Scale Questions

- How have I used this benchmark in my reading/math?
- How did the benchmark help me better understand _____?
- Where is my learning on the scale?
- Can I teach someone else?
- Can I do it on my own?
- I understand, but have questions.

### Test Item Specification Notes

Clarification

The student will:

- Describe how heat flows in predictable ways.
- Explain that adding heat to or removing heat from a system may result in a temperature change and possibly a change of state.

Content Limits:

- Items will not address chemical changes.
- Items will not require calculations.
- Items will not address the concepts of conductors and insulators or examples of either in isolation.
- Items will not require the use or memorization of formulas or values of specific heat, heat of fusion, or heat of vaporization for substances.
- Items may assess the concept of specific heat.

Stimulus Attributes:

- Scenarios addressing methods of heat transfer (conduction, convection, radiation) will not use an Earth Science context.
- Temperature will only be shown in degrees Celsius (°C).

Response Attributes:

- Temperature will only be shown in degrees Celsius (°C).

Prior Knowledge:

- Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.3.P.9.1, SC.3.P.11.1, SC.4.P.11.1, and SC.4.P.11.2

### 5 E Model Components

**Engage**
- Demonstrations
- Reading Text
- Free Write
- Analyze Graphic Organizer
- KWL
- Brainstorming/Thinking Maps

**Explore**
- Perform an Investigation
- Read Authentic Resources to Collect
- Information Shared
- Solve a Problem
- Construct a Model

**Explain**
- Student Analysis & Explanation
- Supporting ideas with Evidence
- Structure Questioning
- Reading and Discussion
- Teacher Explanation
- Thinking Skill

**Extend**
- Problem Solving
- Decision Making
- Experimental Inquiry

**Evaluate**
- Rubric
- Mini Assessment
- Journal Entry
- Portfolio

### Thinking Maps Correlation

- Cognitive Process: Classifying
  - Product: Tree Map
- Cognitive Process: Defining
  - Product: Circle Map/Frame
- Cognitive Process: Describing
  - Product: Bubble Map

**STUDENT SUMMATIVE WRITING TASK**

After completing __________, the evidence from the lesson that helps me understand and answer the essential question is ____________. This relates to the essential question because ____________.
## MIDDLE SCHOOL BENCHMARK TASK CARD: STANDARD Big Idea 13: Forces and Changes in Motion DOK: MODERATE

**BENCHMARK:** SC.6.P.13.1 INVESTIGATE AND DESCRIBE TYPES OF FORCES INCLUDING CONTACT FORCES AND FORCES ACTING AT A DISTANCE, SUCH AS ELECTRICAL, MAGNETIC, AND GRAVITATIONAL. (ALSO ASSESSES SC.6.P.13.2 AND SC.8.P.8.2.) SC.6.P.13.2 Explore the Law of Gravity by recognizing that every object exerts gravitational force on every other object and that the force depends on how much mass the objects have and how far apart they are. SC.8.P.8.2 Differentiate between weight and mass recognizing that weight is the amount of gravitational pull on an object and is distinct from, though proportional to, mass.

### BENCHMARK SIGNAL WORDS AND SAMPLE ITEM

<table>
<thead>
<tr>
<th>SIGNAL WORDS</th>
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</thead>
<tbody>
<tr>
<td>− Identify</td>
<td>Luis rubbed a balloon on his hair and held the balloon next to the wall. He observed the balloon stick to the wall. Which of the following is responsible for the balloon sticking to the wall?</td>
</tr>
<tr>
<td>− Describe</td>
<td>A. friction</td>
</tr>
<tr>
<td>− Differentiate</td>
<td>B. gravity</td>
</tr>
<tr>
<td>− Investigate</td>
<td>C. electric force*</td>
</tr>
<tr>
<td>− Explain</td>
<td>D. magnetic force</td>
</tr>
</tbody>
</table>

### HIGH ORDER QUESTION STEMS

- Can you distinguish between ____?
- Compare and contrast ____ to ____?
- What if ____?
- What would happen when ____?
- Why did this happen ____?
- What can you find out about ____?
- What do you already know about this ____?
- Can you provide an example of ____?

### STUDENT SCALE QUESTIONS

- How have I used this benchmark in my reading/math?
- How did the benchmark help me better understand ____?
- Where is my learning on the scale?
- ____ I can teach someone else.
- ____ I can do it on my own.
- ____ I understand, but have questions.

### TEST ITEM SPECIFICATION NOTES

**Clarification**

The student will:

- Identify and/or describe types of forces.
- Describe the relationship among distance, mass, and gravitational force between any two objects.
- Differentiate between mass and weight.

**Content Limits:**

- Items assessing gravity will use a conceptual understanding of the Law of Universal Gravitation by keeping either the mass or distance constant.
- Items will not assess nuclear forces.
- Items will not require the use of formulas or calculations.
- Items addressing mass and/or weight will not assess the units of measure for mass and weight.

**Prior Knowledge:**

- Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.5.10.3 and SC.5.P.13.1.
**MIDDLE SCHOOL BENCHMARK TASK CARD:**  
**STANDARD** Big Idea 13: **Forces and Changes in Motion**  
**DOK:** MODERATE

**BENCHMARK:** SC.6.P.13.3 INVESTIGATE AND DESCRIBE THAT AN UNBALANCED FORCE ACTING ON AN OBJECT CHANGES ITS SPEED, OR DIRECTION OF MOTION, OR BOTH. (ALSO ASSESSES SC.6.P.12.1) SC.6.P.12.1 Measure and graph distance versus time for an object moving at a constant speed. Interpret this relationship.

### SIGNAL WORDS
- Describe
- Interpret
- Analyze
- Explain
- Investigate
- Distinguish

### BENCHMARK SIGNAL WORDS AND SAMPLE ITEM

<table>
<thead>
<tr>
<th>SIGNAL WORDS</th>
<th>SAMPLE ITEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Describe</td>
<td>The diagram below shows forces acting on a model airplane. Both its speed and height above the ground are constant.</td>
</tr>
<tr>
<td>Interpret</td>
<td></td>
</tr>
<tr>
<td>Analyze</td>
<td></td>
</tr>
<tr>
<td>Explain</td>
<td></td>
</tr>
<tr>
<td>Investigate</td>
<td></td>
</tr>
<tr>
<td>Distinguish</td>
<td></td>
</tr>
</tbody>
</table>

**HIGH ORDER QUESTION STEMS**

- Why did... changes occur?  
- Compare and contrast... to...?  
- What if...?  
- Can you predict what will happen to... as... is changed?  
- What would happen if...?  
- Why did this happen?  
- What can you find out about...?  
- What do you already know about this...?  
- What type of evidence is most compelling?  
- What is the significance of...?  

### STUDENT SCALE QUESTIONS

- How do I understand this benchmark?  
- How can I do it on my own?  
- How can I teach someone else?  

**TEST ITEM SPECIFICATION NOTES**

- **Clarification**  
  **The student will:**  
  - Describe and/or explain that unbalanced force acting on an object changes its speed and/or direction.  
  - Interpret and/or analyze graphs of distance and time for an object moving at a constant speed.

- **Content Limits:**  
  - Items requiring the interpretation and/or analysis of a graph may assess the relative speed of an object at various points or sections of the graph and the direction of motion.  
  - Items will not require a comparison of the speeds of more than five different objects.  
  - Items will not assess the addition of nonparallel vectors.  
  - Items will not require the calculation of acceleration.  
  - Items may require the calculation of net force.  
  - Items may assess understanding of friction as a force in both sliding and stationary situations.  
  - Items will not require knowledge of coefficient of friction.  
  - Items will not require a comparison of the speeds of more than five different objects.

### THINKING MAPS CORRELATION

**Cognitive Process: Cause and Effect**
- Product: Multi-Flow

**Cognitive Process: Defining**
- Product: Circle Map w/ Frame

**STUDENT SUMMATIVE WRITING TASK**

After completing ______, the evidence from the lesson that helps me understand and answer the essential question is ______. This relates to the essential question because ______.

**5 E MODEL COMPONENTS**

- **Engage**
  - Demonstrations
  - Reading text
  - Free Write
  - Analyze Graphic Organizer
  - KWL
  - Brainstorming/Thinking Maps

- **Explore**
  - Perform an Investigation
  - Read Authentic Resources to Collect
  - Information Shared
  - Solve a Problem
  - Construct a Model

- **Explain**
  - Student Analysis & Explanation
  - Supporting ideas with Evidence
  - Structure Questioning
  - Reading and Discussion
  - Teacher Explanation
  - Thinking Skill

- **Extend**
  - Problem Solving
  - Decision making
  - Experimental Inquiry

- **Evaluate**
  - Rubric
  - Mini Assessment
  - Journal Entry
  - Portfolio

**BIG IDEA 13:** INVESTIGATE AND DESCRIBE THAT AN UNBALANCED FORCE ACTING ON AN OBJECT CHANGES ITS SPEED, OR DIRECTION OF MOTION, OR BOTH.
**STANDARD** Big Idea 14: Organization and Development of Living Organisms

**DOK: LOW**

**Benchmark: SC.6.L.14.1** Describe and identify patterns in the hierarchical organization of organisms from atoms to molecules and cells to tissues to organs to organ systems to organisms.

### Benchmark Signal Words and Sample Item

**Signal Words**
- Identify
- Describe
- Classify
- Explain
- Apply

**Sample Item**

Structures in the human body work together to perform specific functions. The diagram below shows the organization of structures found in the human body.

A picture of which of the following structures belongs in the box above?

- A. cell
- B. organ
- C. organelle
- D. tissue *

### High Order Question Stems

- What do you already know about ____?
- What fact would you use to show ____?
- How would you apply what you learned to develop ____?
- What if ____?
- What conclusion can you draw ____?
- How can you apply your learning to develop ____?
- How can you organize ____ to show ____?

### Student Scale Questions

- How have I used this benchmark in my reading/math?
- How did the benchmark help me better understand ____?
- Where is my learning on the scale?
- I can teach someone else.
- I can do it on my own.
- I understand, but have questions.

### Test Item Specification Notes

**Clarification**

The student will:
- Identify and/or describe patterns in the hierarchical organization of organisms, from atoms to molecules, to cells, to tissues, to organs, to organ systems, to organisms.

**Content Limits:**
- Items will not assess cell specialization.
- Items may use the terms for the types of tissues in animals (epithelial, muscle, nervous, connective) but will not assess knowledge of the structure or function of these types of tissues.

**Stimulus Attributes:**
- Scenarios referring to atoms and molecules are limited to biotic contexts.

**Prior Knowledge:**
- This benchmark grouping is foundational. These concepts have not been introduced in the NGSSS prior to this grade-level grouping.

### 5 E Model Components

- **Engage**
  - Demonstrations
  - Reading Text
  - Free Write
  - Analyze Graphic Organizer
  - KWL
  - Brainstorming/Thinking Maps

- **Explore**
  - Perform an Investigation
  - Read Authentic Resources to Collect
  - Information Shared
  - Solve a Problem
  - Construct a Model

- **Explain**
  - Student Analysis & Explanation
  - Supporting ideas with Evidence
  - Structure Questioning
  - Reading and Discussion
  - Teacher Explanation
  - Thinking Skill

- **Extend**
  - Problem Solving
  - Decision Making
  - Experimental Inquiry

- **Evaluate**
  - Rubric
  - Mini Assessment
  - Journal Entry
  - Portfolio

### Thinking Maps Correlation

- **Cognitive Process:** Classifying
  - **Product:** Tree Map

- **Cognitive Process:** Defining
  - **Product:** Circle Map/Frame

- **Cognitive Process:** Sequencing
  - **Product:** Flow Map

### Student Summative Writing Task

After completing _______, the evidence from the lesson that helps me understand and answer the essential question is __________. This relates to the essential question because __________.
**MIDDLE SCHOOL BENCHMARK TASK CARD: STANDARD** Big Idea 14: Organization and Development of Living Organisms

**DOK: MODERATE**

**BENCHMARK: SC.6.L.14.2 INVESTIGATE AND EXPLAIN THE COMPONENTS OF THE SCIENTIFIC THEORY OF CELLS (CELL THEORY): ALL ORGANISMS ARE COMPOSED OF CELLS (SINGLE-CELLED OR MULTI-CELLULAR), ALL CELLS COME FROM PREEXISTING CELLS, AND CELLS ARE THE BASIC UNIT OF LIFE. (ALSO ASSESSES SC.6.L.14.3.) SC.6.L.14.3 Recognize and explore how cells of all organisms undergo similar processes to maintain homeostasis, including extracting energy from food, getting rid of waste, and reproducing.**

**BENCHMARK SIGNAL WORDS AND SAMPLE ITEM**

<table>
<thead>
<tr>
<th>SIGNAL WORDS</th>
<th>SAMPLE ITEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify</td>
<td>The cell theory applies to all organisms, including the five shown below.</td>
</tr>
<tr>
<td>Explain</td>
<td>Which of the following statements describes how these organisms are an example of the cell theory?</td>
</tr>
<tr>
<td>Describe</td>
<td>- A. The organisms have cells that lack a nucleus.</td>
</tr>
<tr>
<td>Investigate</td>
<td>- B. The organisms are made of one or more cells. *</td>
</tr>
<tr>
<td>Apply</td>
<td>- C. The cells of the organisms undergo photosynthesis.</td>
</tr>
<tr>
<td></td>
<td>- D. The cells of the organisms are identical to each other.</td>
</tr>
</tbody>
</table>

**HIGH ORDER QUESTION STEMS**

- Can you distinguish between ____ and ____?
- Can you design a ____ to ____?
- What is the principle role of ____?
- What if ____?
- Which has both ____ and ____?
- What can you conclude ____?
- How would ____ compare to ____?
- What do you already know about ____?

**STUDENT SCALE QUESTIONS**

- How have I used this benchmark in my reading/math?
- How did the benchmark help me better understand ____?
- Where is my learning on the scale?
  - I can teach someone else.
  - I can do it on my own.
  - I understand, but have questions.

**TEST ITEM SPECIFICATION NOTES**

- Clarification: The student will:
  - Identify, describe, and/or explain the components of cell theory.
  - Describe how cells undergo similar processes to maintain homeostasis.

- Content Limits:
  - Items will assess neither scientists who contributed to the cell theory nor the historical development of the cell theory.
  - Items addressing homeostasis should focus on cells maintaining homeostasis and are limited to the cellular level. Items will not address permeability, osmosis, or diffusion.
  - Items may use the terms cellular respiration and photosynthesis in the context of homeostasis and the functions of cell structures but will not assess knowledge of these processes.
  - Items will not assess cellular reproduction.

- Prior Knowledge:
  - This benchmark grouping is foundational. These concepts have not been introduced in the NGSSS prior to this grade-level grouping.

**5 E MODEL COMPONENTS**

**Engage**
- Demonstrations
- Reading text
- Free Write
- Analyze Graphic Organizer
- KWL
- Brainstorming/Thinking Maps

**Explore**
- Perform an Investigation
- Read Authentic Resources to Collect
- Information Shared
- Solve a Problem
- Construct a Model

**Explain**
- Student Analysis & Explanation
- Supporting ideas with Evidence
- Structure Questioning
- Reading and Discussion
- Teacher Explanation
- Thinking Skill

**Extend**
- Problem Solving
- Decision making
- Experimental Inquiry

**Evaluate**
- Rubric
- Mini Assessment
- Journal Entry
- Portfolio
MIDDLE SCHOOL BENCHMARK TASK CARD:  STANDARD Big Idea 14: Organization and Development of Living Organisms

DOK: MODERATE

BENCHMARK: SC.6.L.14.4 COMPARE AND CONTRAST THE STRUCTURE AND FUNCTION OF MAJOR ORGANELLES OF PLANT AND ANIMAL CELLS, INCLUDING CELL WALL, CELL MEMBRANE, NUCLEUS, CYTOPLASM, CHLOROPLASTS, MITOCHONDRIA, AND VACUOLES.

### BENCHMARK SIGNAL WORDS AND SAMPLE ITEM

<table>
<thead>
<tr>
<th>SIGNAL WORDS</th>
<th>SAMPLE ITEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compare</td>
<td>Plant cells are different from animal cells. The diagram below identifies four different structures in a plant cell.</td>
</tr>
<tr>
<td>Contrast</td>
<td></td>
</tr>
<tr>
<td>Identify</td>
<td></td>
</tr>
<tr>
<td>Investigate</td>
<td></td>
</tr>
<tr>
<td>Explore</td>
<td></td>
</tr>
</tbody>
</table>

**SAMPLE ITEM**

Compared to the structures in an animal cell, which of the following structures is found only in a plant cell?

A. Mitochondrion  
B. Cell Wall  
C. Cytoplasm  
D. Nucleus

### HIGH ORDER QUESTION STEM

- What is the difference between a ____ and______?
- Compare and contrast_______ to ________.
- Can you design a______?
- What if_______?
- What would happen when, ____?
- Can you distinguish between_______?
- What can you find out about_______?
- What do you already know about this____?

### STUDENT SCALE QUESTIONS

- How have I used this benchmark in my reading/math?
- How did the benchmark help me better understand __________?
- Where is my learning on the scale?
- ___ I can teach someone else.  
- ___ I can do it on my own.  
- ___ I understand, but have questions.

### TEST ITEM SPECIFICATION NOTES

**Clarification**

The student will:

- Compare and/or contrast the structure and/or function of major organelles of plant and animal cells.

**Content Limits:**

- Items assessing cellular structures are limited to the cell wall, cell membrane, nucleus, cytoplasm, chloroplasts, mitochondria, and vacuoles.

**Stimulus Attributes:**

- Scenarios will require a comparison or contrast of organelles in plant and/or animal cells.

**Prior Knowledge:**

- This benchmark grouping is foundational. These concepts have not been introduced in the NGSSS prior to this grade-level grouping.
MIDDLE SCHOOL BENCHMARK TASK CARD: **STANDARD** Big Idea 14: Organization and Development of Living Organisms

**BENCHMARK:** SC.6.L.14.5 **IDENTIFY AND INVESTIGATE THE GENERAL FUNCTIONS OF THE MAJOR SYSTEMS OF THE HUMAN BODY (DIGESTIVE, RESPIRATORY, CIRCULATORY, REPRODUCTIVE, EXCRETOARY, IMMUNE, NERVOUS, AND MUSCULOSKELETAL) AND DESCRIBE WAYS THESE SYSTEMS INTERACT WITH EACH OTHER TO MAINTAIN HOMEOSTASIS.**

(ALSO ASSESSES SC.6.14.6.) SC.6.L.14.6 Compare and contrast types of infectious agents that may infect the human body, including viruses, bacteria, fungi, and parasites.

**BENCHMARK SIGNAL WORDS AND SAMPLE ITEM**

<table>
<thead>
<tr>
<th>SIGNAL WORDS</th>
<th>SAMPLE ITEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Identify</td>
<td>In order to maintain homeostasis, the systems of the human body work together to keep a constant internal temperature. Which of the following statements describes how the human body responds in a cold environment?</td>
</tr>
<tr>
<td>• Describe</td>
<td>A. The nervous system moves the jaw bones and causes the chattering of teeth.</td>
</tr>
<tr>
<td>• Compare</td>
<td>B. The nervous system signals the muscles of the muscular system to contract and warm the body.</td>
</tr>
<tr>
<td>• Contrast</td>
<td>C. The circulatory system delivers less carbon dioxide to the muscular system, resulting in stiffening of the muscles.</td>
</tr>
<tr>
<td>• Illustrate</td>
<td>D. The skeletal system produces more blood cells that circulate through the blood vessels, increasing the warmth of the body.</td>
</tr>
<tr>
<td>• Explain</td>
<td></td>
</tr>
</tbody>
</table>

**HIGH ORDER QUESTION STEMS**

- Can you distinguish between ____?
- Compare and contrast ________ to ________?
- How many different ________?
- What happens to ____ when ________?
- Can you explain why ________?
- What if ________?
- What can you find out about ________?
- What do you already know about ________?
- Can you explain what must have happened when ________?

**STUDENT SCALE QUESTIONS**

- How have I used this benchmark in my reading/math?
- How did the benchmark help me better understand ________?
- How many different ________?
- Where is my learning on the scale?
- I can teach someone else.
- I understand, but have questions.
- I can do it on my own.
- I can’t do it on my own.
- I can’t do it yet.
- I need help.
- I don’t understand.
- I don’t know what to do.

**TEST ITEM SPECIFICATION NOTES**

Clarification

The student will:

- Identify and/or describe the general functions of the major systems of the human body.
- Identify and/or describe how the major systems of the human body interact to maintain homeostasis.
- Identify, compare, and/or contrast the types of infectious agents that affect the human body.

Content Limits:

- Items are limited to the human digestive, respiratory, circulatory, reproductive, excretory, immune, nervous, and musculoskeletal systems.
- Items will not assess the structures or functions of individual organs in isolation.
- Items assessing the interactions of systems to maintain homeostasis should include a reference to homeostasis and are limited to the organismal level.
- Items will not require specific knowledge of diseases that affect the human body or their causal agents.
- Items may assess the interactions of no more than three systems.

Stimulus Attributes:

- Diagrams of the human reproductive system will not be used.

Prior Knowledge:

- Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.5.L.14.1 and SC.5.L.14.2.
**MIDDLE SCHOOL BENCHMARK TASK CARD:**

**STANDARD** Big Idea 15: Diversity and Evolution of Living Organisms  
**DOK:** HIGH

**BENCHMARK:** SC.6.L.15.1  
**ANALYZE AND DESCRIBE HOW AND WHY ORGANISMS ARE CLASSIFIED ACCORDING TO SHARED CHARACTERISTICS WITH EMPHASIS ON THE LINNAEAN SYSTEM COMBINED WITH THE CONCEPT OF DOMAINS.**

**BENCHMARK SIGNAL WORDS AND SAMPLE ITEMS**

<table>
<thead>
<tr>
<th>SIGNAL WORDS</th>
<th>SAMPLE ITEMS</th>
<th>SAMPLE ITEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Analyze</td>
<td>Mushrooms, bread molds, and yeasts are classified together in the fungi kingdom. Specific characteristics are used to classify these organisms. Which of the following is a characteristic used to classify these organisms as fungi?</td>
<td>What kingdoms did Carolus Linnaeus originally use for his classification system?</td>
</tr>
</tbody>
</table>
| • Describe   | A. They are parasites.  
B. They are unicellular.  
C. They are prokaryotes.  
D. They are heterotrophs. *  | A. Fungi and Protista  
B. Fungi and Animalia  
C. Plantae and Protista  
D. Plantae and Animalia *  |
| • Classify   |             |              |
| • Construct  |             |              |

**HIGH ORDER QUESTION STEMS**

- Can you design a ____?
- What is the order____?
- What happens to___ when ______?  
- Can you group by characteristics such as______?  
- What do you think_______?
- What do you already know about this____?  
- What evidence is there that____?  

**STUDENT SCALE QUESTIONS**

- ✓ How have I used this benchmark in my reading/math?
- ✓ How did the benchmark help me better understand ____?  
- ✓ Where is my learning on the scale?  
  - ___ I can do it on my own.  
  - ___ I understand, but have questions.

**TEST ITEM SPECIFICATION NOTES**

**Clarification**

- **The student will:**
  - Analyze and/or describe how and/or why organisms are classified.

**Content Limits:**

- Items may assess how characteristics are used to classify organisms but will not assess specific characteristics of individual types of organisms.
- Items assessing the classification of organisms into kingdoms are limited to Eubacteria, Archaea, Protist, Fungus, Plant, and Animal. Items assessing the classification of organisms into domains are limited to Bacteria, Archaea, and Eukarya. Items may assess knowledge of the hierarchy of classification but will not assess the specific characteristics of organisms classified in a particular phylum, class, order, family, genus, or species.
- Items may use scientific names and the term binomial nomenclature but will not require specific knowledge of an organism’s scientific name and common name.

**Prior Knowledge:**

- Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.3.L.15.1, SC.3.L.15.2, and SC.5.L.14.2.
MIDDLE SCHOOL BENCHMARK TASK CARD:  STANDARD  Big Idea 15 : Diversity and Evolution of Living Organisms  DOK: HIGH

BENCHMARK: SC.7.L.15.2 EXPLAIN THE SCIENTIFIC THEORY OF EVOLUTION BY RECOGNIZING AND EXPLAINING WAYS IN WHICH GENETIC VARIATION AND ENVIRONMENTAL FACTORS CONTRIBUTE TO EVOLUTION BY NATURAL SELECTION AND DIVERSITY OF ORGANISMS. (ALSO ASSESSES SC.7.L.15.1 AND SC.7.L.15.3.) SC.7.L.15.1 Recognize that fossil evidence is consistent with the scientific theory of evolution that living things evolved from earlier species. SC.7.L.15.3 Explore the scientific theory of evolution by relating how the inability of a species to adapt within a changing environment may contribute to the extinction of that species.

BENCHMARK SIGNAL WORDS AND SAMPLE ITEMS

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<th>SAMPLE ITEMS</th>
<th>SAMPLE ITEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify</td>
<td>A certain reptile species is a herbivore and exists only on an isolated island. Which of the following would most likely result in the extinction of the reptile species over a period of twenty thousand years?</td>
<td>Each zebra has slightly different stripes that allow it to blend into the herd and confuse predators. Blending into the herd helps the zebras do which of the following?</td>
</tr>
<tr>
<td>Explain</td>
<td>A. The reptile species produces many offspring with many unique traits, and the vegetation remains constant.</td>
<td>A. find water</td>
</tr>
<tr>
<td>Describing</td>
<td>B. The reptile species produces few offspring with some unique traits, and the vegetation remains constant.</td>
<td>B. hunt for prey</td>
</tr>
<tr>
<td>Explore</td>
<td>C. The reptile species produces few offspring with some unique traits, and the vegetation changes quickly.</td>
<td>C. adapt and evolve</td>
</tr>
<tr>
<td>Investigate</td>
<td>D. The reptile species produces many offspring with some unique traits, and the vegetation changes slowly.</td>
<td>D. survive and reproduce</td>
</tr>
</tbody>
</table>

HIGH ORDER QUESTION STEM

Which statement is true? What questions would you ask of? What if? What is? What is the underlying theme of? Why did this happen? What evidence is there that? What do you already know about this? The best inference that can be made from here is.

STUDENT SCALE QUESTIONS

After completing __________, the evidence from the lesson that helps me understand and answer the essential question is __________. This relates to the __________. Where is my learning on the scale?

STUDENT SUMMATIVE WRITING TASK

THINKING MAPS CORRELATION

Cognitive Process: Classifying
Product: Tree Map

Cognitive Process: Defining
Product: Circle Map/ Frame

Cognitive Process: Cause and Effect
Product: Multi-Flow

5 E MODEL COMPONENTS

Engage
- Demonstrations
- Reading text
- Free Write
- Analyze Graphic Organizer
- KWL
- Brainstorming/Thinking Maps

Explore
- Perform an Investigation
- Read Authentic Resources to Collect
- Information Shared
- Solve a Problem
- Construct a Model

Explain
- Student Analysis & Explanation
- Supporting ideas with Evidence
- Structure Questioning
- Reading and Discussion
- Teacher Explanation
- Thinking Skill

Extend
- Problem Solving
- Decision making
- Experimental Inquiry

Evaluate
- Rubric
- Mini Assessment
- Journal Entry
- Portfolio

Clarification
The student will:
- Identify and/or explain ways in which genetic variation and environmental factors contribute to evolution by natural selection and diversity of organisms.
- Identify and/or explain ways in which fossil evidence is consistent with the scientific theory of evolution.
- Identify and/or explain how a species' inability to adapt may contribute to the extinction of that species.

Content Limits:
- Items will not address topics such as speciation, genetic drift, or gene pools.
- Items will not assess or address hominid evolution or primate fossils.
- Items assessing fossil evidence should focus on progressions over time/evolution from earlier species and/or the idea that not all species alive today were alive in the past.
- Items will not assess fossils in the context of relative dating or plate tectonics/continental movement.

Prior Knowledge:
- Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.5.L.15.1 and SC.5.L.17.1.
## MIDDLE SCHOOL BENCHMARK TASK CARD: STANDARD Big Idea 16: Heredity and Reproduction DOK: HIGH


### HIGH ORDER QUESTION STEMS

- Can you distinguish between ____ and ____?
- Can you compare and contrast_______ to ______?
- What does this information indicate______?
- What happens when_______?
- From the information given van you develop a set of instructions about ______?
- Would this information be useful if you had a ________?
- What do you already know about_______?
- What most likely caused_______?

### STUDENT SCALE QUESTIONS

- **A.** How have I used this benchmark in my reading/math?
- **B.** Did the benchmark help me better understand_______?
- **C.** Where is my learning on the scale?
- **D.** Can I do it on my own?
- **E.** I understand, but have questions.
- **F.** I can do it on my own.
- **G.** I can do it on my own.
- **H.** I understand, but have questions.

### STUDENT SUMMATIVE WRITING TASK

After completing ________, the evidence from the lesson that helps me understand and answer the essential question is ________. This relates to the essential question because ________.

### THINKING MAPS CORRELATION

<table>
<thead>
<tr>
<th>Cognitive Process: Classifying</th>
<th>Product: Tree Map</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A.</strong></td>
<td><strong>B.</strong></td>
</tr>
<tr>
<td><strong>C.</strong></td>
<td><strong>D.</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cognitive Process: Defining</th>
<th>Product: Circle Map/ Frame</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A.</strong></td>
<td><strong>B.</strong></td>
</tr>
<tr>
<td><strong>C.</strong></td>
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<thead>
<tr>
<th>Cognitive Process: Comparing and Contrasting</th>
<th>Product: Double Bubble Map</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A.</strong></td>
<td><strong>B.</strong></td>
</tr>
<tr>
<td><strong>C.</strong></td>
<td><strong>D.</strong></td>
</tr>
</tbody>
</table>

### TEST ITEM SPECIFICATION NOTES

**Clarification**

**The student will:**

- Describe and/or explain that every organism requires a set of instructions that specifies its traits.
- Identify and/or explain that hereditary information (DNA) contains genes located in the chromosomes of each cell and/or that heredity is the passage of these instructions from one generation to another.
- Use Punnett squares and pedigrees to determine genotypic and phenotypic probabilities.
- Compare and/or contrast general processes of sexual and asexual reproduction that result in the passage of hereditary information from one generation to another.

**Content Limits:**

- Items may assess the general concepts of mitosis and meiosis but will not assess the phases of mitosis or meiosis. Items will not use the terms haploid or diploid.
- Items referring to sexual reproduction will not address human reproduction.
- Items addressing Punnett squares and pedigrees will only assess dominant and recessive traits.
- Items addressing pedigrees are limited to assessing the probability of a genotype or phenotype of a single individual. Items may require the identification of parental genotypes that result in certain genotypic or phenotypic probabilities in offspring.
- Items will not assess incomplete dominance, sex-linked traits, polygenic traits, multiple alleles, or codominance.
- Items addressing Punnett squares are limited to the P and F1 generations.
- Items will not assess mutation.
- Items will not address or assess the stages of meiosis, fertilization, or zygote formation.
- Items will not address or assess human genetic disorders or diseases.

**Stimulus Attributes:**

- Genotype and phenotype probabilities will only be in percent.

**Response Attributes:**

- Options may be in the form of percents or percentages.

**Prior Knowledge:**

- Items may require the student to apply science knowledge described in the NGSS from lower grades. This benchmark requires prerequisite knowledge from SC.4.L.16.1, SC.4.L.16.2, and SC.4.L.16.3.
**BENCHMARK SIGNAL WORDS AND SAMPLE ITEM**

<table>
<thead>
<tr>
<th>SIGNAL WORDS</th>
<th>SAMPLE ITEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compare</td>
<td>Mangrove trees are common to the Florida Everglades. The tree roots serve as a place for freshwater oysters to attach when the tide is high, as shown in the picture below. The oysters are protected from predators when attached to the roots underwater.</td>
</tr>
<tr>
<td>Contrast</td>
<td>The oysters do not harm the trees nor do they provide any benefit to the trees. Which of the following relationships is most similar to the relationship between the mangrove trees and the oysters?</td>
</tr>
<tr>
<td>Describe</td>
<td>A. African ants living in acacia trees feed on leaf-eating insects found on the tree.</td>
</tr>
<tr>
<td>Explain</td>
<td>B. Spider crabs are camouflaged by the green-brown algae growing on their shells.</td>
</tr>
<tr>
<td>Identify</td>
<td>C. A whale is unaffected by the attached remora fish feeding on the whale’s leftover food.*</td>
</tr>
<tr>
<td></td>
<td>D. Bees fly from one flowering plant to another gathering nectar and pollinating the flowers.</td>
</tr>
</tbody>
</table>

**HIGH ORDER QUESTION STEM**

- Can you distinguish between ____ and ____? 
- Can you compare and contrast _______ to _______...? 
- How would _____compare to _____? 
- What relationship exists between_____? 
- Why did ______ happen? 
- What do you already know about____? 
- What factors would ____? 
- Based on the diagram what conclusion____? 

**STUDENT SCALE QUESTIONS**

- How have I used this benchmark in my reading/math? 
- How did the benchmark help me better understand ________? 
- Where is my learning on the scale? 
- I can teach someone else. 
- I can do it on my own. 
- I understand, but have questions. 

**TEST ITEM SPECIFICATION NOTES**

**Clarification**

**The student will:**
- Compare and/or contrast relationships between organisms, such as mutualism, predation, parasitism, competition, and commensalism. 
- Describe and/or explain the roles of and relationships among producers, consumers, and decomposers in the process of energy transfer in a food web. 
- Identify and/or describe various limiting factors in an ecosystem and their impact on native populations.

**Content Limits:**
- Items assessing the relationships between organisms may require the identification of the relationship as mutualism, predation, parasitism, competition, or commensalism.
- Items assessing the relationships of organisms may require recognition of common examples of mutualism, predation, parasitism, competition, and/or commensalism.
- Items will not require specific knowledge of organisms.
- Items may assess food webs but will not assess food chains.
- Items assessing consumers in a food web are limited to primary, secondary, and tertiary consumers.
- Items will not assess that the Sun is the source of energy for living things in isolation.
- Items will not address energy pyramids or use the term trophic level.

**Stimulus Attributes:**
- Food webs may include a maximum of 15 organisms.

**Prior Knowledge:**
- Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.4.L.17.2, SC.4.L.17.3, and SC.4.L.17.4.
HIGH ORDER QUESTION STEMS
- What is the principal role of _____?
- What happens to _____ when _____?
- Can you write in your own words _____?
- Can you distinguish between _____?
- Do you know another instance where _____?
- What can you find out about _____?
- What is the principal role of _____?
- What evidence is there that _____?

STUDENT SCALE QUESTIONS
- How have I used this benchmark in my reading/math?
- How did the benchmark help me better understand _____?
- Where is my learning on the scale? I understand __________?

TEST ITEM SPECIFICATION NOTES
- Clarification: The student will:
  - Describe and/or explain the general processes of photosynthesis or cellular respiration.
  - Describe how matter and energy are transferred in the carbon cycle.
  - Describe the role of light, carbon dioxide, water, and/or chlorophyll in the process and products of photosynthesis.

Content Limits:
- Items will not address or assess the stages of photosynthesis or cellular respiration.
- Items may not assess the interrelatedness of photosynthesis and cellular respiration.
- Items will not use the term reactant.
- Items will not use the term ATP.
- Items will not assess the function of organelles related to the processes of cellular respiration or photosynthesis.
- Items will not assess anaerobic respiration.
- Items referring to the carbon cycle may include carbon reservoirs, such as the atmosphere, organisms, fossil fuels, sediments, and oceans/water.

Stimulus Attributes:
- Scenarios may use word equations for photosynthesis or cellular respiration; chemical equations may not be used.

Prior Knowledge:
- Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.3.L.17.2, SC.4.L.17.2, and SC.4.L.17.3.