LOUISIANA DEPARTMENT OF EDUCATION

Office of Assessments, Analytics, and Accountability

LEAP Released Item Guide for Science Grade 5

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Purpose

The LEAP released item guide is intended to be used as an instructional tool and not to predict performance on the summative test. These items are meant to help teachers better understand how the achievement level descriptors are used in creating assessment questions.

How to Use and Not Use

The recommendations and cautions that follow are meant to help teachers better understand the achievement level descriptors and help administrators better understand what should and should not be done with the released items.

How to Use

- Learn how achievement level descriptors work with the dimensions in an item;
- Provide guidance when selecting assessment items in terms of rigor, content, and item types

How Not to Use

- Avoid prioritizing the PEs used in the released items because they do not represent all of the content eligible for the operational test;
- Avoid limiting instructional strategies to the released items (creating instructional sets using only the PEs found in the document);
- Do not use only the stimulus materials provided in the released items for classroom instruction;
- Avoid creating assessment items that mirror the released items;
- Avoid designing instructional tasks and sets based on only one PE.

Assessment Design

Supporting Science Instruction

The LEAP tests will assess students' understanding of the LSS for Science, reflecting the multiple dimensions of the standards.

Apply content knowledge and skills (Disciplinary Core Idea, DCI)

On the LEAP test, students answer questions which require content knowledge and skills aligned to PE bundles (groupings of PEs) and the corresponding DCIs.

Investigate, evaluate, and reason scientifically (Science and Engineering Practice, SEP)

On the LEAP test, students do more than answer recall questions about science; they apply the practices, or behaviors, of scientists and engineers to investigate each real-world phenomenon and design solutions to problems.

Connect ideas across disciplines (Crosscutting Concept, CCC)

On the LEAP test, sets of questions assess student application of knowledge across the domains of science for a comprehensive picture of student readiness for their next grade or course in science.

Set Based Design

The grade 5 tests include item sets, task sets, and standalone items.

Item Sets

Item sets consist of four items that have a common stimulus. There are two one-point items and two two-point items in each item set on the LEAP test. For three of the item sets, one of the two-point items will be a Constructed Response item. In the released item sets, there may be more than four items or fewer than four items with a common stimulus.

Task Sets

Task sets consist of five items that have a common stimulus. There are two one-point items, two two-point items, and one nine-point Extended Response item. In the released task sets, there may be more than five items or fewer than five items with a common stimulus.

Standalone Items

Standalone items are one-point or two-point items that do not share a stimulus with other items.

Achievement-Level Definitions

Achievement-level definitions briefly describe the expectations for student performance at each of Louisiana's five achievement levels:

- Advanced: Students performing at this level have **exceeded** college and career readiness expectations and are well prepared for the next level of study in this content area.
- Mastery: Students performing at this level have **met** college and career readiness expectations and are prepared for the next level of study in this content area.
- Basic: Students performing at this level have **nearly met** college and career readiness expectations and may need additional support to be fully prepared for the next level of study in this content area.
- Approaching Basic: Students performing at this level have **partially met** college and career readiness expectations and will need much support to be prepared for the next level of study in this content area.
- Unsatisfactory: Students performing at this level have **not yet met** the college and career readiness expectations and will need extensive support to be prepared for the next level of study in this content area.

Achievement Level Descriptors

Achievement Level Descriptors (ALDs) indicate what a typical student at each level should be able to demonstrate based on his or her command of grade-level standards. ALDs are written for the three assessment reporting categories. Access the ALDs on the Assessment Resources Webpage for a breakdown of the knowledge, skills, and practices associated with each achievement level.

Released Items

This section includes released test items. With each item, item set, and task set, is a table containing alignment information and the answer key, where possible. Additionally, analyses of the multi-dimensional alignment, achievement level descriptor, rationales for answers, and rubrics for CRs and ERs are included with the items. An asterisk (*) denotes correct answer(s).

The achievement level descriptor provides information about how students who answer the item correctly are performing.

For example, an item is aligned to the SEP and DCI for 5-ESS2-1:

Performance Expectation	Level 5: Advanced	Level 4: Mastery	Level 3: Basic	Level 2: Approaching Basic
5-ESS1-2 Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky. CCC: PAT SEP: 4	Use data to construct an explanation about or compare patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.	Analyze data in graphical displays to describe patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.	Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.	Use simple data displays about patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.

Identifies the performance level of students who answer the question correctly.

Achievement Level Descriptor: Students who answer this item correctly are performing at a level of 2 or higher. The student can use a model to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.

Which interaction of Earth's systems could scientists study with the wave tank?

A. how the hydrosphere and atmosphere affect the geosphere*

Identifies how the item aligns to the dimensions.

Items Released:
Standalone Items
Item Set: Saltwater Reactions
Task Set: Melting Fruit Pops

Standalone Items

Item Type	PE	DCI	SEP	CCC	Points	Achievement Level
TEI	5-ESS1-1	UE.ESS1A.a	7. ARG	SPQ	1	4
MC	5-ESS2-1	UE.ESS2A.b	2. MOD	SYS	1	2
TEI	5-ESS3-1	UE.ESS3C.a	6. E/S		1	4
MS	5-PS1-2	UE.PS1A.b	5. MCT	E/M	1	4
TPD	5-PS2-1	UE.PS2B.c	7. ARG		2	4

SEP = blue; DCI = orange; CCC = green An asterisk (*) denotes correct answer(s).

Technology-Enhanced Item
Performance Expectation
5-ESS1-1 Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from the Earth.

Use the information and your knowledge of science to answer the question.

The distance from Earth to most of the stars in the table is given in light-years. A light-year is the distance that light can travel in one year. The distance from Earth to the Sun is given in light-minutes. A light-minute is the distance light travels in one minute.

Distance of Stars from Earth

Star	Distance from Earth
Sun	8.3 light-minutes
Proxima Centauri	4.2 light-years
Barnard's Star	6.0 light-years
Sirius A	8.6 light-years
Procyon A	11.4 light-years

A student is writing an argument about the brightness of the Sun compared with other stars.

Select the two correct phrases in the student's argument.

The Sun appears brighter than other stars because it is farther from Earth than Barnard's Star and much closer to Earth than Proxima Centauri. A model that shows the difference between the brightness of the Sun and the brightness of Procyon A would be looking at a friend who is holding a bright flashlight and a dim flashlight, looking at two equally bright street lights the same distance away, or standing next to one street light and looking at another street light that is far away.

Multi-Dimensional Alignment: The item requires the student to apply the science and engineering practices of engaging in an argument with evidence, and knowledge of the apparent brightness of the sun compared to other stars to demonstrate an understanding of scale, proportion, and quantity.

Achievement Level Descriptor: Students who answer this item correctly are performing at a level of 4 or higher. The student can support an argument that for differences in the apparent brightness of the sun compared to other stars is due to their relative distances from the Earth.

Scoring

The Sun appears brighter than other stars because it is farther from Earth than Barnard's Star and much closer to Earth than Proxima Centauri. A model that shows the difference between the brightness of the Sun and the brightness of Procyon A would be looking at a friend who is holding a bright flashlight and a dim flashlight, looking at two equally bright street lights the same distance away, or standing next to one street light and looking at another street light that is far away.

Rationales

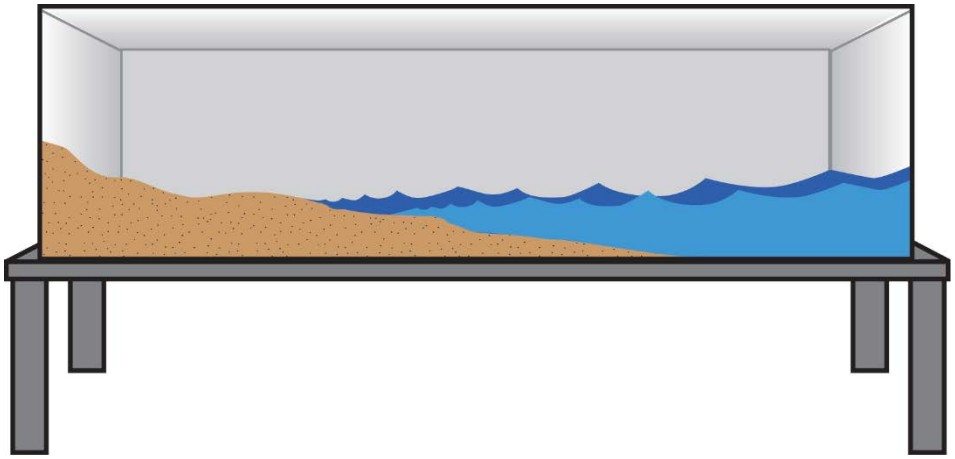
Response	Rationale
The Sun appears brighter than other stars because it is farther from Earth than Barnard's Star and much closer to Earth than Proxima Centauri. A model that shows the difference between the brightness of the Sun and the brightness of Procyon A would be looking at a friend who is holding a bright flashlight and a dim flashlight, looking at two equally bright street lights the same distance away, or standing next to one street light and looking at another street light that is far away.	Correct.
The Sun appears brighter than other stars because it is farther from Earth than Barnard's Star and much closer to Earth than Proxima Centauri. A model that shows the difference between the brightness of the Sun and the brightness of Procyon A would be looking at a friend who is holding a bright flashlight and a dim flashlight, looking at two equally bright street lights the same distance away, or standing next to one street light and looking at another street light that is far away.	The difference in brightness of the stars is due to their relative distances from Earth.

Response	Rationale
The Sun appears brighter than other stars because it is farther from Earth than Barnard's Star and much closer to Earth than Proxima Centauri. A model that shows the difference between the brightness of the Sun and the brightness of Procyon A would be looking at a friend who is holding a bright flashlight and a dim flashlight, looking at two equally bright street lights the same distance away, or standing next to one street light and looking at another street light that is far away.	Barnard's star is much farther from Earth than the sun is.
The Sun appears brighter than other stars because it is farther from Earth than Barnard's Star and much closer to Earth than Proxima Centauri. A model that shows the difference between the brightness of the Sun and the brightness of Procyon A would be looking at a friend who is holding a bright flashlight and a dim flashlight, looking at two equally bright street lights the same distance away, or standing next to one street light and looking at another street light that is far away.	The sun is much closer to Earth than Barnard's star is.

Multiple Select
Performance Expectation
5-ESS2-1 Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.

Use the information and your knowledge of science to answer the question.

Rayne visited a college in Louisiana and saw a wave tank. She learned that scientists use wave tanks to study ocean waves by performing different kinds of tests. Rayne wanted to know what scientists could learn using the wave tank.



Which interaction of Earth's systems could scientists study with the wave tank?

A. how the hydrosphere and atmosphere affect the geosphere*
B. how the hydrosphere and geosphere affect the biosphere
C. how the geosphere affects the hydrosphere and atmosphere
D. how the atmosphere affects the hydrosphere and biosphere

Multi-Dimensional Alignment: The item requires the student to apply the science and engineering practices of developing and using models, and knowledge of the geosphere, biosphere, hydrosphere, and/or atmosphere to demonstrate an understanding of systems and system models.

Achievement Level Descriptor: Students who answer this item correctly are performing at a level of 2 or higher. The student can use a model to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.

Which interaction of Earth's systems could scientists study with the wave tank?

A. how the hydrosphere and atmosphere affect the geosphere*

Rationales
A. Correct.
B. There are no living organisms in the wave tank.
C. The movement of the sand is caused by the movement of the water.
D. The hydrosphere is moving and living organisms are missing from the tank.

Technology-Enhanced Item
Performance Expectation
5-ESS3-1 Generate and compare multiple solutions about ways individual communities can use science to protect the Earth's resources and environment.

Use the information and your knowledge of science to answer the question.

These are three methods of cleaning up oil spills to protect the environment:

1. Burning: Large areas of floating oil can be set on fire and burned up. This method works best for places far away from the shore with calm water and gentle wind.
2. Chemicals: Chemicals can be added to the oil to break it up into tiny bits so that it can be eaten by microbes. This method works best for small amounts of oil far away from the shore.
3. Skimming: Boats can pull long traps across the surface of the water and remove floating oil. This method works best when the water is calm.

An environmental group is determining the best method to use in order to clean up two different spills. Identify the best method to use for each spill.

Select one correct answer in each row.

	Burning	Chemicals	Skimming
Large oil spill in an area of the ocean near the shoreline with a lot of birds	☐	☐	☐
Large oil spill in the middle of the ocean	☐	☐	☐

Multi-Dimensional Alignment: While effectively applying the science and engineering practices of constructing explanations and designing solutions, the student demonstrates knowledge of ways individual communities can use science to protect the Earth's resources and environment.

Achievement Level Descriptor: Students who answer this item correctly are performing at a level of 4 or higher. The student can compare multiple solutions about ways individual communities can use science to protect the Earth's resources and environment.

Scoring

	Burning	Chemicals	Skimming
Large oil spill in an area of the ocean near the shoreline with a lot of birds	☐	☐	☑
Large oil spill in the middle of the ocean	☑	☐	☐

Rationales

Response	Rationale
Large oil spill in an area of the ocean near the shoreline with a lot of birds: skimming Large oil spill in the middle of the ocean: burning	Correct.
Large oil spill in an area of the ocean near the shoreline with a lot of birds: skimming Large oil spill in the middle of the ocean: chemicals	Chemicals only work well for small oil spills.
Large oil spill in an area of the ocean near the shoreline with a lot of birds: chemicals Large oil spill in the middle of the ocean: burning	Chemicals can be harmful to wildlife.
Large oil spill in an area of the ocean near the shoreline with a lot of birds: skimming Large oil spill in the middle of the ocean: skimming	Skimming only removes oil from the surface.

Multiple Select
Performance Expectation
5-PS1-2 Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total amount of matter is conserved.

Use the information and your knowledge of science to answer the question. A student did two experiments: 1. Ice Experiment • Place an ice cube in a plastic bag and seal the bag. • Measure the mass of the bag. • Allow the ice cube to melt. • Measure the mass of the bag again. 2. Vinegar and Baking Soda Experiment • Place baking soda into a plastic bag. • Being careful not to spill any, place a small paper cup of vinegar in the same bag. • Seal the bag. • Measure the mass of the bag. • Without opening the bag, turn the paper cup over so that the vinegar mixes with the baking soda. • Measure the mass of the bag again.	Which statements **best** describe how the mass after the experiments will compare with the mass before the experiments? Select the **two** correct answers. A. In Experiment 1, the mass will be the same before and after the ice melts. * B. In Experiment 1, the mass will be less after the ice melts than before the ice melts. C. In Experiment 1, the mass will be greater after the ice melts than before the ice melts. D. In Experiment 2, the mass will be less after the materials are mixed than before they are mixed. E. In Experiment 2, the mass will be the same after the materials are mixed as before they are mixed.* F. In Experiment 2, the mass will be greater after the materials are mixed than before they are mixed.

Multi-Dimensional Alignment: The item requires the student to apply the science and engineering practices of using mathematics and computational thinking, and knowledge that regardless of the type of change that occurs when heating, cooling, or mixing substances to demonstrate an understanding of energy and matter.

Achievement Level Descriptor: Students who answer this item correctly are performing at a level of 4 or higher. The student can use quantities in graphs and tables to construct an explanation that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total amount of matter is conserved.

Which statements best describe how the mass after the experiments will compare with the mass before the experiments?

Select the **two** correct answers.

A. In Experiment 1, the mass will be the same before and after the ice melts. *

E. In Experiment 2, the mass will be the same after the materials are mixed as before they are mixed.*

Rationales
A. Correct.
B. Mass is unaffected by phase changes.
C. The mass will be the same after the ice melts.
D. The mass of a mixture is equal to the combined masses of its components.
E. Correct.
F. The masses of the components of the mixture are unaffected by mixing.

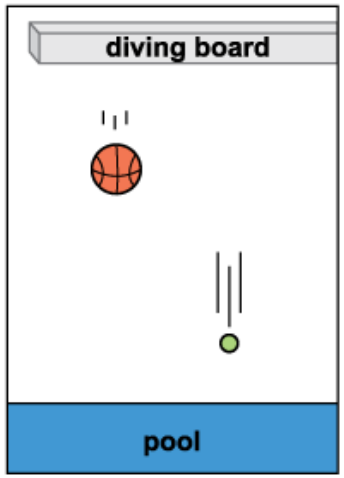
Two-Part Independent
Performance Expectation
5-PS2-1 Support an argument that the gravitational force exerted by the Earth is directed down.

Use the information and your knowledge of science to answer the questions.

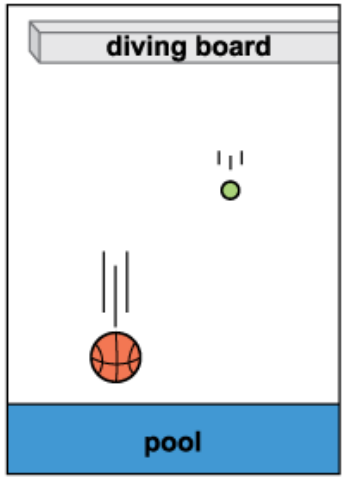
Part A

A student drops a heavy basketball and a light tennis ball at the same time off a diving board that is a few meters above a pool. Which model **best** shows how the balls will fall?

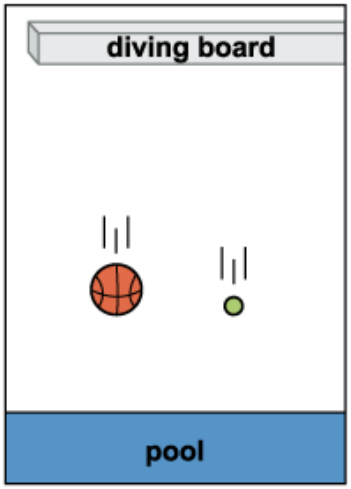
A.



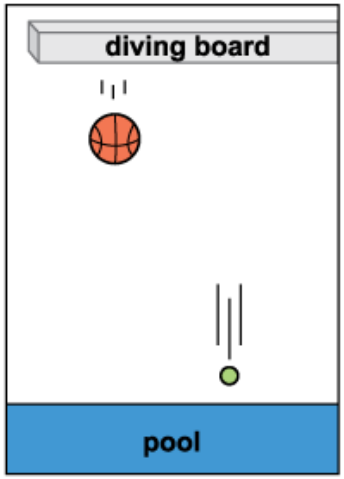
B.



C. *



D.



Part B

Which statement **best** supports the answer to Part A?

A. The basketball falls much faster than the tennis ball because it is full of air and has a lot of mass.

B. The tennis ball falls much faster than the basketball because gravity pulls harder on objects with less volume.

C. The basketball and tennis ball fall at very different speeds because gravity pulls on each ball in a different way.

D. The basketball and tennis ball fall at about the same speed because mass does not change how gravity pulls on objects.*

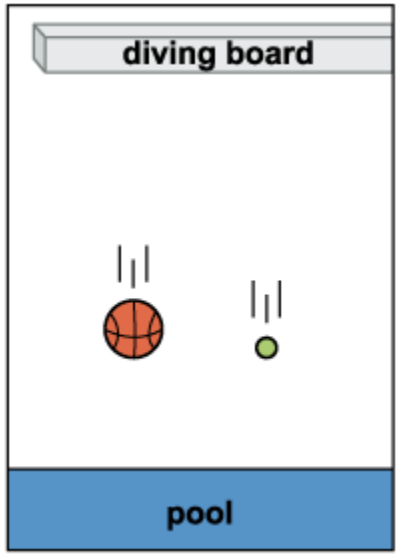
Multi-Dimensional Alignment: While effectively applying the science practice of engaging in an argument, the student demonstrates knowledge that the gravitational force exerted by the Earth is directed down.

Achievement Level Descriptor: Students who answer this item correctly are performing at a level of 4 or higher. The student can support an argument that Earth's gravitational force results in objects being pulled toward the center of Earth.

Part A

A student drops a heavy basketball and a light tennis ball at the same time off a diving board that is a few meters above a pool. Which model **best** shows how the balls will fall?

C.



Part B

Which statement **best** supports the answer to Part A?

D. The basketball and tennis ball fall at about the same speed because mass does not change how gravity pulls on objects.*

Rationales

Part A

A. The tennis ball will travel the same distance as the basketball.
B. The basketball will travel the same distance as the tennis ball.
C. Correct.
D. The tennis ball will travel the at the same speed as the basketball.

Part B

A. Objects fall at the same rate, regardless of mass.
B. Objects fall at the same rate, regardless of volume.
C. Objects fall at the same rate, because gravity pulls on all objects equally.
D. Correct.

Item Set: Saltwater Reactions

Item Type	PE	DCI	SEP	CCC	Points	Achievement Level
MC	5-PS1-4	UE.PS1B.a		C/E	1	1
MC	5-PS1-4	UE.PS1B.a	3. INV	C/E	1	3
TEI	5-PS1-3	UE.PS1A.c	3. INV		2	5
CR	5-PS1-3	UE.PS1A.c	3. INV		2	4

SEP = blue; DCI = orange; CCC = green An asterisk (*) denotes correct answer(s).

Use the information about saltwater reactions and your knowledge of science to answer the questions.

Saltwater Reactions

Adelae noticed that some metal objects near a beach were beginning to change color. She observed that the change is similar to how iron rusts. She found images of objects before and after being left outside.

Table 1. Student's Observations

Object	Before Being Left Outside	After Being Left Outside
brass coin		
copper penny		
nickel pellet		
steel nail		

Adelae wanted to investigate how to prevent these color changes. She found out that some coatings could be put on iron to prevent rusting. The information she found during her research is shown in Table 2.

Table 2. Coatings That Prevent Rust

Coating	What It Is	Other Information
oil	Oil is poured on the moving parts of the object.	-can drip off or evaporate -must be added to the object over and over again
paint	Paint is spread on the surfaces of the object.	-comes in many colors -cannot be put on moving parts of objects
resin	A waxy material is spread on the surfaces of the object.	-protects objects for a long time -can be used to reduce noise -can be used to keep materials warm or cool
protective metal	A metal that does not rust is put onto the surface of the object.	-holds tightly to the other metal and is not likely to come off -should be done by a professional

Multiple Choice
Performance Expectation
5-PS1-4 Conduct an investigation to determine whether the mixing of two or more substances results in new substances.

Use the information in Table 1 to answer the question.

Objects near a beach are often sprayed with salt water from the ocean. What conclusion can be made about how objects are affected by salt water?

A. Some objects will erode when they touch salt water.
B. All objects will lose mass when they touch salt water.
C. All objects will change color when they touch salt water.
D. Some objects will have a chemical reaction when they touch salt water.*

Multi-Dimensional Alignment: The item requires the student to apply knowledge of whether the mixing of two or more substances results in new substances to demonstrate an understanding of cause and effect.

Achievement Level Descriptor: Students who answer this item correctly are performing at a level of 1 or higher. The student can identify whether the mixing of two or more substances results in new substances.

Objects near a beach are often sprayed with salt water from the ocean. What conclusion can be made about how objects are affected by salt water?

D. Some objects will have a chemical reaction when they touch salt water.*

Rationales
A. Erosion involves the movement of materials.
B. Objects changed color, but did not change mass.
C. Only some objects changed color.
D. Correct.

Multiple Choice
Performance Expectation
5-PS1-4 Conduct an investigation to determine whether the mixing of two or more substances results in new substances.

Use the information in Table 1 to answer the question.

Which observation about the objects provides evidence that a chemical reaction occurred?

A. The steel nail was attracted to a magnet before it was left outside.
B. The mass of the nickel coin did not change when it was left outside.
C. The color of the copper penny was different after it was left outside.*
D. The brass coin was able to conduct electricity after it was left outside.

Multi-Dimensional Alignment: The item requires the student to apply the science and engineering practices of planning and carrying out investigations, and knowledge of whether the mixing of two or more substances results in new substances to demonstrate an understanding of cause and effect.

Achievement Level Descriptor: Students who answer this item correctly are performing at a level of 3 or higher. The student can use data to determine whether the mixing of two or more substances results in new substances.

Use the information in Table 1 to answer the question.

Which observation about the objects provides evidence that a chemical reaction occurred?

C. The color of the copper penny was different after it was left outside.*

Rationales
A. The magnetism of the steel nail after it was left outside is needed for comparison.
B. The total mass of substances remains constant before and after a chemical reaction.
C. Correct.
D. The conductivity of the brass coin before it was left outside is needed for comparison.

Technology-Enhanced Item
Performance Expectation
5-PS1-3 Make observations and measurements to identify materials based on their properties.

Use the information in Table 1 to answer the question.

Adelae found a piece of discolored metal on the beach. She could not tell what kind of metal it was. She found a table that stated some physical properties of different metals.

Properties of Metals

Metal	Attracted to a magnet?	Conducts electricity?
brass	no	yes
copper	no	yes
nickel	yes	yes
steel	yes	yes

Select the correct answer from each drop-down menu to complete the statements.

Adelae sees that the metal does not have a green color, which means it is not [ ]. She determines that the metal is

- brass
- copper
- nickel
- steel

attracted to a magnet, so she knows it is either [ ].

- brass or copper
- brass or nickel
- brass or steel
- copper or nickel
- copper or steel
- nickel or steel

She sees that the metal is discolored, which means it is not [ ]. She decides that the metal must be [ ].

- brass
- copper
- nickel
- steel

Multi-Dimensional Alignment: While effectively applying the science practice of planning and carrying out investigations, the student demonstrates knowledge of whether the mixing of two or more substances results in new substances.

Achievement Level Descriptor: Students who answer this item correctly are performing at a level of 5 or higher. The student can construct an explanation from data collected to identify materials based on their properties.

Scoring

Adelae sees that the metal does not have a green color, which means it is not [copper ▾]. She determines that the metal is attracted to a magnet, so she knows it is either [nickel or steel ▾]. She sees that the metal is discolored, which means it is not [nickel ▾]. She decides that the metal must be [steel ▾].

Rationales

Response	Rationale
Adelae sees that the metal does not have a green color, which means it is not **copper**. She determines that the metal is attracted to a magnet, so she knows it is either **nickel or steel**. She sees that the metal is discolored, which means it is not **nickel**. She decides that the metal must be **steel**.	Correct.
Adelae sees that the metal does not have a green color, which means it is not **copper**. She determines that the metal is attracted to a magnet, so she knows it is either **nickel or steel**. She sees that the metal is discolored, which means it is not **steel**. She decides that the metal must be **nickel**.	Steel was discolored after being left outside, but nickel was not.
Adelae sees that the metal does not have a green color, which means it is not **copper**. She determines that the metal is attracted to a magnet, so she knows it is either **nickel or steel**. She sees that the metal is discolored, which means it is not **brass**. She decides that the metal must be **nickel**.	Brass is not magnetic, and nickel did not change color.
Adelae sees that the metal does not have a green color, which means it is not **brass**. She determines that the metal is attracted to a magnet, so she knows it is either **nickel or steel**. She sees that the metal is discolored, which means it is not **nickel**. She decides that the metal must be **steel**.	In Table 1, the brass coin turned brown.

Constructed Response
Performance Expectation
5-PS1-3 Make observations and measurements to identify materials based on their properties.

Use the information in Table 1 to answer the question.

Adelae finds a quarter on the beach. She notices that on the edge there is a little bit of a green coating. The rest of the quarter is shiny and silver, as shown in the image.

Identify the two metals that make up the quarter. Include observations from Adelae's experiment to support your answer.

Multi-Dimensional Alignment: While effectively applying the science practice of planning and carrying out investigations, the student demonstrates knowledge of whether the mixing of two or more substances results in new substances.

Achievement Level Descriptor: Students who answer this item correctly are performing at a level of 4 or higher. The student can make observations and measurements to identify materials based on their properties.

Adelae finds a quarter on the beach. She notices that on the edge there is a little bit of a green coating. The rest of the quarter is shiny and silver, as shown in the image.

Identify the two metals that make up the quarter. Include observations from Adelae's experiment to support your answer.

Scoring Information	
Score	Description
2	Student's response correctly identifies the materials that make up the quarter AND includes observations from the experiment to support their reasoning.
1	Student's response correctly identifies the materials that make up the quarter, but does not include observations from the experiment to support their reasoning.
0	Student's response does **not** correctly identify the materials that make up the quarter or include observations from the experiment to support their reasoning.

Scoring Notes:

- Identification of the materials that make up the quarter (1 point)
- Providing observations from the experiment to support the identification (1 point)

Examples include:

Scoring notes	Examples
Identification of the materials that make up the quarter (1 point)	• The quarter is made of nickel and copper. OR • The outer part of the quarter is made of nickel and the middle part of the quarter is made of copper.
Providing observations from the experiment to support the identification (1 point)	• The copper part of the quarter turned green in salt water like the copper penny in the experiment. The rest of the quarter stayed shiny like the nickel pellet in the experiment. OR • The outer part of the quarter stayed shiny like the nickel pellet, and the middle part of the quarter turned green like the copper penny.

Accept other reasonable answers.

Student Responses (CR)
Identify the **two** metals that make up the quarter. Include observations from Adelae's experiment to support your answer.

Response 1

There are two metals that are used to make a quarter. One is nickel you can tell because in Adelae's observations nickel dosen't rust or curod. The second metal in the nikel is copper, it is also easy to tell because the copper curods but does not rust ar seen in Adelae's observation. So the metals is nickle and copper..

Score: 2
This response earns a 2. It accurately identifies the two metals that make up the quarter: "the metals is nickle and copper." The response accurately describes observations from Adelae's experiment to support your answer: "One is nickel you can tell because in Adelae's observations nickel dosen't rust or curod. The second metal in the nikel is copper, it is also easy to tell because the copper curods but does not rust ar seen in Adelae's observation."

Response 2

copper around it and nickle pellet

Score: 1
This response earns a 1. It accurately identifies the two metals that make up the quarter: "copper around it and nickle pellet." The response does not include observations from Adelae's experiment to support the answer.

Response 3

two metals that make up the quarter is the copper and the brass the makes it rust

Score: 0
This response earns a 0. The response does not accurately identify the two metals that make up the quarter: "two metals that make up the quarter is the copper and the brass." The response does not accurately describe observations from Adelae's experiment to support the answer: "the makes it rust."

Task Set: Melting Fruit Pops

Item Type	PE	DCI	SEP	CCC	Points	Achievement Level
MC	5-PS1-2	UE.PS1B.b	5. MCT		1	4
TEI	5-PS1-1	UE.PS1A.a	2. MOD		1	3
TPD	5-PS1-2	UE.PS1B.b	5. MCT	E/M	2	4
ER	5-PS1-2	UE.PS1A.b	5. MCT	E/M	9	5

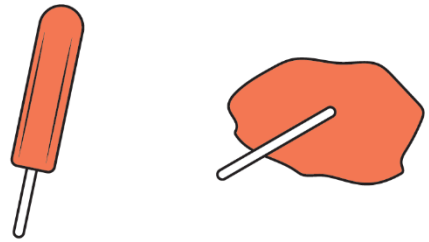
SEP = blue; DCI = orange; CCC = green An asterisk (*) denotes correct answer(s).

Use the information about melting fruit pops and your knowledge of science to answer the questions.

Melting Fruit Pops

Students are celebrating the end of the school year with a party. They are outside on a sunny 95°F day in Shreveport, Louisiana. Two students notice that their fruit pops are melting before they can finish eating them.

Figure 1. Frozen and Melted Fruit Pop



frozen state **melted state**

The teacher gives them each an identical paper cup to put under their fruit pops. One student argues that the mass of the fruit pop is decreasing as it melts. The students design an experiment to test this idea. Table 1 shows the mass for each fruit pop.

Table 1. Mass of Fruit Pops: Frozen and Melted

Fruit Pop Color	Frozen Mass (g)	Melted Mass in a Paper Cup (g)
red	53	57
blue	50	54
green	50	54
orange	51	55

A student compares this experiment to a time when the student's power went out at home one night. The freezer was without power for four hours, and the frozen vegetables and fruit in the freezer changed slightly. The student lists these observations in Table 2.

Table 2. Thawing Food

Item in the Freezer	Characteristics when Frozen	Characteristics when Warmed Up
green peas	-Bag was hard, stiff, and difficult to break apart with my hands. -Mass is 284 g.	-Bag was really soft. -I could feel the peas rolling around in the bag. -The bag seemed to be larger than before. -Mass is 284 g.
blueberries	-Bag was hard, stiff, and difficult to break apart with my hands. -Harder to break apart than green peas. -Mass is 340 g.	-Bag was very soft. -The blueberries were not rolling around as much as the green peas were. -The bag seemed to be larger than before. -Mass is 340 g.
broccoli	-Bag was hard, stiff, and difficult to break apart with my hands. -Bag took the shape of broccoli crowns in certain places. -Mass is 306 g.	-Bag was softer than before. -I could no longer see the broccoli crowns on the bag surface. -Mass is 306 g.

Multiple Choice
Performance Expectation
5-PS1-2 Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total amount of matter is conserved.

Which statement **best** explains why the frozen and melted masses in Table 1 are different?

A. The mass of the fruit pop increased when it changed from a solid to a liquid.
B. The frozen mass is less because it includes the mass of the wooden stick.
C. The melted mass is greater because the mass includes the fruit pop and the paper cup.*
D. The mass of the fruit pop decreased when some of the liquid soaked into the paper cup.

Multi-Dimensional Alignment: While effectively applying the science practice of mathematical and computational thinking, the student demonstrates knowledge that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total amount of matter is conserved.

Achievement Level Descriptor: Students who answer this item correctly are performing at a level of 4 or higher. The student can use quantities in graphs and tables to support an explanation that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total amount of matter is conserved.

Which statement best explains why the frozen and melted masses in Table 1 are different?

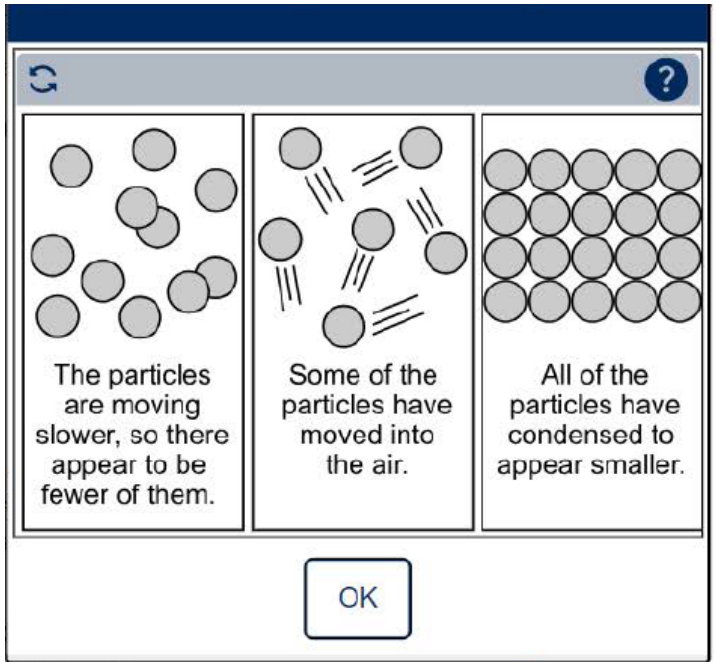
C. The melted mass is greater because the mass includes the fruit pop and the paper cup.*

Rationales
A. The mass of the fruit pop remained the same when it melted.
B. The mass of the wooden stick would be added to the mass of the fruit pop.
C. Correct.
D. Matter from the fruit pop may have been transferred to the paper cup, but the mass of the material remains the same.

Technology-Enhanced Item
Performance Expectation
5-PS1-1 Develop a model to describe that matter is made of particles too small to be seen.

Students take the experiment further by letting the fruit pop begin to evaporate. After some time they notice there seems to be less of the fruit pop in the cup.

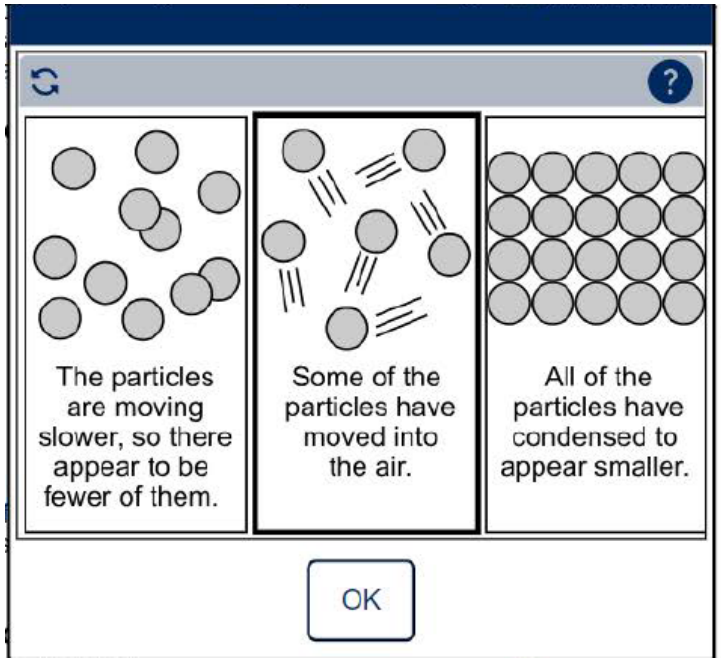
Select the image that **best** explains what the students are observing.



Multi-Dimensional Alignment: While effectively applying the science practice of developing and using models, the student demonstrates knowledge that matter is made of particles.

Achievement Level Descriptor: Students who answer this item correctly are performing at a level of 3 or higher. The student can use a model to describe that matter is made of particles.

Scoring



Rationales

Response	Rationale
The particles are moving slower, so there will be fewer of them.	The particles are moving faster, and the number of particles remains the same.
Some of the particles have moved into the air.	Correct.
All of the particles have condensed to appear smaller.	The particles have moved farther apart, and the particles remain the same size.

Two-Part Dependent
Performance Expectation
5-PS1-2 Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total amount of matter is conserved.

Part A	Part B
What change in the state of matter did the bag of broccoli go through according to Table 2? A. solid to liquid B. solid to gas C. liquid to solid D. There was no change in the state of matter.*	What was the effect of the change in the state of matter on the amount of mass the broccoli had? A. The mass decreased when the broccoli went from a solid to a gas. B. The mass decreased when the broccoli went from a solid to a liquid. C. The mass increased when the broccoli went from a liquid to a solid. D. The mass did not change because the state of matter did not change.*

Multi-Dimensional Alignment: The item requires the student to apply the science and engineering practices of using mathematical and computational thinking, and knowledge that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total amount of matter is conserved to demonstrate an understanding of energy and matter.

Achievement Level Descriptor: Students who answer this item correctly are performing at a level of 4 or higher. The student can use quantities in graphs and tables to support an explanation that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total amount of matter is conserved.

Part A
What change in the state of matter did the bag of broccoli go through according to Table 2?

D. There was no change in the state of matter.*

Part B
What was the effect of the change in the state of matter on the amount of mass the broccoli had?

D. The mass did not change because the state of matter did not change.*

Rationales

Part A

A. The broccoli remained a solid.
B. The temperature of the broccoli increased, but the broccoli remained a solid.
C. The broccoli was a solid before it was microwaved.
D. Correct.

Part B

A. The mass of a solid remains constant when it sublimates, and the broccoli remained a solid.
B. The mass of a solid remains constant when it melts, and the broccoli remained a solid.
C. The mass of a substance remains constant when it freezes, and the broccoli remained a solid.
D. Correct.

Extended Response
Performance Expectation
5-PS1-2 Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total amount of matter is conserved.

Some scientists predict that the average temperature of Earth may increase by five to ten degrees Celsius in the future.

As you respond to Part A, Part B, and Part C, follow the directions below.

- Address all the instructions in each prompt.
- Use evidence from the information provided and your own knowledge of science to support your responses.

Part A

Describe how a large area of ice or snow on Earth will change if the scientists' prediction is correct. In your response, be sure to:

- describe the change that will occur in the ice or snow
- explain how the total mass of the system will be affected by the change
- support your explanation with evidence from Table 2

Part B

Describe the arrangement of the particles in the area of ice or snow. In your response, be sure to:

- explain how the particles of matter will be arranged before and after the change
- support both explanations with evidence from Table 2

Part C

Describe the motion of the particles in the area of ice or snow. In your response, be sure to:

- explain how the particles of matter will be moving before and after the change
- support both explanations with evidence from Table 2

Multi-Dimensional Alignment: The item requires the student to apply the science and engineering practices of using mathematical and computational thinking, and knowledge that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total amount of matter is conserved to demonstrate an understanding of energy and matter.

Achievement Level Descriptor: Students who answer this item correctly are performing at a level of 5 or higher. The student can use quantities in graphs and tables to construct an explanation that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total amount of matter is conserved.

Some scientists predict that the average temperature of Earth may increase by five to ten degrees Celsius in the future.

As you respond to Part A, Part B, and Part C, follow the directions below.

- Address all the instructions in each prompt.
- Use evidence from the information provided and your own knowledge of science to support your responses.

Part A

Describe how a large area of ice or snow on Earth will change if the scientists' prediction is correct. In your response, be sure to:

- describe the change that will occur in the ice or snow
- explain how the total mass of the system will be affected by the change
- support your explanation with evidence from Table 2

Part B

Describe the arrangement of the particles in the area of ice or snow. In your response, be sure to:

- explain how the particles of matter will be arranged before and after the change
- support both explanations with evidence from Table 2

Part C

Describe the motion of the particles in the area of ice or snow. In your response, be sure to:

- explain how the particles of matter will be moving before and after the change
- support both explanations with evidence from Table 2

Score Points

- The student's score is the sum total of all the points earned across all parts (up to an item-maximum of 9 points) of the item.
- No response (blank) or a response that does not address the prompt earns 0 points.

Part A (0-3 points maximum)

- 1 point for describing a change that will occur in the ice or snow
- 2 points for describing conservation of mass:
    - Score 2 points: Correct explanation with supporting evidence from Table 2

    OR
    - Score 1 point: Correct explanation without supporting evidence

Part B (0-3 points maximum)

- 3 points for explanation of particle arrangement:
    - Score 3 points: description of particles before and after the change, with evidence from Table 2 supporting one description

    OR
    - Score 2 points: description of particles before and after the change
    - Score 2 points: description of particles before OR after the change, with evidence from Table 2 supporting the description

    OR
    - Score 1 point: description of particles before OR after the change

Part C (0-3 points maximum)

- 3 points for explanation of particle motion:
    - Score 3 points: description of particles before and after the change, with evidence from Table 2 supporting one description

    OR
    - Score 2 points: description of particles before and after the change
    - Score 2 points: description of particles before OR after the change, with evidence from Table 2 supporting the description

    OR
    - Score 1 point: description of particles before OR after the change

Sample Responses

Scoring Notes	Examples
Part A	
Description of a change that will occur in the ice or snow (1 point)	• Polar ice caps melt when they warm up. OR • Ice in a glacier warms up and melts. OR • Snow on a mountaintop melts because temperatures increase. (NOTE: Accept other relevant examples of large-scale melting of ice or snow.)
Description of the change in mass (1 point)	• There is no loss of mass, even though the ice changes forms.
Description of the supporting evidence for the change in mass from Table 2 (1 point)	• The frozen bag of green peas had the same mass as the bag of green peas after it was warmed up. (NOTE: Accept similar descriptions that mention snow and similar explanations that include the blueberries or broccoli from Table 2.)

Part B	
Description of particle arrangement before the change (1 point)	• Solid ice particles are held in a certain shape.
Description of particle arrangement after the change (1 point)	• Liquid water particles are not held in a certain shape.
Evidence from Table 2 supporting the description (1 point)	• In the frozen bag of green peas, the groups of peas held a certain shape. OR • In the bag of green peas that had been warmed up, the groups of peas could change shape. (NOTE: Accept similar descriptions that mention snow and similar explanations that include the blueberries or broccoli from Table 2.)

Part C	
Description of the particles before the change (1 point)	• Solid ice particles can move in place.
Description of the particles after the change (1 point)	• Liquid water particles are able to slide around each other.
Evidence from Table 2 supporting one description (1 point)	• In the frozen bag of green peas, the green peas could not move around each other. OR • In the bag of green peas that had been warmed up, the peas could slide past each other. (NOTE: Accept similar descriptions that mention snow and similar explanations that include the blueberries or broccoli from Table 2.)

Student Responses (ER)

Part A

Describe how a large area of ice or snow on Earth will change if the scientists' prediction is correct. In your response, be sure to:

- describe the change that will occur in the ice or snow
- explain how the total mass of the system will be affected by the change
- support your explanation with evidence from Table 2

Response 1

If the scientists prediction is correct then their will not be that much ice or snow since the hot weather will melt it into water. The mass of the system won't change …since you still have the same amount of matter if its going from solid to liquid. In table 2 it shows that the green peas starting mass was 284 grams. After the green peas weren't frozen they still had the same mass.

Score: 3

This response earns a 3. The response accurately describes the change that will occur in the ice or snow: "their will not be that much ice or snow since the hot weather will melt it into water." The response accurately explains how the total mass of the system will be affected by the change: "The mass of the system won't change…since you still have the same amount of matter if its going from solid to liquid." The response accurately supports the explanation with evidence from Table 2: "In table 2 it shows that the green peas starting mass was 284 grams. After the green peas weren't frozen they still had the same mass."

Response 2

A large area of ice or snow on Earth will change if the scientists prediction is correct because the ice or snow ill change forms. According to Table 2 it shows that when the food was still frozen it was hard buut whne it warmed up it began yo get soft. But, the mass never changed because matter can never appear or dissapear. This proves that when the temeture increases the ice or snow will warm up and eventually melt going from a solid to a liquid but, there will be no change in the mass of the matter. To conclude, a large area of ice or snow will be affected if the scientist's prediction is correct because the ice or snow will melt.

Score: 2

This response earns a 2. The response accurately describes the change that will occur in the ice or snow: “the ice or snow will melt.” The response accurately explains how the total mass of the system will be affected by the change: “, there will be no change in the mass of the matter.” The response does not accurately support the explanation with evidence from Table 2: “According to Table 2 it shows that when the food was still frozen it was hard buut whne it warmed up it began yo get soft.”

Response 3

A large area of ice of snow will change because it will go from a solid to a liquid because it would melt. On table 2 it states how a bag of peas went from hard to soft. According to Table 2, it states,"Bag was hard, stiff, and difficult to break apart with my hands." In addition, it states,"Bag was really soft."

Score: 1

This response earns a 1. The response accurately describes the change that will occur in the ice or snow: “it will go from a solid to a liquid because it would melt.” The response does not accurately explain how the total mass of the system will be affected by the change: “On table 2 it states how a bag of peas went from hard to soft.” The response does not accurately support the explanation with evidence from Table 2: “According to Table 2, it states,‘Bag was hard, stiff, and difficult to break apart with my hands.’ In addition, it states,‘Bag was really soft.’”

Response 4

The change that will occur in the ice or snow their water vaper and it change because ice is ice it's melts and snow melts but they don't melt fast because its a season. The total mass of the system will be affected by the change because the different weather if its hot or cold cold help it stay like snow hot makes it melt but if you step on ice its brakes. This evidence supports my answer on table 2 is Characteristics when Frozen and Characteristics when Warmed Up."

Score: 0

This response earns a 0. The response does not accurately describe the change that will occur in the ice or snow: “their water vaper and it change because ice is ice it's melts.” The response does not accurately explain how the total mass of the system will be affected by the change: “The total mass of the system will be affected by the change.” The response does not accurately support either explanation with evidence from Table 2: “This evidence supports my answer on table 2 is Characteristics when Frozen and Characteristics when Warmed Up.”

Part B

Describe the arrangement of the particles in the area of ice or snow. In your response, be sure to:

- explain how the particles of matter will be arranged before and after the change
- support both explanations with evidence from Table 2

Response 1

Before the change the particles in the ice and snow are closer together and more packed. After, the particles were all spread out because it changed to a liquid form. In table 2, the broccoli shows that before it was frozen and iit was stuck in place, After they were thawed they weren't stuck in place anymore.

Score: 3

This response earns a 3. The response accurately explains how the particles of matter will be arranged before the change: "Before the change the particles in the ice and snow are closer together and more packed." The response accurately explains how the particles of matter will be arranged after the change: "After, the particles were all spread out because it changed to a liquid form." The response accurately supports both explanations with evidence from Table 2: "In table 2, the broccoli shows that before it was frozen and iit was stuck in place, After they were thawed they weren't stuck in place anymore."

Response 2

The particles in te ice caps are currantly a solid, so they are close together. When the ice caps are to melt they will be spread apart, but still connected, this is proven with how the ice didnt fill up the entire bag, but went to the shape of it at the bottem and how the ice was solidly clung to the broccoli.

Score: 2

This response earns a 2. The response accurately explains how the particles of matter will be arranged before the change: "The particles in te ice caps are currantly a solid, so they are close together." The response accurately explains how the particles of matter will be arranged after the change: "When the ice caps are to melt they will be spread apart, but still connected." The response did not accurately support both explanations with evidence from Table 2: "this is proven with how the ice didnt fill up the entire bag, but went to the shape of it at the bottem and how the ice was solidly clung to the broccoli."

Response 3

The arrangtment in ice with the molecules is very tight. Since the molecules are frozen, that means that the molecules are not able to move whi he means that they are solid becusee they have to be close together.

Score: 1
This response earns a 1. It accurately explains how the particles of matter will be arranged before the change: “The arrangtment in ice with the molecules is very tight. Since the molecules are frozen, that means that the molecules are not able to move whi he means that they are solid becusee they have to be close together.” The response does not accurately explain how the particles of matter will be arranged after the change. It does not accurately support either explanation with evidence from Table 2.

Response 4

The particles of matter will be arranged before and after the change because its be frozen or it warms ups. The "Characteristics when its frozen and the Characteristics when its warmed up."

Score: 0
This response earns a 0. It does not accurately explain how the particles of matter will be arranged before or after the change: “The particles of matter will be arranged before and after the change because its be frozen or it warms ups.” The response does not accurately support either explanation with evidence from Table 2: “The "Characteristics when its frozen and the Characteristics when its warmed up.”

Part C
Describe the motion of the particles in the area of ice or snow. In your response, be sure to:
- explain how the particles of matter will be moving before and after the change
- support both explanations with evidence from Table 2

Response 1

The motion of the particals in the area of ice or snow will go from not moving at all to spread apart moving around each other. Accpording to Table 2 it shows that at first the green peas bag was hard, stiff, and hard to break apart with hand. It also shows that when it was hested up you could feel the peas rolling around in the bag. This proves that when the ice or snow melts and flows apart the ice or snow will turn into a liquid and still be cloos to each other but the particals will not be stuch together as before because the heat will break them apart. To conclude, the motion of the particals in the area of ice or snow will break apart from when they were close togteyer and movee freely but still circle around the other particals.

Score: 3
This response earns a 3. It accurately explains how the particles of matter will be moving before and after the change: “The motion of the particals in the area of ice or snow will go from not moving at all to spread apart moving around each other.” The response accurately supports both explanations with evidence from Table 2: “Accpording to Table 2 it shows that at first the green peas bag was hard, stiff, and hard to break apart with hand. It also shows that when it was hested up you could feel the peas rolling around in the bag.”

Response 2

The particles will first not move, because they are attacked to themselves or the broccoli in this case. After the ice melts into water it will be able to move around more, but will still be attached and pulled down by gravity like how it didnt fly around in the bag and settled at the bottom together in the shape of the bag instead.I.

Score: 2

This response earns a 2. It accurately explains how the particles of matter will be moving before and after the change: "The particles will first not move." It accurately explains how the particles of matter will be moving after the change: "After the ice melts into water it will be able to move around more." The response does not accurately support either explanation with evidence from Table 2: "like how it didnt fly around in the bag and settled at the bottom together in the shape of the bag instead."

Response 3

The particles will be moving farther apart after the change of the ice melting.

Score: 1

This response earns a 1. It accurately explains how the particles of matter will be moving after the change: "The particles will be moving farther apart after the change of the ice melting." The response does not address how the particles of matter will be moving before the change. The response does not support either explanation with evidence from Table 2.

Response 4

The particles of matter will be moving before and after a change because they devlope they move slow but everywhere. Bags was hard to break through by hands and its was diffuclut of the shapes to places.

Score: 0

This response earns a 0. It does not accurately explain how the particles of matter will be moving before and after the change: "The particles of matter will be moving before and after a change because they devlope they move slow but everywhere." The response does not accurately support both explanations with evidence from Table 2: "Bags was hard to break through by hands and its was diffuclut of the shapes to places."

Resources

Contact the LDOE

- assessment@la.gov for assessment questions
- STEM@la.gov for instructional or curriculum implementation support
- AskLDOE for general questions
- ldoecommunications@la.gov to subscribe to newsletters; include the newsletter(s) you want to subscribe to in your email

Updates Log

The table below lists any updates made to this document after the original posting date.

Available	Description of Updates
July 2025	Document original posting.

Email assessment@la.gov with any questions or comments about this released item guide.