Coherence and Alignment Among Science Curriculum, Instruction, and Assessment (CASCIA) Project

CASCIA Grade 5 Unit 1 End-of-Unit Assessment Scoring Guide

November 2024

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Student Worksheet

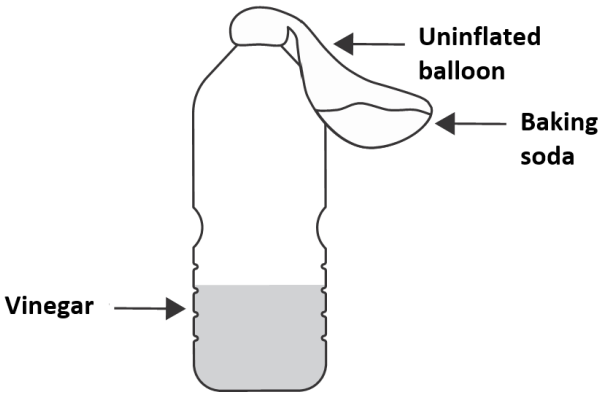
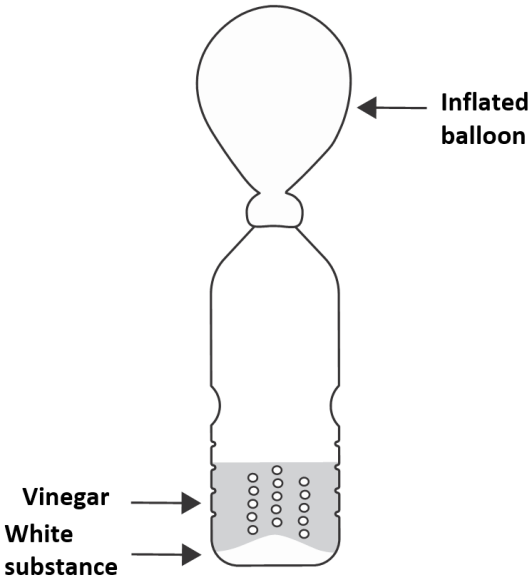
This task is about the results of mixing solids with liquids.

Task

Ms. Kim's students are learning about matter. Matter can be a liquid, solid, or gas. Ms. Kim plans to show what can happen when a liquid and solid are mixed together. Vinegar is a clear liquid. Baking soda is a white powder.

Prompt 1

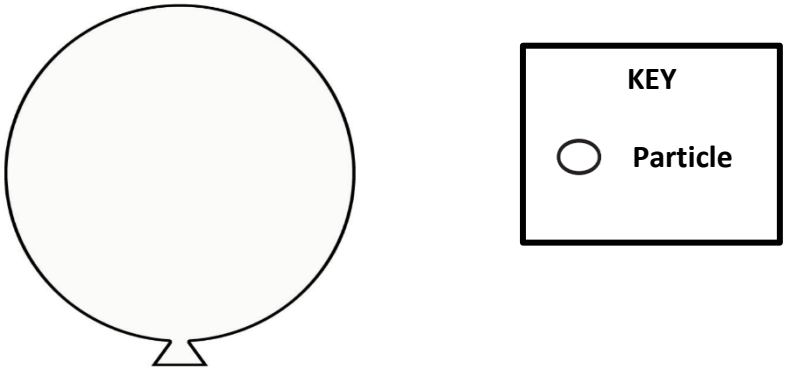
Before mixing, Ms. Kim pours some vinegar into a bottle. Then she places some baking soda into an uninflated balloon. Next, she attaches the balloon to the top of the bottle. To mix the two materials, Ms. Kim lifts the balloon and the baking soda falls into the vinegar.

Before Mixing	After Mixing
	

Part A.

After mixing the vinegar and baking soda, bubbles form. The balloon begins to expand. Ms. Kim tells the students that the gas from the bubbles fills the balloon.

In the space below, draw the arrangement of the particles **in the balloon after mixing**. Use the symbol of a particle in the key to draw the particles.



Gas

Part B.

Ms. Kim tells the students that when materials are mixed, they can make a gas. Gases cannot be seen.

Use your particle arrangement drawing to explain why the students cannot see the gas particles inside the balloon.

_____

_____

_____

_____

Part C.

Ms. Kim tells the students that we can see solids and liquids. Solids and liquids are also made of particles like gases. Then, a student says the following:

The particles of solids and liquids are arranged the same as gases. We can see solids and liquids because their particles are much bigger than gas particles.

Do you agree with the student's description of why we can see solids and liquids?

Circle your answer. **YES** **NO**

Use what you know about the arrangement **AND** size of particles of matter to explain your answer.

_____

_____

_____

_____

Prompt 2

Ms. Kim provides Table 1. It shows the properties of three solids. It also shows reactions, or changes, when each of the solids is mixed with water or vinegar.

Table 1. Material Properties

Solid	Description of Appearance	Mixed with Water	Mixed with Vinegar
Baking Soda	White powder	Dissolves	Forms bubbles
Corn Starch	White powder	Forms a white mixture	Forms a white mixture
Powdered Sugar	White powder	Dissolves	Dissolves

Next, Ms. Kim shows the students three unknown solids. Ms. Kim tells the class each of the unknown solids is one of the solids in Table 1.

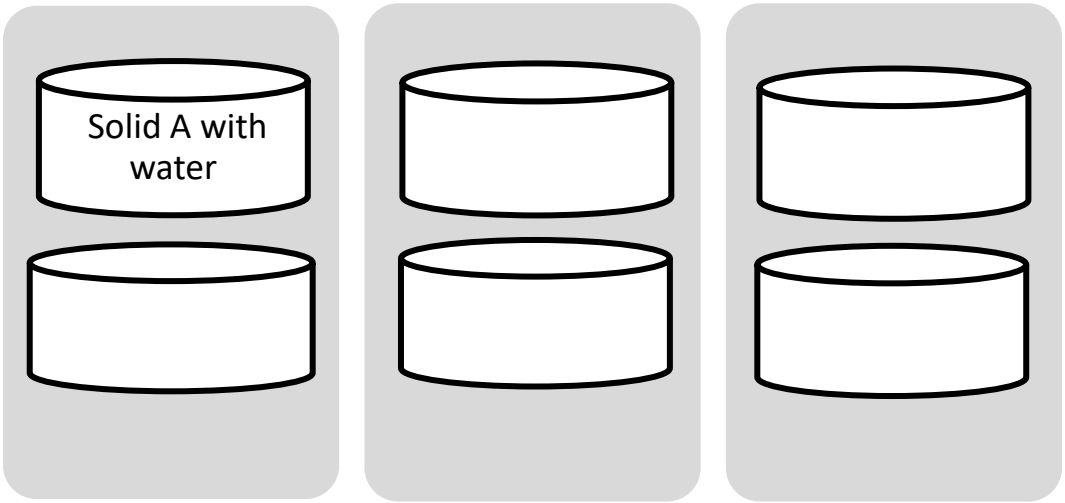
The unknown solids are labeled as:

- Solid A
- Solid B
- Solid C

Ms. Kim asks the students to think of a way to identify the unknown solids.

Complete **Diagram 1** with mixtures of unknown solids, water, and vinegar that can be used to identify the unknown solids. One mixture is filled in.

Diagram 1. Mixtures of Unknown Solids with Liquids



Prompt 3

Which mixtures and observations would determine that **Solid B** is powdered sugar? Use **Table 1** and the completed **Diagram 1** to support your explanation.

I would mix **Solid B** with _____because

_____.

I will know **Solid B** is powdered sugar if_____

_____.

SIPS Grade 5 Unit 1 EOU Assessment Task 1 Rubric (5-PS1-1, 5-PS1-3, 5-PS1-4)

Prompt	Score Point 0	Score Point 1	Score Point 2	Score Point 3
Prompt 1 **Part A. & Part B.** **Scored Responses**	No aspect of the response is correct	Response includes **one (1)** of the **two (2)** aspects	Response includes the following aspects: **Part A** • The drawing represents gas particles that are spaced widely apart and distributed throughout the balloon **AND** **Part B** • Evidence from the drawing supports an explanation that the particles are spread far apart, and each particle is too small to be seen	NA
Prompt 1 **Part C.** **Scored Responses**	No aspect of the response is correct	Response includes **one (1)** of the **three (3)** aspects	Response includes **two (2)** of the **three (3)** aspects	Response includes the following aspects: • Circles "**NO**" • Uses the particle arrangement of matter to support their explanation

Prompt	Score Point 0	Score Point 1	Score Point 2	Score Point 3
				• Uses the size of particles of matter to support their explanation
Prompt 2 **Scored Responses**	No aspect of the response is correct	Response includes **one (1)** of the **five (5)** correct mixtures that can be used to identify the unknown solids	Response includes **two (2)** or **three (3)** of the **five (5)** correct mixtures that can be used to identify the unknown solids	Response includes **four (4)** or **five (5)** of the **five (5)** correct mixtures that can be used to identify the unknown solids
Prompt 3 **Scored Responses**	No aspect of the response is correct	Response includes **one (1)** of the **three (3)** aspects	Response includes **two (2)** of the **three (3)** aspects	Response includes the following aspects: • Solid B needs to be mixed with both liquids • Solid B must dissolve in both liquids • Only powdered sugar dissolves in both liquids **OR** • Solid B needs to be mixed with vinegar • Solid B must dissolve in vinegar • Only powdered sugar dissolves in vinegar

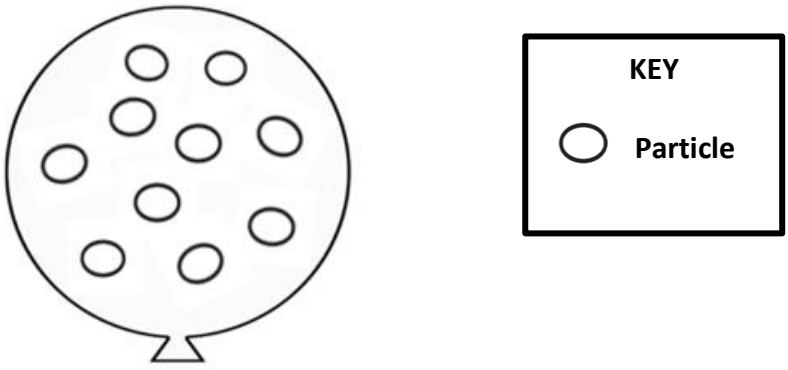
Student Exemplars

Student exemplars represent high-quality responses that align to full-point rubric scores. The exemplar responses are intended to assist educators' understanding of the nature and expectations of each prompt. Note the exemplars serve as examples of high-quality responses, and students may respond with equally relevant, scientifically accurate responses and ideas that meet the expectations of a full-point rubric score.

Prompt 1

Part A.

*In the space below, draw the arrangement of the particles **in the balloon after mixing**. Use the symbol of a particle in the key to draw the particles.*



Gas

Part B.

Use your particle arrangement drawing to explain why the students cannot see the gas particles inside the balloon.

Gas is produced. The gas fills and inflates the balloon. The students cannot see the gas particles because they are very tiny. Like in my drawing, gas particles fill up the space in the balloon because they are spread far apart.

Part C.

Do you agree with the student's description of why we can see solids and liquids?

Circle your answer. ***YES*** ***NO***

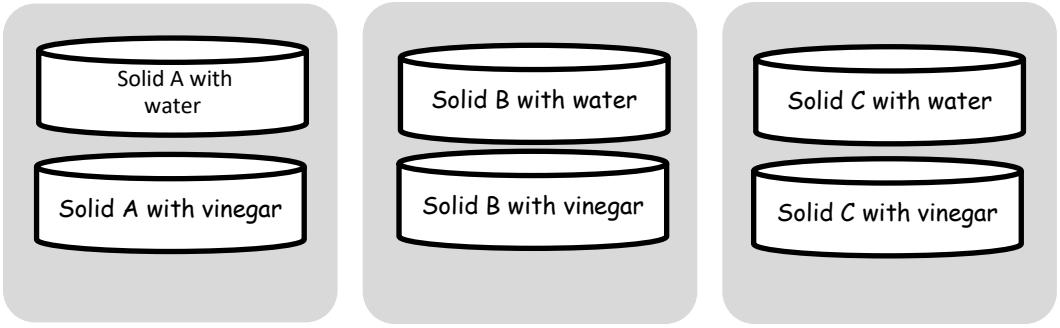
*Use what you know about the arrangement **AND** size of particles of matter to explain your answer.*

I disagree because all matter is made of particles too small to be seen. That means I can't see the particles of solids and liquids or gases. The reason why I can see a solid or liquid is because of the arrangement of the particles. Because gas particles are spread far apart is why gas cannot be seen. I can see solids and liquids because the particles are close together, but I would not be able to see a single particle. It would be too small.

Prompt 2

*Complete **Diagram 1** with mixtures of unknown solids, water, and vinegar that can be used to identify the unknown solids. One mixture is filled in.*

Diagram 1. Mixtures of Unknown Solids with Liquids



Prompt 3

*Which mixtures and observations must be collected to determine that **Solid B** is powdered sugar? Use **Table 1** and **Diagram 1** to support your explanation.*

*I would mix **Solid B** with* each of the liquids *because* powdered sugar dissolves in both water and vinegar.

*I will know **Solid B** is powdered sugar if* the powder dissolves in both liquids, and there is no reaction.

OR

*I would mix **Solid B** with* vinegar *because* only powdered sugar dissolves in vinegar.

*I will know **Solid B** is powdered sugar if* the powder dissolves in vinegar, and there is no reaction, and no white substance is formed.

Student Worksheet

This task is about properties of matter.

Task

Have you ever reached for a glass of ice water to have the glass slip from your hand? When you pour the water over the ice, the glass is dry on the outside. But when you pick it up later, the outside of the glass is covered with water droplets. Condensation occurs when water vapor cools and forms water droplets on a surface.

The pictures below show Glass 1 with no ice and Glass 2 with ice.

- Each glass is the same size.
- Each glass is filled with the same amount of room temperature water.
- Ice cubes are only added to **Glass 2.**

Glass 1 with No Ice

Glass 2 with Ice

After a few minutes, there is no change to Glass 1.

After a few more minutes, water droplets form on the surface of Glass 2.

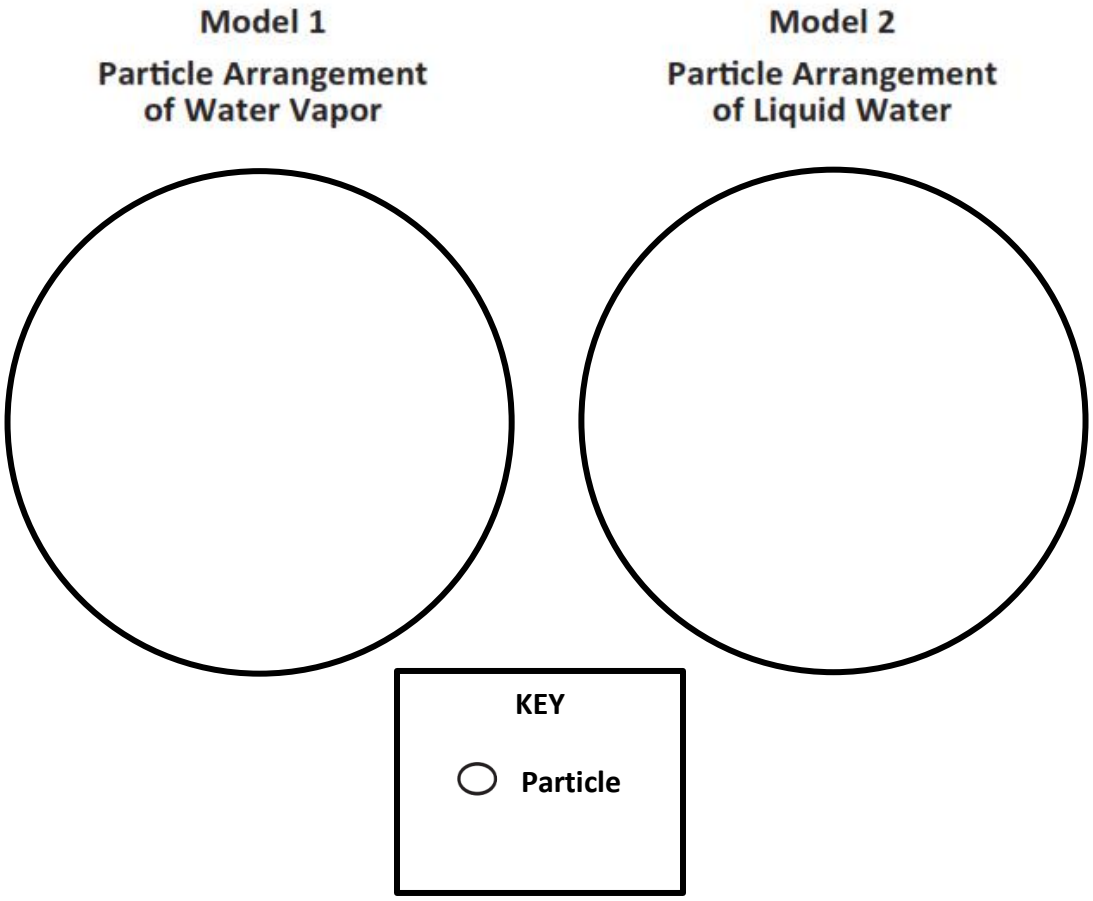
Prompt 1

Part A.

Condensation happens when particles in a gas cool down. As the gas particles cool, they begin to move closer together. Finally, the particles form a liquid.

When water is a gas, it is called water vapor. When water vapor cools, it forms liquid water.

- Use **Model 1** to draw the particle arrangement of water particles in water vapor.
- Use **Model 2** to draw the particle arrangement of water particles in liquid water.
- Use the symbol of a particle in the key to draw the particles.



Part B.

Explain how the process of condensation supports the idea that all single water particles are too small to be seen. Use your particle arrangement drawings to support your response.

_____

_____

_____

_____

_____

Prompt 2

Materials can be identified by their properties. One property is how long it takes heat to flow through a material.

An investigation is conducted to measure how quickly heat flows through three different materials used to make drinking containers. Each container is filled with the same amount of water. For each of the three containers:

- The starting temperature of the water is measured.
- After 20 minutes, the final temperature of the water is measured.
- The total amount of heat loss is calculated.

Table 1 describes the observable properties of the three different drinking containers **A**, **B**, and **C**. It also shows the property of heat flow as the amount of heat lost by the water in each drinking container after 20 minutes.

Table 1. Properties of Drinking Containers

Drinking Container	Property of Material	Amount of Heat Lost (in Degrees Fahrenheit
A	• clear, blue color • stiff	41°F
B	• white color • bends slightly • goes back into shape without breaking	38°F
C	• bright silver • bendable • bending results in a dent	48°F

Materials with high heat flow lose heat much faster than materials with low heat flow.

Use **Table 1** to identify the drinking container with the **highest** rate of heat flow. Compare data from all three drinking containers to explain your answer.

The drinking container with the **highest** rate of heat flow is_____.

I know this because_____

_____

_____.

Prompt 3

Part A.

Table 2 shows the properties of three different materials used to make drinking containers.

Table 2. Properties of Drinking Container Materials

Material	Properties
Foam	• extremely light weight and flexible • usually white in color • very low heat flow
Metal	• moderately light material • shiny surface • high heat flow
Plastic	• light weight material • may be transparent • low heat flow

Use the results from **Table 1** and information from **Table 2** to identify the material used to make **one** of the drinking containers used in the investigation. Compare the data from all three drinking containers to explain how you identified the material.

The material used to make **Drinking Container** _____ is _____.

I know this because _____

_____

_____.

Part B.

Which measurements **AND** observations are the most useful to identify the material used to make the drinking container?

The most useful measurements are _____

_____.

The most useful observations are_____

_____.

SIPS Grade 5 Unit 1 EOU Assessment Task 2 Rubric (5-PS1-1, 5-PS1-2, 5-PS1-3)

Prompt	Score Point 0	Score Point 1	Score Point 2	Score Point 3	Score Point 4
Prompt 1 Part A. Scored Responses	No aspect of the response is correct	Response includes **one (1)** of the **two (2)** aspects	The response includes the following aspects: • Model 1 shows the arrangement of water vapor particles spread widely apart and distributed throughout the drawing • Model 2 shows the arrangement of liquid water particles spread slightly apart	NA	NA
Prompt 1 Part B. Scored Responses	No aspect of the response is correct	Response includes **one (1)** of the **three (3)** aspects	Response includes **two (2)** of the **three (3)** aspects	Response includes the following aspects: • Indicates that condensation is the movement of particles in the air to a surface • References the drawings of particles	NA

Prompt	Score Point 0	Score Point 1	Score Point 2	Score Point 3	Score Point 4
				arrangements for water vapor and liquid water • Uses evidence to support an explanation that a single water particle is too small to be seen	
Prompt 2 **Scored Responses**	No aspect of the response is correct	Response includes **one (1)** of the **two (2)** aspects	Response includes the following aspects: • **Container C** has the highest rate of heat flow • Explains how the data supports the conclusion	NA	NA
Prompt 3 Part A. & Part B. **Scored Responses**	No aspect of the response is correct	Response includes **one (1)** of the **three (3)** aspects	Response includes **two (2)** of the **three (3)** aspects	Response includes the following aspects: **Part A** • Correctly identifies the material of **one** of the containers • Evidence to support the determination of the material for	NA

Prompt	Score Point 0	Score Point 1	Score Point 2	Score Point 3	Score Point 4
				<u>one</u> container is based on information from Table 1 **<u>and</u>** Table 2 **AND** **Part B** • Measuring change in temperature or rate of heat flow as the most useful measurement **<u>and</u>** surface description as the most useful observation to identify the material	

Student Exemplar(s)

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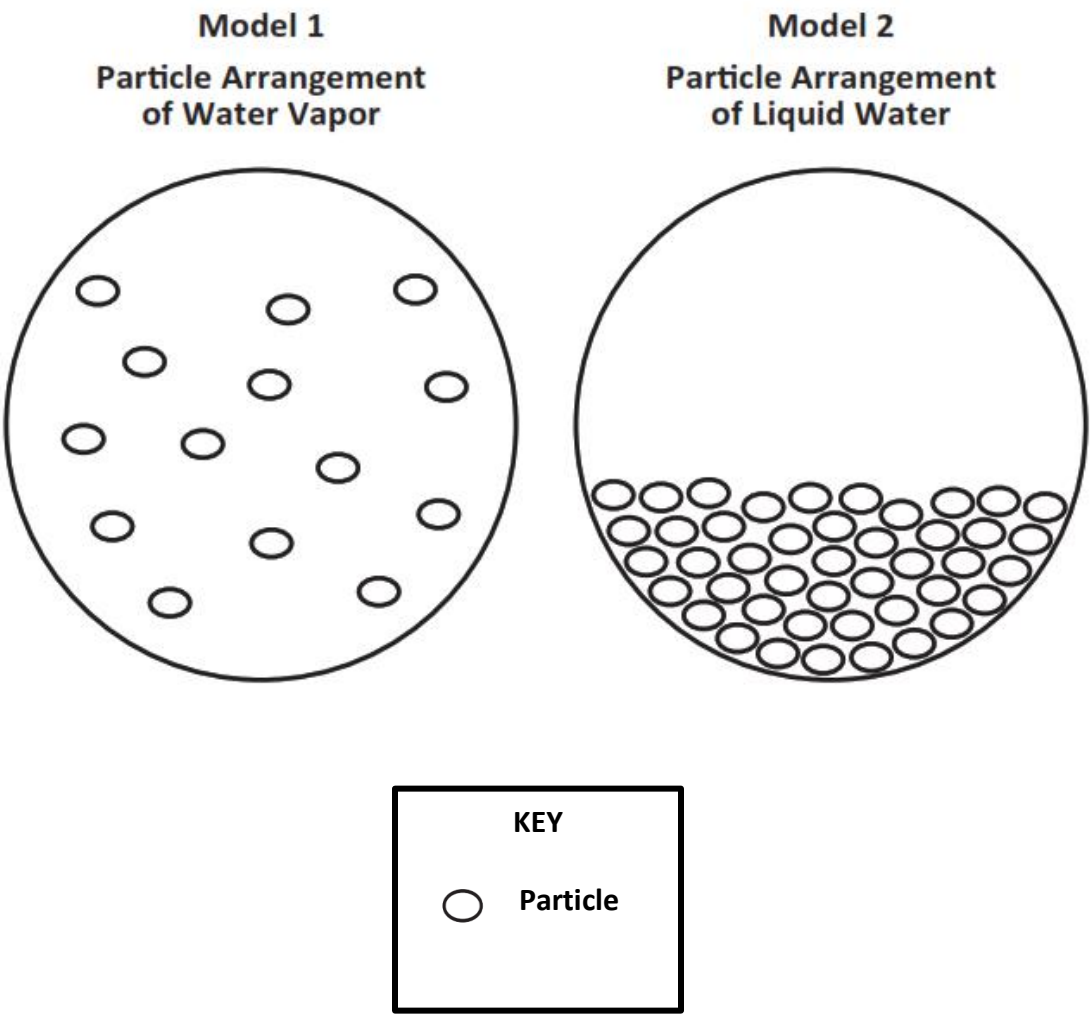
Prompt 1

Part A.

When water is a gas, it is called water vapor. When water vapor cools, it forms liquid water.

- *Use **Model 1** to draw the particle arrangement of water particles in water vapor.*
- *Use **Model 2** to draw the particle arrangement of water particles in liquid water.*
- *Use the symbol of a particle in the key to draw the particles.*



Part B.

Explain how the process of condensation supports the idea that all single water particles are too small to be seen. Use your particle arrangement drawings to support your response.

When condensation happens, the water particles in water vapor cool and move closer together. Then it becomes liquid water droplets on the glass. That means the water particles in a gas that I cannot see are the same water particles that form liquid water. My drawings show how the water particles are spread out more in a gas than in a liquid. That is why I can see liquid water. But I can't see single water particles because each one is too small to be seen.

Prompt 2

*Use **Table 1** to identify the drinking container with the **highest** rate of heat flow. Compare data from all three drinking containers to explain your answer.*

*The drinking container with the **highest** rate of heat flow is* C.
I know this because Container C lost the most amount of heat from start to finish.

Prompt 3

Part A.

*Use the results from **Table 1** and information from **Table 2** to identify the material used to make **one** of the drinking containers used in the investigation. Compare the data from all three drinking containers to explain how you identified the material.*

*The material used to make **Drinking Container** A is* plastic. *I know this because* it is stiff and has a clear blue color. Of the three containers, it was second best at keeping the temperature of the water warm.

OR

*The material used to make **Drinking Container*** B *is* foam.

I know this because it is described as white in color and loses the least amount of heat or has very low heat flow.

OR

*The material used to make **Drinking Container** C is* metal. *I know this because* it has a shiny silver surface and loses the most amount of heat or has a high rate of heat flow.

Part B.

*Which measurements **AND** observations are the most useful to identify the material used to make the drinking container?*

The most useful measurements are taking the temperature to find heat flow rates*.*

The most useful observations are the descriptions of what the surface of each container looks like*.*

Student Worksheet

This task is about the results of mixing materials.

Task

Mr. Carter and his students design an investigation to determine if mixing different substances can result in a new substance. The students ask if the total mass of the combined substances will stay the same if a new substance is formed. Mr. Carter says, "Great question! Let's investigate to find out what happens."

Prompt 1

Mr. Carter has a solution of water and soda ash in Jar A and a solution of water and Epsom salt in Jar B. Mr. Carter slowly combines the solutions from Jar A and Jar B into Jar C.

Table 1 shows the students' record of their observations.

Table 1. Record of Observations

Solution in Jar A	Solution in Jar B	Solution in Jar C
After mixing the soda ash and water, the solution is clear.	After mixing the Epsom salt and water, the solution is clear.	After mixing the two clear solutions together, a white solid is seen on the bottom of the jar.

Part A.

Did mixing the two solutions together cause a new substance to form? Circle your answer.

A new substance IS formed. **A new substance IS NOT formed.**

Part B.

Use **Table 1** showing the students' observations of Jar A, Jar B, and Jar C to support your answer to **Part A**.

_____

_____

_____

_____

Prompt 2

In Table 2 and Table 3, Mr. Carter writes the mass, in grams, of the materials in Jar A and Jar B on the board.

Table 2.

Mass of Solution in Jar A

Substance	Mass (in g)
Water	40
Soda ash	13

Table 3.

Mass of Solution in Jar B

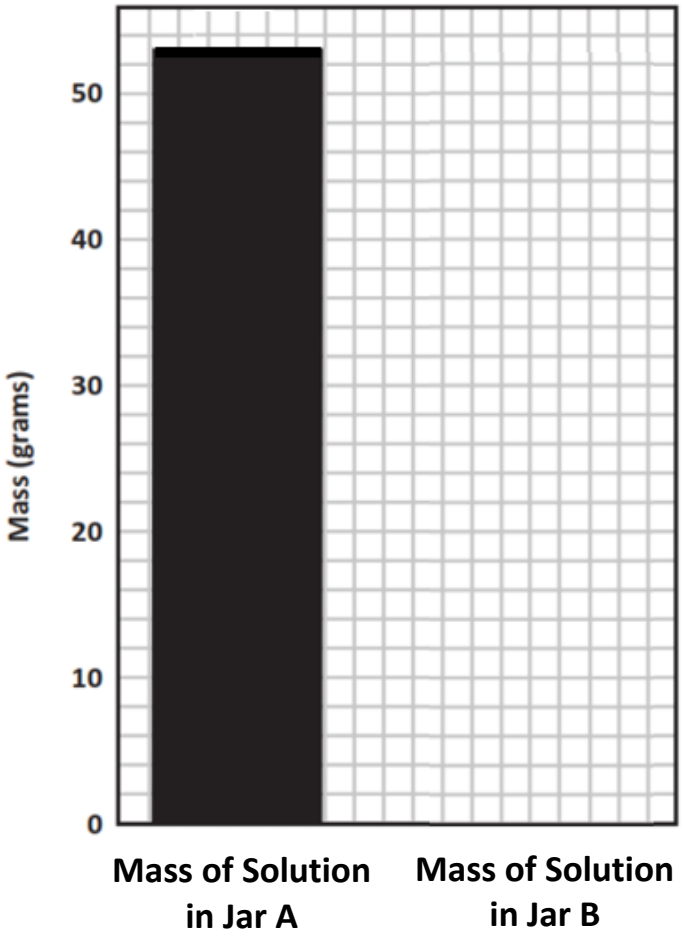
Substance	Mass (in g)
Water	40
Epsom salt	8

Part A.

Graph 1 shows the total mass of the materials in Jar A.

Use the data in **Table 3** to complete **Graph 1** to show the total mass of the solution in Jar B.

Graph 1. Mass of the Solution in Jar A and the Mass of the Solution in Jar B



Part B.

Mr. Carter tells the students that the total mass of the combined solutions in Jar C is 101 grams. Then, Mr. Carter writes the following sentence on the board:

> **When a new substance is formed by mixing different materials, the total mass of the new substance is equal to the combined masses of the original materials.**

Do you agree with Mr. Carter's description of the results of the investigation?

Circle your answer. **YES** **NO**

Use the information from **Graph 1** and the total mass of **Jar C** to support your answer to **Part B**.

Graph 1 shows_____

_____

_____.

The total mass of the solution of Jar C is_____.

So, when the solutions were mixed and a change occurred, _____

_____

_____.

SIPS Grade 5 Unit 1 EOU Assessment Task 3 Rubric (5-PS1-2, 5-PS1-3, 5-PS1-4)

Prompt	Score Point 0	Score Point 1	Score Point 2	Score Point 3	Score Point 4
Prompt 1 Scored Responses	No aspect of the response is correct	Response includes **one (1)** of the **three (3)** aspects	Response includes **two (2)** of the **three (3)** aspects	Response includes the following aspects: **Part A** • Circles "**A new substance IS formed.**" **AND** **Part B** • Describes the solutions in Jars A and B as being clear • Describes the solution in Jar C as forming a solid or white solid	NA
Prompt 2 Scored Responses	No aspect of the response is correct	Response includes **one (1)** of the **four (4)** aspects	Response includes **two (2)** of the **four (4)** aspects	Response includes **three (3)** of the **four (4)** aspects	Response includes the following aspects: **Part A** • Completes bar graph to show Solution B as 48 grams **AND**

Prompt	Score Point 0	Score Point 1	Score Point 2	Score Point 3	Score Point 4
					Part B • Circles "**YES"** • Describes the combined mass of solutions A and B as 101 grams **and** the total mass of Jar C as 101 grams • Describes that mass is conserved or remains the same after mixing

Student Exemplar(s)

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Prompt 1

Part A.

Did mixing the two solutions together cause a new substance to be formed? Circle your answer.

A new substance IS formed. ***A new substance IS NOT formed.***

Part B.

*Use **Table 1** showing the students' observations of Jar A, Jar B, and Jar C to support your answer to **Part A**.*

The solutions in Jar A and in Jar B were clear. After the solutions were combined, a solid, white substance formed in Jar C. This must be a new substance because the other solutions were clear.

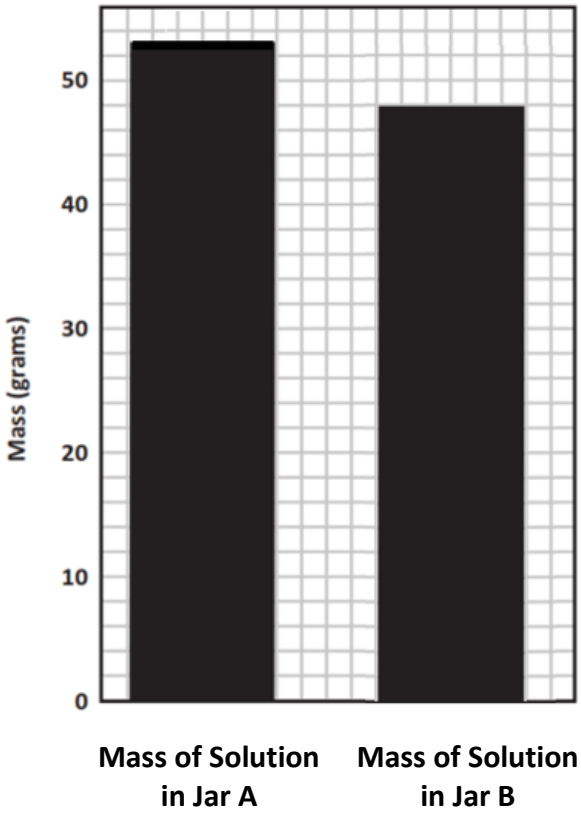
Prompt 2

Part A.

Graph 1 shows the total mass of the materials in Jar A.

*Use the data in **Table 3** to complete **Graph 1** to show the total mass of the solution in Jar B.*

Graph 1. Mass of the Solution in Jar A and the Mass of the Solution in Jar B



Part B.

Do you agree with Mr. Carter's description of the results of the investigation?

Circle your answer. **YES** **NO**

*Use the information from **Graph 1** and the total mass of **Jar C** to support your answer to **Part B**.*

Graph 1 shows the total weight of solution A and solution B adds up to 101 grams.

The total mass of the solution of Jar C is 101 grams.

So, when the solutions were mixed and a change occurred, the total mass of the new substance is equal to the combined masses of the original materials which is 101 grams.