

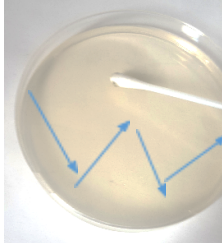
Name _____ Date _____

**SEN Entry 4-2: Making Predictions About the Causes of Changes in
Landfill Bottles**

Write your prediction of the cause of changes in the food materials in the landfill bottle.

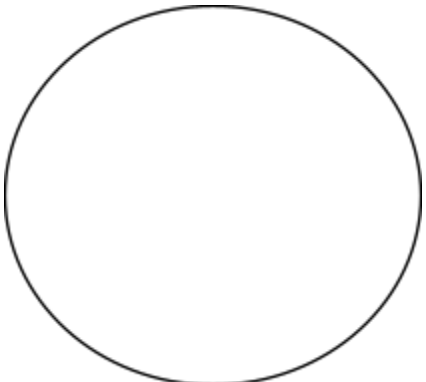
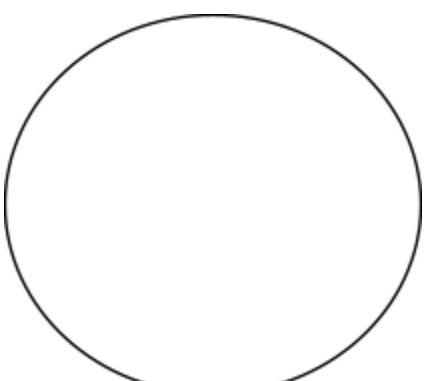
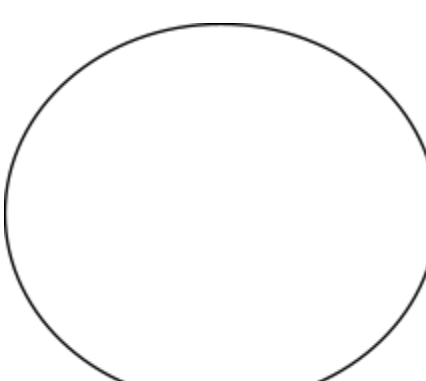
Name _____ Date _____

Investigation 4-2: Agar Plate

Investigation plan		✓
1	Gather supplies for the group: € Paper towels/Newspaper cover for desktop € Plastic gloves (1 pair per student) € Safety goggles (1 per student) € Agar plates (1 per group) € Cotton swabs (1 per group) € Landfill bottle with food and nonfood materials € 1 Permanent marker € 1 Piece of masking tape € 1 Plastic baggie (big enough to fit the agar plate) € Antiseptic wipes	
2	Clear the desks and cover the desktop with newsprint.	
3	Put on plastic gloves.	
4	Observe the agar in the agar plate. Do not open. Draw a diagram of the agar plate below.	
5	Prepare agar plate: € Take off the clear plastic lid of agar plate and lay it on the desk. The lid is the part without agar gel. € Use a cotton swab to swab the material your teacher has assigned to your group. € Gently move the swab back and forth on the agar plate to transfer the contents of the cotton swab to the agar plate. € Place the cotton swab to the side. € Put the lid back on the agar plate.	  

6	Label agar plate: € Use the permanent marker to write on a piece of masking tape the: - o Group number - o Condition on the agar plate ▪ Example: Group #1 food € Stick the label on the bottom of the agar plate.		
7	Draw a second diagram of the agar plate in the investigation packet. Make sure to keep the agar plate closed.		
8	Place the agar plate into a baggie (upside down, and the label up) and close the baggie.		
9	Place the baggie with the agar plate in a warm location (e.g., under a lamp, by a window).		
10	Clean up: € Throw out the newsprint, cotton swabs, and plastic gloves in the hazardous waste bag. € Clean the desks with antiseptic wipes.		

Investigation 4-2 Observations:

Agar plate before swabbing:	
	Date: _____ Material Swabbed: _____ Observations:
Agar plate after swabbing:	
	Date: _____ Material Swabbed: _____ Observations:
Agar plate after 2-3 days:	
	Date: _____ Material Swabbed: _____ Observations:

Investigation 4-2: Agar Plate (Questions)

1. What do you predict will happen to the agar plate after 3 days?

Investigation Questions to Answer after 2-3 Days:

2. What is on the agar plate? How do you know?

3. What do your observations of the agar plate tell you about the landfill bottles?

Name _____ Date _____

Article 4-2: Decomposers in Our Environment

Have you ever opened the refrigerator door and immediately smelled something bad? Oops! You forgot to throw out an apple. Now the apple is rotten. What happened to the apple?



Decomposition

When materials break down into smaller or simpler parts, scientists call this process *decomposition*. The decomposition of materials causes the properties of the materials to change. For example, when you first put the apple in the refrigerator, the apple was red and fresh-smelling. When the apple decomposed, or broke down, it turned brown and smelly. Scientists have observed the decomposition of many different types of materials, including watermelons, leaves, and bread. They have noticed a pattern of changes in the properties of these materials. All of these materials change color and start to smell bad when they decompose. What causes these materials to decompose?

Types of Decomposers

Organisms that break down materials are called *decomposers*. There are two different types of decomposers: animals and microbes.

Animals

When organisms die, some animals break down these dead organisms by eating them. These animals are decomposers because they eat dead plant and animal materials. Cockroaches, earthworms, and ants are all examples of decomposers.



Cockroach



Earthworms



Ants

Microbes

Another type of decomposer is microbes. Similar to animal decomposers, microbes break down plant and animal materials by eating them. Microbes decompose these materials into small pieces that end up in the soil or in the air as gases. When microbes decompose plant and animal materials, they release gases that smell. Remember, it was the decomposing apple that caused the refrigerator to smell so bad.

Microbes are so small that we cannot see them unless there are many in one place. Scientists use a special tool called an agar plate to observe microbes that are too small to see. Microbes on an agar plate multiply to a large number and appear as a blob. Scientists refer to these blobs as colonies of microbes. When there are colonies on an agar plate, scientists have evidence that microbes are present. Bacteria and some fungi are both examples of microbes.



Agar plate with colonies of microbes



Microbes on food materials



Microbes enlarged under a microscope

Nombre _____ Fecha _____

Artículo 4-2: Descomponedores en Nuestro Ambiente

¿Alguna vez abriste el refrigerador e inmediatamente oliste algo feo?
¡Oops! Te olvidaste de tirar la manzana. Ahora la manzana está podrida. ¿Qué le paso a la manzana?



Descomposición

Cuando los materiales se reducen a partes más pequeñas, los científicos llaman este proceso *descomposición*. La descomposición de materiales hace que las propiedades de los materiales cambien. Por ejemplo, cuando pusiste la manzana en el refrigerador por primera vez, la manzana era roja y tenía olor fresco. Cuando la manzana se descompuso, o redujo, se volvió marrón y olorosa. Los científicos han observado la descomposición de muchos tipos de materiales diferentes, como sandías, hojas y pan. Han encontrado un patrón de cambios en las propiedades de estos materiales. Todos ellos cambian de color y empiezan a oler mal cuando se descomponen. ¿Qué hace que estos materiales se descompongan?

Tipos de Descomponedores

Los organismos que descomponen los materiales se llaman *descomponedores*. Hay dos tipos diferentes de descomponedores: animales y microbios.

Animales

Cuando los organismos mueren, algunos animales reducen estos organismos muertos al comerlos. Estos animales son descomponedores porque comen plantas muertas y materiales animales. Cucarachas, gusanos y hormigas son todos ejemplos de descomponedores.



Cucaracha

Gusanos

Hormigas

Microbios

Otro tipo de descomponedores son los microbios. Similar a los animales descomponedores, los microbios reducen los materiales vegetales y animales comiéndolos. Los microbios descomponen estos materiales en pequeñas partes que terminan en la tierra o en el aire en forma de gases. Cuando los microbios descomponen los materiales vegetales y animales, liberan gases que huelen mal. Recuerda, era la manzana descomponiéndose la que causaba que el refrigerador oliera tan mal.

Los microbios son tan pequeños que no podemos verlos a menos de que haya muchos juntos en un lugar. Los científicos usan una herramienta especial llamada placa de agar para observar microbios que son muy pequeños para ver. En la placa de agar, los microbios se multiplican en gran número y se ven como una gota. Los científicos refieren a estas gotas como colonias de microbios. Cuando hay colonias en una placa de agar, los científicos tienen evidencia de que hay microbios presentes. Bacterias y algunos hongos son ejemplos de microbios.



Placa de agar con colonias de microbios



Microbios en comida



Microbios agrandados bajo un microscopio

Name _____ Date _____

Article 4-2: Questions**Use the article to respond to the following questions:**

1. What breaks down plants and animals?

2. What are microbes? What do they do?

3. What makes food materials decompose in the landfill?

4. What causes the smell in the landfill bottles?

Name _____ Date _____

Explanation 4-2

Question: _____ _____	
Claim: _____ _____	
Evidence:	Why did you use these data?
_____ _____ _____	_____ _____ _____
_____ _____ _____	_____ _____ _____
_____ _____ _____	_____ _____ _____
Reasoning: _____ _____ _____	

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Teacher Feedback:

	Comments
Claim	
Evidence	
Reasoning	

Name _____ Date _____

Lesson 4-2: SELF AND PEER CHECK! Group Model of Landfill Bottle Systems

Instructions: The purpose of this activity is to provide feedback to another group on their landfill bottle system model. As another group presents their model, check whether they have included the components, processes, and modeling conventions listed in the table below. Then, use this information to ask questions that will help the group revise their model.

Example: If a group's model does not show microbes breaking down food materials, you might ask, "What causes changes in the food materials? What is your evidence?"

Does the model include the following components?		YES
Open and closed landfill bottles		☐
Garbage materials		☐
Microbes		☐
Gas particles (smell)		☐
Does the model include the following processes?		
The properties of the food materials changed over time.		☐
The weight of the closed system stayed the same, but the weight of the open system decreased over time.		☐
Microbes break down food materials.		☐
Gas particles (smell) are produced in both systems and move freely out of the open system.		☐
Does the model follow modeling conventions?		
Components and processes are clearly identified using labels and/or a key.		☐

Identify one area for improvement in your peer group's model.

Name _____ Date _____

Thinking About The Garbage Unit

1. What did you learn in this science unit that you did not know before?

2. What was your favorite part of this unit? Why?

3. What did you think of each of the following investigations in the unit? Put an X under your rating for each investigation.

Investigation	Loved it!	It was okay	Did not like it much
Landfill bottle investigation			
Crush investigation			
Mixing water and sugar investigation			
Syringe investigation			
Rock salt and baking soda investigation			
Microbes investigation			

4. What did you think of each of the following practices and crosscutting concepts you participated in? Put an X under your rating.

Practice	Loved it!	It was okay	Did not like it much
Developing models			
Planning and carrying out investigations			
Writing arguments and explanations			

Crosscutting Concept	Loved it!	It was okay	Did not like it much
Finding patterns			
Identifying system components and how they go together (landfill bottle, garbage collection)			
Finding the conservation of matter (weight) in investigations (landfill bottles, crush investigation, rock salt, baking soda, and water investigation)			

5. Which investigations and/or practices were most helpful for answering the Driving Question (*What happens to our garbage*)? Why?
