SEPARATING MIXTURES

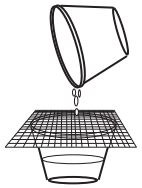
PART 1. Prepare three cups. Put one level spoon (5-ml spoon) of each solid material in its cup. Observe the three solid materials. Fill in the property chart below.

	Color	Texture	Particle shape	Particle size	Other
Gravel					
Powder (diatomaceous earth)					
Salt (sodium chloride)					

PART 2. Add 50 ml of water (one full syringe) to each cup. Stir and observe. Write your observations here.

Gravel and water
Powder and water
Salt and water

PART 3. Separate all three mixtures with filters.



a. Place a screen over an empty, labeled cup.

b. Stir the mixture thoroughly.

c. Pour the mixture through the screen filter.

d. If the screen filter doesn't separate the mixture, repeat the process with a filter paper.

Were you able to separate the mixtures? Record your results.

	Screen	Filter Paper
Gravel		
Powder		
Salt		

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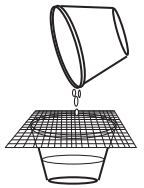

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	Screen	Filter Paper
Gravel		
Powder		
Salt		

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THINKING ABOUT MIXTURES

1. What is a mixture? Give some examples.

2. What is a solution? Give some examples.

3. Is salt and water a mixture? A solution? Is it both a mixture and a solution?

4. How do you know when a solid and a liquid form a solution?

5. How can mixtures be separated?

6. How are screen filters and paper filters alike? How are they different?

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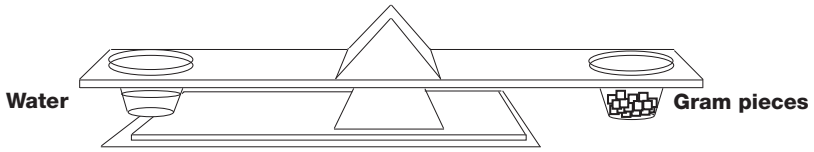
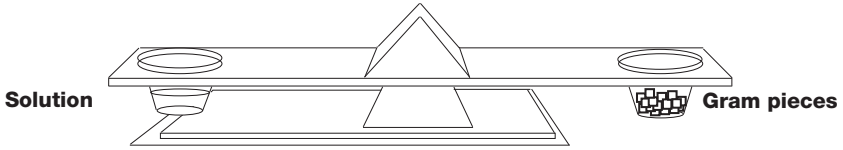
MAKING A SOLUTION



1. Weigh 50 ml of water. Record its mass on line 2 in the box below.

1. Mass of salt-and-water solution	_____ g
2. Mass of 50 ml of water	_____ g
3. Mass of salt	_____ g

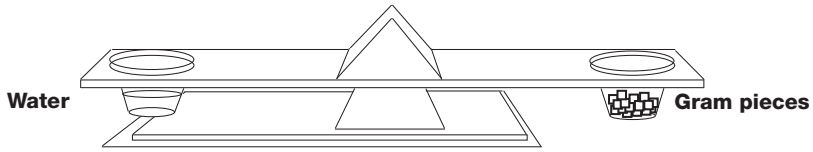
2. Make a solution with one level spoon of salt and 50 ml of water.
3. Carefully weigh the solution. Record its mass on line 1 in the box below.



4. Calculate the number of grams of salt you put in the water to make the solution, by subtracting to find the difference.

How could you separate the salt from the water in the solution?

MAKING A SOLUTION



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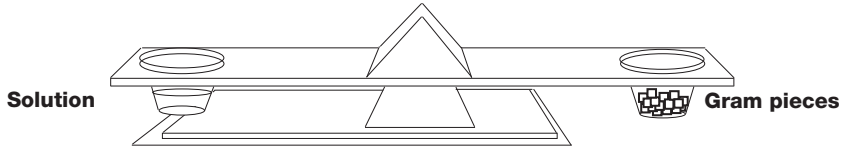

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How could you separate the salt from the water in the solution?

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RESPONSE SHEET—SEPARATING MIXTURES

Kim wrote in his journal,

A solution is not a mixture, it is just a solution.

Is he confused? How would you explain mixtures and solutions to Kim?

RESPONSE SHEET—SEPARATING MIXTURES

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SEPARATING A DRY MIXTURE

Challenge: Design a method to separate a mixture of gravel, salt, and powder.

PART 1. Prepare the solid mixture.

a. Label a plastic cup "dry mixture."

b. Put one 5-ml spoon of salt in the cup.

c. Put one 5-ml spoon of gravel in the cup.

d. Put one 5-ml spoon of powder in the cup.

e. Stir the mixture with a stick.

PART 2. Describe your plan for separating the mixture so that the salt is in one cup, the gravel is in a second cup, and the powder is in a third cup.

PART 3. Summarize the results of your plan. Describe how you might improve your separation.

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Challenge: Design a method to separate a mixture of gravel, salt, and powder.

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SATURATING A SOLUTION

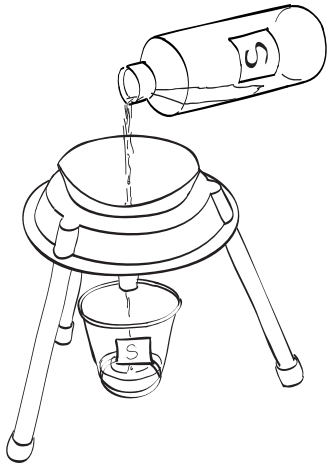
Steps for determining the amount of solid material required to saturate 50 ml of water.

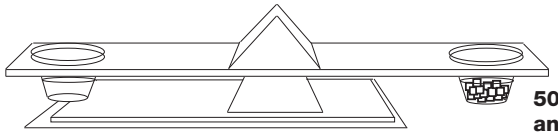
1. Put a filter paper in the funnel. Sprinkle it with water.

2. Place the labeled cup under the funnel.

3. Pour the saturated solution from the bottle into the wet filter.

4. Place the saturated solution on one side of the balance and 50 ml of water on the other side.





5. Add gram masses to the water until it balances. The amount of mass added to the water is equal to the mass of the solid material dissolved in the saturated solution.

6. Record the results in your science notebook.

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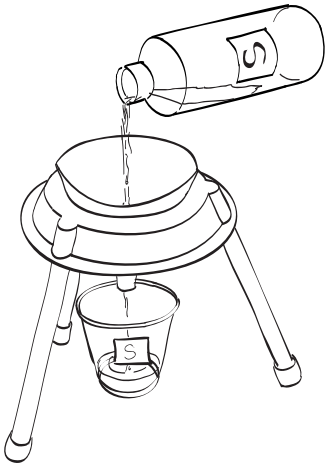

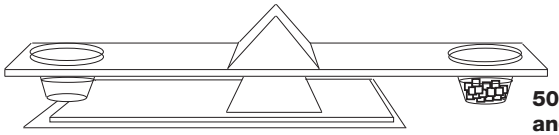

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6. Record the results in your science notebook.

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RESPONSE SHEET—REACHING SATURATION

Jasmine and Mack were making instant iced tea. In the 1/2-liter glasses, Mack put two spoonfuls of iced-tea powder and Jasmine put four spoonfuls. Both filled their glasses half full with water from the tap. Mack stirred his mixture and it all dissolved. Jasmine stirred hers, and it didn't all dissolve.

"I think you have a saturated solution," said Mack. "Why don't you add more water?"

"I know another way to make it dissolve," said Jasmine.

Would Mack's suggestion to add more water work? Explain your answer.

What could Jasmine do to make the powder dissolve?

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Would Mack's suggestion to add more water work? Explain your answer.

What could Jasmine do to make the powder dissolve?

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CHEMICAL DATA SHEET

Challenge: Can you identify the mystery chemical?

Here is a table of properties for five chemicals.

Chemical name	Appearance	Amount needed to saturate 50 ml of water
Sodium Chloride	**Small white grains**	14 grams
Baking soda	**Small white grains**	3 grams
Epsom salts	**Small white rains**	48 grams
Citric acid	**Small white grains**	60 grams
Alum	**Small white grains**	6 grams

Record your observations about the mystery chemical.

The mystery chemical is _____.

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Investigation 2: Reaching Saturation
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SOFT-DRINK RECIPES

Solution 1. 1 spoon of powder in 1000 ml of water	
Solution 2. 3 spoons of powder in 1000 ml of water	
List all the ways that the solutions are the same.	List all the ways that the solutions are different.

Solution A. 2 spoons of powder in 1000 ml of water	
Solution B. 2 spoons of powder in 500 ml of water	
List all the ways that the solutions are the same.	List all the ways that the solutions are different.

My recommended recipe for soft drink is

SOFT-DRINK RECIPES

Solution 1. 1 spoon of powder in 1000 ml of water	
Solution 2. 3 spoons of powder in 1000 ml of water	
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Investigation 3: Concentration
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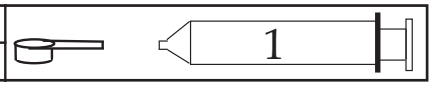
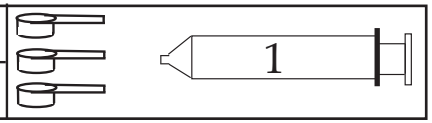
SALT CONCENTRATION

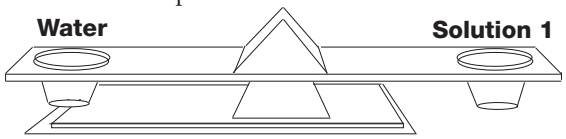
PART 1. Make salt solutions 1 and 2.

a. Label two cups "Solution 1" and "Solution 2."
b. Use the 5-ml spoon to measure salt for solutions 1 and 2.
c. Use the syringe to measure the water.
d. Stir with a stirring stick.

Solution 1	**1 spoon of salt** **50 ml of water**	
Solution 2	**3 spoons of salt** **50 ml of water**	

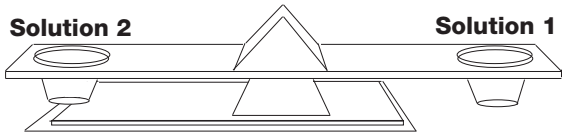
PART 2. Use the balance to make the comparisons described below.

Compare **50 ml of water** and **50 ml of solution 1.**



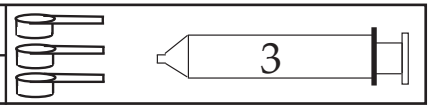
Circle the solution that is heavier.

Compare **50 ml of solution 2** and **50 ml of solution 1.**



Circle the solution that is heavier.

PART 3. Make a third salt solution in a third labeled cup.

Solution 3	**3 spoons of salt** **150 ml of water**	

Discuss in your group which solution is more concentrated, solution 2 or solution 3. Write your prediction here. _____

PART 4. Use the balance to compare solution 2 and solution 3.
Which solution proved to be more concentrated? _____

SALT CONCENTRATION

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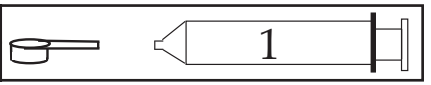
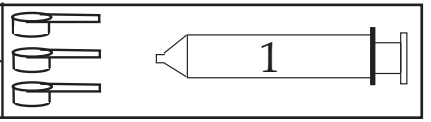
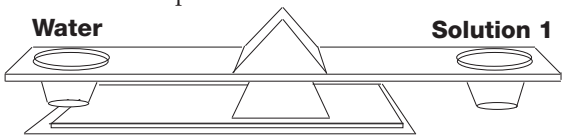
Solution 1	**1 spoon of salt** **50 ml of water**	
Solution 2	**3 spoons of salt** **50 ml of water**	

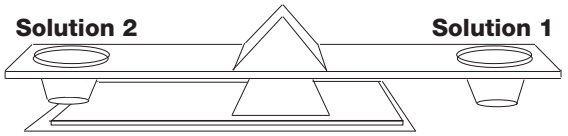
PART 2. Use the balance to make the comparisons described below.

Compare **50 ml of water** and **50 ml of solution 1.**



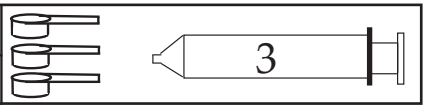
Circle the solution that is heavier.

Compare **50 ml of solution 2** and **50 ml of solution 1.**



Circle the solution that is heavier.

PART 3. Make a third salt solution in a third labeled cup.

Solution 3	**3 spoons of salt** **150 ml of water**	

Discuss in your group which solution is more concentrated, solution 2 or solution 3. Write your prediction here. _____

PART 4. Use the balance to compare solution 2 and solution 3.
Which solution proved to be more concentrated? _____

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Investigation 3: Concentration
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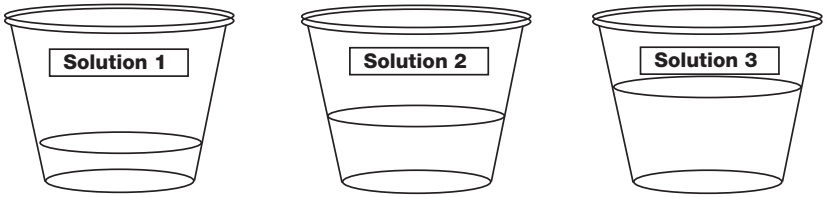
RESPONSE SHEET—CONCENTRATION

In comparing three solutions Julie wrote in her journal that solution 3 was the most concentrated because it had the most water and the most salt. What can you tell Julie about concentration?



50 ml of water
2 spoons of salt

100 ml of water
4 spoons of salt

150 ml of water
5 spoons of salt

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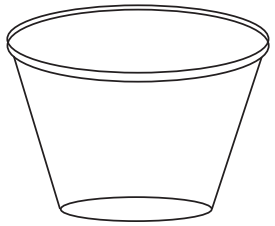
Investigation 3: Concentration
No. 13—Science Notebook

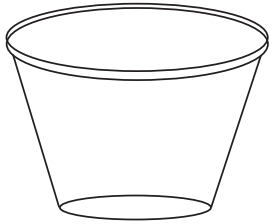
FIZZ-QUIZ OBSERVATIONS

Follow the *Fizz-Quiz Place Mat* directions to make the mixtures. Record the results. Draw and describe what you observed.

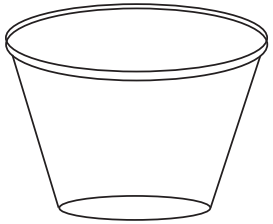
Cup 1 1 spoon of calcium chloride, 1 spoon of baking soda, and 50 ml of water



Cup 2 1 spoon of calcium chloride, 1 spoon of citric acid, and 50 ml of water



Cup 3 1 spoon of baking soda, 1 spoon of citric acid, and 50 ml of water



Which chemicals reacted to form a gas?

Which chemicals reacted to form a precipitate?

FIZZ-QUIZ OBSERVATIONS

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Cup 1 1 spoon of calcium chloride, 1 spoon of baking soda, and 50 ml of water

Cup 2 1 spoon of calcium chloride, 1 spoon of citric acid, and 50 ml of water

Cup 3 1 spoon of baking soda, 1 spoon of citric acid, and 50 ml of water

Which chemicals reacted to form a gas?

Which chemicals reacted to form a precipitate?

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Investigation 4: Fizz Quizz
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RESPONSE SHEET—FIZZ QUIZ

Tarren wrote in his journal,

After I mixed calcium chloride, baking soda, and citric acid together in water, I saw bubbles and lots of fizzing. A short time later I saw a new white material on the bottom of the cup. A reaction took place.

After the same experiment Julie wrote,

After I mixed calcium chloride, baking soda, citric acid, and water, it dissolved.

Who wrote the better observation? Why do you think so?

Who has the better conclusion? Why do you think so?

Describe the differences between dissolving and reacting.

RESPONSE SHEET—FIZZ QUIZ

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Investigation 4: Fizz Quizz
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PROJECT PROPOSAL

1. What is the question or the project that you are proposing?

2. What materials or references will you need to complete the project?

3. What steps do you need to take to complete the project?

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