

Date: \_\_\_\_\_

Your Name: \_\_\_\_\_

Name(s) of Partner(s): \_\_\_\_\_



**NEW ENGLAND  
COMMON ASSESSMENT PROGRAM**

**Released Science Inquiry Task**

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**Mass and Matter**

**2010**

**Grade 8**

**Inquiry Booklet**

# Science

## Directions:

You will conduct a science investigation called **Mass and Matter**. First, you will work with your partner(s) and then you will copy your data into your Student Answer Booklet and work alone.

You will make a prediction on your own. You will set up and conduct the investigation and collect and record your data with your partner(s).

Follow the directions in this Inquiry Booklet. Remember that in addition to working with the science materials, you must also record your data in the data table on page 9.

In this task, you will

- Read a story and review the materials used in the investigation.
- Make a prediction.
- Share one set of materials with your partner(s).
- Work together.
- Record your data and observations in the tables on page 9.
- Copy your data from your investigation to page 2 of your Student Answer Booklet.

## Word Bank

<b>Average (mean)</b>	to get the <i>average</i> , add all of the numbers together and divide the total by the number of figures in the set
<b>Carbon dioxide (CO<sub>2</sub>)</b>	a gas that is given off during combustion and breathing
<b>Ingredient</b>	a substance that is part of a mixture; in cooking, recipes identify which <i>ingredients</i> are needed to prepare something
<b>Multiple trials</b>	when an experiment is repeated several times
<b>Oxygen</b>	a gas in the air that is used by living things

## Mass and Matter

Elaine helped her father make bread at the family bakery. He asked her to measure the mass of the bread mix and the mass of the water. Elaine used a balance to measure each mass. After mixing the ingredients together, she formed a ball of dough, covered it with plastic wrap, and let it rise for two hours. After two hours, the ball of dough was larger. When Elaine measured the mass of the bread dough, she was surprised to find that it was the same as the mass of the ingredients before they were mixed together. She wondered why the size of the dough increased without the mass increasing.

The next day, Elaine shared her observations with her science class. Many students thought that the mass of the dough should be more than the mass of the ingredients before they were mixed together. Other students thought the mass would stay the same. To help the students understand what happened at the bakery, the teacher told the class that they needed to conduct a scientific investigation.

The teacher told the students to think of a question about the masses of substances when mixed together that they could investigate scientifically. The students came up with the following research question.

### **Research Question:**

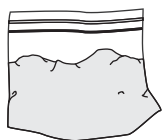
**How does the mass of two substances before mixing compare with the total mass after mixing?**

Elaine's class split into groups of two and the teacher gave each pair of students two substances—Powder X and water—safety goggles, plastic bags, a plastic scoop, a measuring cup, a plastic cup for water, washers, and a single-beam balance to investigate their question.

You have the same materials as Elaine's class.

**Materials for the Investigation:**

- 1 bag of Powder X



Powder X

- 1 plastic cup with water



- 1 small cup to measure water



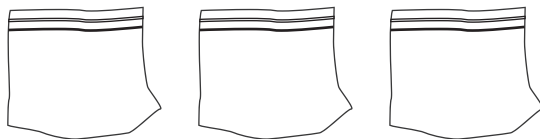
- 1 plastic scoop to measure Powder X



- 1 small plastic bag for water



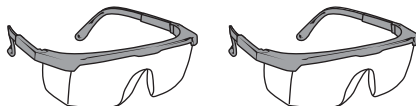
- 3 medium plastic bags



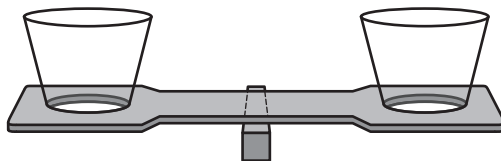
- 8 washers



- 2 pairs of safety goggles



- 1 single-beam balance



## Making a Prediction

### Research Question:

**How does the mass of two substances before mixing compare with the total mass after mixing?**

In this investigation, Powder X will be mixed with water. Write a prediction **on your own** about what will happen to the total mass of Powder X and water after they are mixed together.

Use the information from the story and what you already know to support your prediction.

I predict

## Conducting Your Investigation

You and your partner(s) will investigate what happens to the total mass of Powder X and water after they are mixed together.

You will combine two substances:

- Powder X
- Water

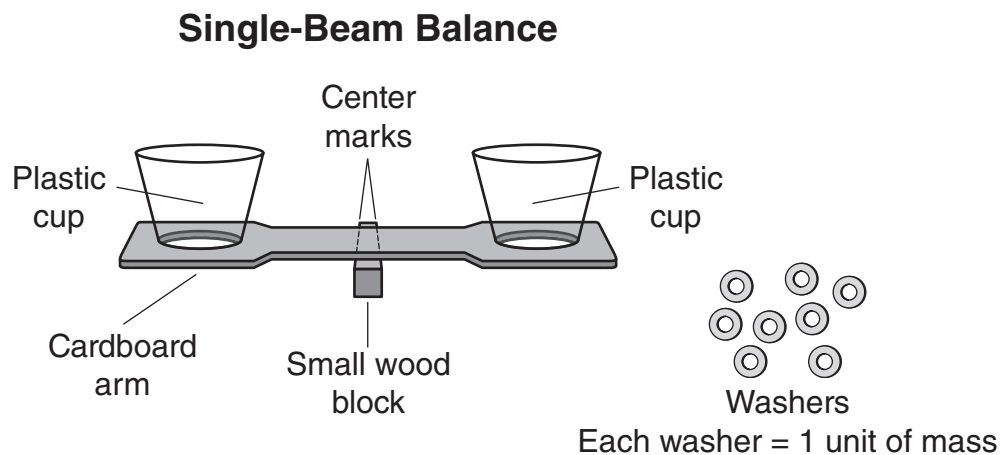
You will conduct three trials with Powder X.

### Safety:

You will be working with an unknown substance and water so you need to follow safe laboratory practices.

- Each student should have a pair of safety goggles.
- **Always** wear safety goggles throughout this investigation.
- **Never** taste or touch unknown substances.
- Follow your teacher's instructions to dispose of the substances and bags.

The single-beam balance is made by setting two cups in a cardboard arm, and then placing the arm and two cups on a wood block. Washers are used to measure the mass of the substances. Each washer equals 1 unit of mass.



Procedure:

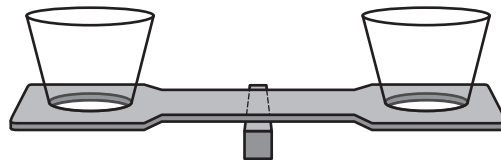
TRIAL 1

**Step 1: Measure Powder X**

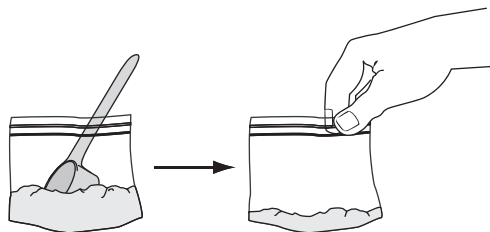
1. Put on your safety goggles.



2. Make sure that the cardboard arm on the wooden block is balanced.



3. Measure one level scoop of Powder X and place it in one of the medium bags. Tightly zip the bag closed.

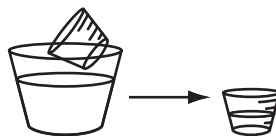


Powder X

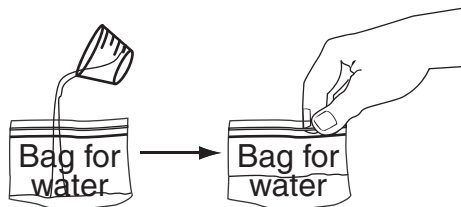
4. Observe the physical characteristics of Powder X. Record your observations in the column labeled “Before Mixing with Water” in the observations table on page 9.

**Step 2: Measure Water**

1. Measure 15 mL of water in the measuring cup.

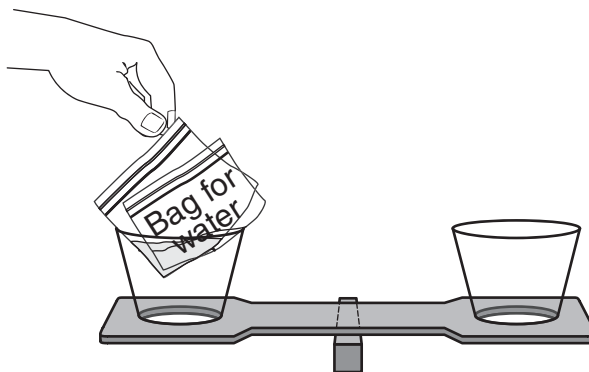


2. Pour the water into the small bag. Tightly zip the bag closed.



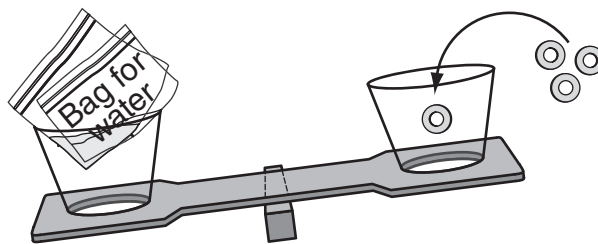
**Step 3: Place Powder X and Bag with Water in Cup on the Single-Beam Balance**

1. Hold the Powder X bag and the water bag by their top (zippered) edges. Place them in the cup on the left side of the single-beam balance.



#### Step 4: Find Mass of Powder X and Bag with Water BEFORE Mixing

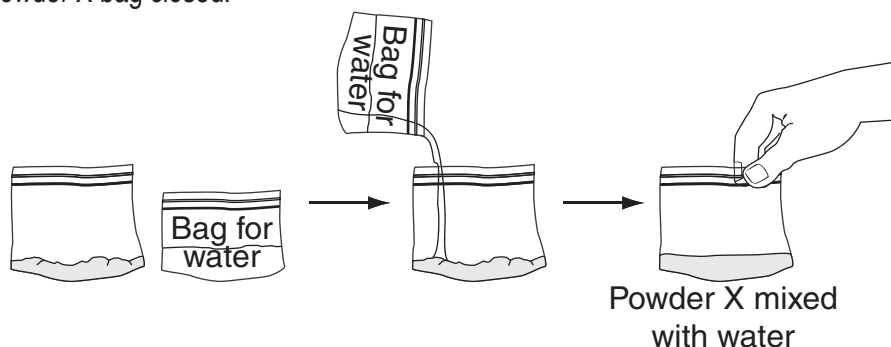
1. **Carefully place** one washer at a time into the cup on the right-hand side until the arm of the single-beam balance is level.



2. **Remove** the cup with the washers from the balance. **Count and record** the number of washers for **Trial 1** in the column labeled "**Mass before Mixing with Water**" in the data table on page 9.

#### Step 5: Mix Powder X and Water

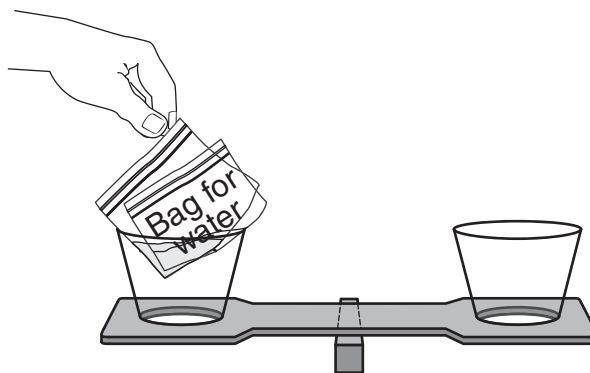
1. **Open** the medium bag with Powder X in it. **Open** the water bag. **Pour** the water into the medium bag with Powder X. **Quickly zip** the Powder X bag closed.



2. **Gently mix** the water with Powder X. (Do **not** shake the bag.)
3. **Observe** Powder X mixed with water. **Record** your observations in the column labeled "**After Mixing with Water**" in the observations table on page 9.

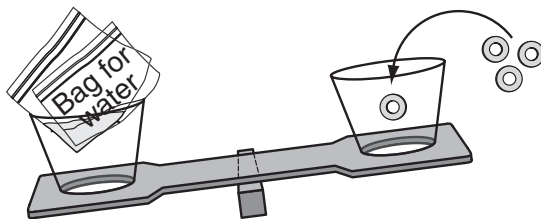
#### Step 6: Place Powder X Mixed with Water and the Empty Water Bag in Cup on the Single-Beam Balance

1. **Place** the bag with Powder X mixed with water **and** the empty water bag in the cup on the left side of the single-beam balance.





**Step 7: Find Mass of Powder X Mixed with Water and the Empty Water Bag AFTER Mixing**



1. **Carefully place** one washer at a time into the right-hand cup until the arm of the single-beam balance is level.
2. **Remove** the cup with the washers from the balance. **Count and record** the number of washers for **Trial 1** in the column labeled "**Mass after Mixing with Water**" in the data table on page 9. Then **calculate** and **record** the difference in mass.
3. **Place** the bag with Powder X aside on your desk or table. **Do not open the bag or shake it.**

**TRIAL 2**

- Reset the single-beam balance.
- Repeat Steps 1–7.
- Be sure to record your data in the "**Trial 2**" row.

**TRIAL 3**

- Reset the single-beam balance.
- Repeat Steps 1–7.
- Be sure to record your data in the "**Trial 3**" row.

After completing the three trials, calculate the average difference in mass. Record the average difference in mass in your data table on page 9.

**Observations:**

	<b>Before Mixing with Water</b>	<b>After Mixing with Water</b>
<b>Trial 1</b>		
<b>Trial 2</b>		
<b>Trial 3</b>		

**Data Table**

	Mass before Mixing with Water (Number of Washers)	Mass after Mixing with Water (Number of Washers)	Difference in Mass
Trial 1			
Trial 2			
Trial 3			
Average Difference in Mass			

**Reminder:** You will copy your observations and average difference in mass from these observation and data tables to the tables on page 2 of your Student Answer Booklet.

