



## **Chocolate Meltdown**

### **Introduction**

In this activity, students will make qualitative and quantitative observations and predictions about chocolate samples before they conduct an experiment to determine which chocolate melts the fastest. The data collected during the class discussion and group experiments will be organized into a chart for later comparison. The activity reinforces the selection and use of tools and the process of following a procedure to carry out an exploration. Whole group and small group participation are encouraged through this activity as characteristics of a simple physical change are explored. If you have younger students, do the activity whole group creating one chart, or work with a parent helper to guide the children. Use only the prediction page with your younger students and focus on the visual observations.

### **Ohio Learning Outcomes**

#### **Strand 1 - Nature of Science**

Outcome 2 Select instruments, make observations, and/or organize observations of an event, object, or organism.

Outcome 3 Identify and/or compare the mass, dimensions, and volume of familiar objects in standard and/or nonstandard units.

Outcome 7 Identify and/or discuss the selection of resources and tools used for exploring scientific phenomena.

Outcome 8 Evaluate observations and measurements made by other persons.

Outcome 9 Demonstrate an understanding of safe use of materials and/or device in science activities.

#### **Strand 2 - Physical Change**

Outcome 11 Identify characteristics of a simple physical change.

### **Getting Started**

#### **Materials:**

- Chart paper
- Easel
- Markers
- 2-4 different samples of chocolate bars, unwrapped, use soft and hard chocolates. (Esther Price is great as a soft chocolate. Hershey's bar is a harder chocolate. Try also Hershey Kisses or melting chocolate used for making candy or chocolate chips. Experiment ahead to find the best chocolate for the conditions you are establishing.)
- Bucket balances
- Rulers in centimeters and inches
- Magnifying glasses

- Paper plates
- Paper towels
- Stopwatches or clocks
- Data collection sheet

### **Technology**

Use a digital camera to record the exploration: beginning, middle, and end. The printed pictures could be attached to the group records. If the student assigned to drawing is capable of using the camera, allow him/her to do so. The digital pictures are excellent for sequencing and retelling at a later time.

### **Vocabulary:**

#### Nature of Science:

- Observe
- Describe
- Organize
- Explain
- Predict
- Measure
- Compare
- Investigate
- Discuss
- Length
- Mass
- Observations
- Standard units
- Metric
- Non-standard

#### Physical Science:

- Physical change
- States of matter
- Mass
- Solid
- Liquid
- Melting

### **Lesson**

#### Orientation Activity

- Share chocolate samples (on paper plates labeled A, B, C, D) already removed from the wrapping so that students cannot easily identify brands and/or favorites.
- List qualitative observations on chart paper divided into columns with the letter of each sample on the top of the column. (See handouts) As you record with the whole group, students can record individually if you like. Encourage students to use their senses as they observe the samples. Be sure to include

all observations shared by students. Students will gain personal observation skills through validation by other students' suggestions. (See handouts)  
Students may share comments that relate to more than one of the samples.  
Be sure to include the comment in every appropriate column.

- Introduce or review, if needed, the use of a balance and ruler.

### Learning Activity

NOTE: This activity uses energy and heat from the sun therefore a sunny day is necessary for success.

If students work in groups of 4, have one sample for each group. It may be necessary to have more than one sample of each letter. If so, label the sample A1, A2, B1, B2, etc. so that each group can easily be identified.

If working as an entire class, the exploration should be carried out over a couple sessions, using 1-2 samples each session and recording data as a class instead of individually. Enlarge a data collection sheet and fill it in as a class.

### Procedure:

1. Prepare to conduct the exploration by assigning jobs to the students. One student will record the beginning time and the ending time. If this student has mastered telling time, they could record the time that specific physical changes occur in the sample, if not beginning and ending times work. (See data collection sheet) One student will hold the magnifying glass between the rays of the sun and the sample. One student will draw pictures of the sample over the period of time. One student will record words that describe any physical changes in the sample during the exploration. All students make observations and share ideas while they investigate the samples.
2. The group works together to determine the mass of the sample. They may use gram weights, unifix cubes, mass bears, etc. any standard or non-standard unit that they are familiar with or units that you would like them to try. If time permits, use 2 different units of measure. It is best to measure the sample including the plate since the same will need to be measured in a different form at a later time. This increases the accuracy of the data collection. Record on group data collection sheet.
3. The group works together to determine the dimensions of the sample. These linear measurements could be in metric, standard, or non-standard units depending upon your group of students. Record on group data collection sheet.
4. Each member of the group makes a prediction of what they think will happen when the magnifying glass is placed between the sun and the sample. Record on individual data collection sheets. Use these sheets later to combine into a class book. If conducting the exploration as a

whole group, the information could be recorded on chart paper instead of data collection sheets.

5. Place the plate and sample on a table surface near a window. Each student performs his or her assigned task. Record all data on the group data collection sheet. (It might be helpful to have a couple group data collection sheets so that multiple students can record at the same time. These could be combined later or just stapled together.) The magnifying glass serves as the heating unit directing the sun's rays onto the sample and speeds up the melting process. Some of the chocolate samples will melt faster than others due to their consistency and contents.
  6. When the sample has completely melted, be sure that the assigned student draws a picture and the group shares words that describe its appearance. The group should also measure the mass using the balance. Teacher guidance with this might be necessary. An attempt at measuring the dimensions will help the students see the difference between liquids and solids. Be sure to include the time the sample totally turned to a liquid and no additional changes occurred.
  7. Each group member writes/draws a description of the changes in the sample before, during, and after the exploration on individual data collection sheets. It is appropriate and suggested to compare individual ideas to the data collected by the group.
  8. During whole group discussion, students describe their sample following the exploration. The groups may bring their samples to the discussion to explain their findings. Record all shared observations on chart paper. Students may refer to this information to complete their individual data collection sheets. Ask questions to make comparisons and describe the physical change from the solid to the liquid. (It might be helpful to have a second sample for each group so that they can compare their melted version to the solid version.)
- What differences do you observe between the original samples and the samples following the exploration?
  - How are the samples alike?
  - What caused the physical changes?
  - Why did we use a magnifying glass?
  - Describe the time that it took for the chocolate to melt.
  - Why would 1 sample change at a different rate than another?
  - What do you predict will happen if we leave the samples the way they are until tomorrow? (If you use this question, be sure to examine the samples the following day.)

#### *Handouts*

- Chart design before and after the exploration
- Group data collection sheet
- Individual data collection sheet

## **Evaluation and Follow-up**

### Assessment Tools and Methods

- The group charts serve as a record for the students to refer to when writing/drawing their own results.
- The chart also shows the thinking during the discussion.
- On the back, during the process, make notes about individual student contribution's including vocabulary usage and explanation.
- Make anecdotal observations of group and individual participation during the discussion and exploration. Look for use of scientific process skills.
- Review the group record sheets to determine contributions to the group.
- Review the individual data collection sheets to determine student comprehension and ability to explain the exploration.

### Interdisciplinary Connections

- Measurements meet Math objectives.
- Written language used to encourage description.
- Oral communication encouraged within large and small group discussions.
- Cooperation and teamwork necessary for the exploration.

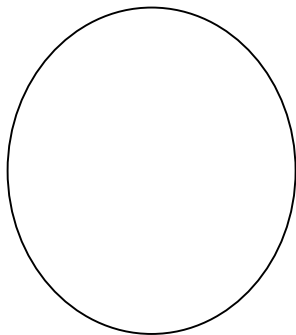
# Chocolate Meltdown Exploration

## Group Data Collection

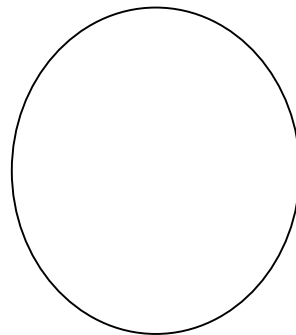
Group members \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_  
Sample letter \_\_\_\_\_

Sample	Before	During	After
Mass			
Size			
Observations			

This clock shows the time  
we started the exploration.



This clock shows the time  
we completed the exploration.



# Chocolate Meltdown Exploration

## Individual Data Collection

Name \_\_\_\_\_ Sample Letter \_\_\_\_\_

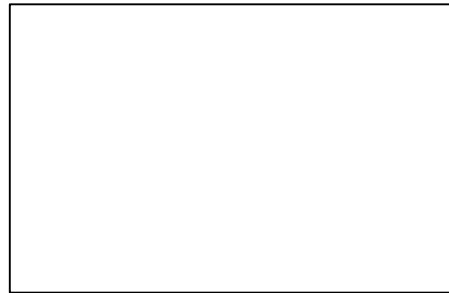
I predict that

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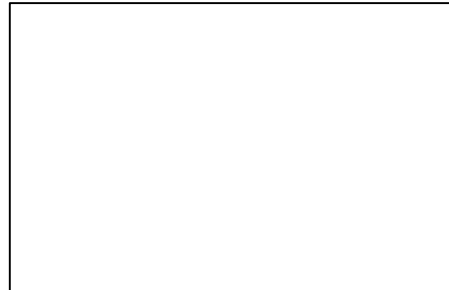
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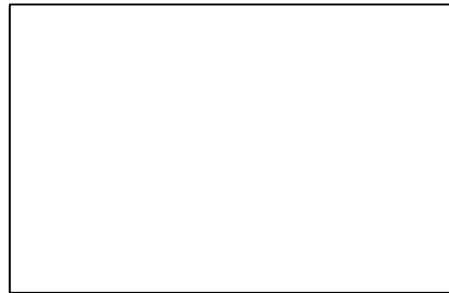
This is what the sample looked like **before** the exploration.



This is what the sample looked like **during** the exploration.



This is what the sample looked like **after** the exploration.



I learned that

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**Chocolate Meltdown Observation Chart**

A	B	C	D	E	F