Lesson 2.3
Cause and Effect
Cause and Effect in the Reference Book

Students use the reference book to search for evidence of potentially good glue ingredients.

Instructional Guide

1. Remind students that they have been investigating which ingredients will make good, sticky glue.

Before you make your next glue mixtures, we need to learn more about the ingredients so that your next glue can be even better at meeting the design goal.

2. Introduce the new ingredients. Write the name of each new ingredient (corn syrup and gelatin) on the board as you introduce it. Explain that you are also keeping flour since flour performed so well on sticky tests.

You observed heated cornstarch and water in the last lesson, but we haven’t yet observed gelatin or corn syrup.

3. Have students share what they know about the new ingredients. Ask students to share their background knowledge about or experience using gelatin and corn syrup.

4. Introduce finding evidence in the Handbook of Interesting Ingredients. Let students know they can find evidence about stickiness in the Cause and Effect section for each of the ingredients. Explain that scientists and engineers use reference books like this one to learn about the substances they use.

Remember—when one thing makes another thing happen, we call the first thing a cause and the thing that happens as a result an effect.

We can look and see if adding one of these ingredients (that would be our cause—adding the ingredient) results in stickiness (stickiness would be our effect).
5. Project page 34, the first page of the Index, again. Model searching for evidence in the book and think aloud as you perform each step.

- Use the index to locate the Flour section (pages 18–19).
- Have students turn to page 18.
- Read the Cause and effect section on page 19.

### Index

- abrasive 7, 25, 27
- absorb 7, 11, 25, 27
- acid 7, 10–11, 28–29
- acid-changer 7
- baking soda 6–7
- cinnamon 8–9
- citric acid 10–11
- clear 10, 13, 14, 16, 22, 24, 26, 28, 30
- color 6, 8, 10, 12, 13, 14, 16, 17, 18, 20, 22, 24, 26, 28, 30
- no color 20, 22, 28, 30
- white 6, 10, 12, 13, 16, 17, 18, 24, 26
- cornstarch 12–13, 14
- corn syrup 14–15
- crystal 6, 7, 10, 24, 25, 26
- dissolve 6, 29
- egg white 16–17
- flavor 7, 9, 10, 21, 23, 25, 27, 29, 31. See also taste
- no flavor 13, 21, 31
- strong flavor 9, 25, 29
- flour 18–19
- fluffy 7, 17
- foamy 16, 17
- freeze 15, 23, 29, 30, 31

Page numbers in **bold** show an ingredient’s main pages.

---

Flour makes a mixture sticky.

Flour makes a mixture thick.

Flour makes a mixture hard when dry.

6. Connect the information about flour to cause and effect.

- There are three cause and effect statements in this section that tell what happens (effect) when you add flour to a mixture (cause).

- The first tells us that flour makes a mixture sticky; the second that flour makes a mixture thick; the third that flour makes a mixture hard when dry.

- The same cause (adding flour) has three different effects.

7. Students share what they think is the relevant evidence about stickiness.

- Of these three cause and effect statements, which one gives us evidence about flour’s stickiness? [Flour makes a mixture sticky.]
8. Project page 38, Gathering Evidence from the *Handbook of Interesting Ingredients*, in the notebook. Explain that students will be tracking their evidence on this sheet, in much the same way that engineers or scientists track their evidence when they are doing research.

9. Model recording information in the Gathering Evidence from the *Handbook of Interesting Ingredients* table on page 38. Write “Flour makes a mixture sticky” in the “Evidence About Stickiness” column.

10. Review the rest of the Gathering Evidence activity. Explain that students should record evidence about stickiness for each ingredient listed and that they can also choose one more ingredient they’d like to research. Point out that if students do not find any evidence about stickiness for a particular ingredient, that is okay.

11. Organize the class into pairs and distribute copies of the *Handbook of Interesting Ingredients*.

12. Have pairs work together to complete page 38. Circulate to provide support as needed.

Teacher Support

Rationale

**Promoting Deeper Thinking: Accessing Prior Knowledge**
Research shows that providing time for students to call to mind what they already know about a topic helps prepare them to learn new information. This kind of priming can be especially helpful for English learners and other students who may struggle with the cognitive load of encountering a new topic if they do not have time to prepare mentally. In addition, the sharing of ideas with the whole class exposes students with less experience with the topic to ideas and experiences other students come in with.

Background

**Science Note: About Firsthand and Secondhand Evidence**
One of the important guiding principles of this program is to involve students in connecting firsthand inquiry experiences and secondhand text-based experiences. Enabling students to make connections between experience and text motivates engaged reading, helps students develop deep understanding of science concepts, improves reading comprehension, and provides authentic opportunities for experience with nonfiction and informational text. Introducing the text as evidence in this lesson prepares students to further refine their glue designs without needing to test each ingredient on its own.

**Background**

**Science Note: On Variability and Results**
Similar to how students may have gotten different results from each other in a previous lesson, they may also get different results about the ingredients from their testing than those found in the Handbook. You can emphasize that getting different results is common and that is why scientists and engineers repeat tests over and over again. You can let students know that there are many different reasons they could have gotten different results. You may wish to provide examples of variables that are hard to control for, such as the exact amount of each ingredient, the air...
temperature, how it’s mixed, contaminants on hands or tools a different test, etc. When the same test is done in precisely the same way, with the same ingredients, then there should always be the same result, or, depending on the phenomenon, close to the same result.

Possible Responses

Investigation Notebook
Gathering Evidence from the *Handbook of Interesting Ingredients* (page 38)

Record evidence about the stickiness of each ingredient in the table.

- **cornstarch**: can become sticky if mixed with hot water
- **gelatin**: no evidence
- **corn syrup**: makes a mixture sticky as the mixture starts to dry out
- **flour**: makes a mixture sticky
- **(another ingredient)**: sugar: makes a mixture sticky
Gathering Evidence from the *Handbook of Interesting Ingredients*

Directions:
1. Look through the book and find evidence of the stickiness of each ingredient in the table.
2. Record the evidence in the table.
3. Choose another ingredient from the book.
4. Add it to the table and record evidence that its stickiness.

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Evidence about stickiness</th>
</tr>
</thead>
<tbody>
<tr>
<td>cornstarch</td>
<td></td>
</tr>
<tr>
<td>gelatin</td>
<td></td>
</tr>
<tr>
<td>corn syrup</td>
<td></td>
</tr>
<tr>
<td>flour</td>
<td></td>
</tr>
<tr>
<td>(another ingredient)</td>
<td></td>
</tr>
</tbody>
</table>
Reunir evidencia del Manual de ingredientes interesantes

Instrucciones:
1. Repasa el libro y busca evidencia de la pegajosidad de cada ingrediente en la tabla.
2. Apunta la evidencia en la tabla.
3. Elige otro ingrediente del libro.
4. Agrégalo a la tabla y apunta evidencia de su pegajosidad.

<table>
<thead>
<tr>
<th>Ingrediente</th>
<th>Evidencia sobre la pegajosidad</th>
</tr>
</thead>
<tbody>
<tr>
<td>almidón de maíz</td>
<td></td>
</tr>
<tr>
<td>gelatina</td>
<td></td>
</tr>
<tr>
<td>jarabe de maíz</td>
<td></td>
</tr>
<tr>
<td>harina</td>
<td></td>
</tr>
<tr>
<td>(otro ingrediente)</td>
<td></td>
</tr>
</tbody>
</table>