

## *learning support tools*

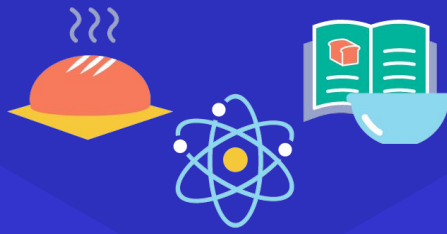
**Learning Support Tools** provide additional support to kids as they work on challenges in the *Learn* project.



*Learning Support Tools* are also our printables. If you prefer printed material, we recommend you print *Learning Support Tools*, instead of the *Learn* project slides.

**UNBOXED** PREPARED  
PARENTS

# The Science of Bread: Learning Support Tools



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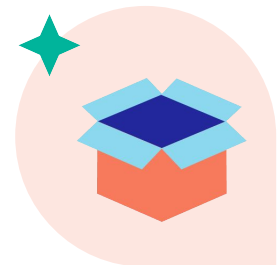
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## Planning and Introduction

Before you dive into the project's challenges, the introductory slides offer a brief look at **what** you'll do to complete the project and **how** and **when** you'll do these things, along with some inspiration to help you find your **why**. The tools below provide support for these introductory steps.

### Materials List

#### What else do you need to complete the project?

The steps in the project assume you have ready access to the Internet and basic materials, like pencils and paper. The optional materials listed on the right may be useful, depending on your interest and chosen product.

#### Required

- Adult supervision for baking steps
- Paper
- Pen/pencil
- Internet access
- Oven for baking
- Kitchen tools (see chosen recipe)
- Recipe ingredients (see chosen recipe)

#### Optional

- Camera
- Dedicated notebook



Name \_\_\_\_\_ Date \_\_\_\_\_

## Explore the Essential Question

Use this tool to record your thoughts and feelings as you consider the essential question.

### The Essential Question:

How can the scientific process help us learn by experimenting?

- 1** Have you wondered or tested how small changes in a process can have a big effect on a result? What is the most memorable instance of this?

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- 2** Use this table to record questions or ideas you think of that might be testable in an experiment.

What I'm wondering about	How I might test it

Name \_\_\_\_\_ Date \_\_\_\_\_

## Plan Your Project Milestones

Use this tool to plan completion dates for each step in the **Science of Bread** project.

Activity	Estimated Time	Complete By Date
 <b>Challenge 1: Produce Your First Loaf</b>		
<b>Step a:</b> Find a recipe and prepare to bake	30–60 min.	
<b>Step b:</b> Bake your first loaf	2–4 hours	
<b>Step c:</b> Reflect on your first bake	30–60 min.	
 <b>Challenge 2: Explore the Science of Bread-Making</b>		
<b>Step a:</b> The science of bread-making	30–60 min.	
<b>Step b:</b> Designing an experiment	30–60 min.	
 <b>Challenge 3: Investigate Changes to Your Recipe</b>		
<b>Step a:</b> Write a testable question	20–40 min.	
<b>Step b:</b> Modify your original recipe	20–40 min.	
<b>Step c:</b> Bake using your new recipe	2–4 hours	
<b>Step d:</b> Reflect on the results of your bake	20–40 min.	

Name \_\_\_\_\_ Date \_\_\_\_\_

Challenge 1, step a: Find a recipe and prepare to bake

## Select and Understand Your Recipe

**Step 1: Choose a recipe.** Bread can have great cultural or personal significance. When selecting a recipe, consider choosing one that is meaningful for you. If you are a new baker, look for something basic, with few ingredients and a simple process.

**Record the source of your recipe:** \_\_\_\_\_

**Step 2: Gather ingredients and equipment.** After you've chosen a recipe, use the space below to list the ingredients and equipment you'll need. Use this checklist to mark off as you gather the items.

<p><b>Ingredients:</b></p> <ol style="list-style-type: none"> <li>1.</li> <li>2.</li> <li>3.</li> <li>4.</li> <li>5.</li> <li>6.</li> </ol>	<p><b>Kitchen tools (bowls, measuring cups, etc.):</b></p> <ol style="list-style-type: none"> <li>1.</li> <li>2.</li> <li>3.</li> <li>4.</li> <li>5.</li> <li>6.</li> </ol>
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Also make sure you have permission to bake and supervision from an adult!

**Step 3: Plan your schedule, step-by-step.** Use the space on the following page to describe each step of your chosen recipe. What ingredients and equipment will you need for each step? How long will it take?

**What's the purpose of this activity?** One of the first steps in using any recipe is to carefully read the recipe from start to finish. Writing down your plan—even if you just summarize the steps—will help you notice all of the important details.

Name \_\_\_\_\_ Date \_\_\_\_\_

Challenge 1, step a: Find a recipe and prepare to bake

## Select and Understand Your Recipe (cont'd)

### Recipe Steps

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Name \_\_\_\_\_ Date \_\_\_\_\_

Challenge 1, step c: Reflect on your first bake

## Reflect on Your Bake

Answer the questions below to record the results and your thoughts about your first bake. You can compare your later bakes to this baseline.

**Step 1: Record elements of your process.** Describe some of the choices you made with your first loaf.

1. What type of flour did you use? \_\_\_\_\_
2. How long did you knead the dough? \_\_\_\_\_
3. How long did you let the bread dough rise? \_\_\_\_\_
4. How much yeast did you use? \_\_\_\_\_
5. How long did you bake the bread? \_\_\_\_\_
6. How hot was the oven? \_\_\_\_\_

**Step 2: Record the results of your first bake.** Measure or describe your first loaf. Consider taking pictures to include in your documentation (both the overall loaf and individual slices).

1. How did the bread taste? \_\_\_\_\_
2. How big were the bubbles in the bread? \_\_\_\_\_
3. What color was the crust? \_\_\_\_\_
4. What was the bread's texture? \_\_\_\_\_

**Step 3: Record your thoughts about the process.** What went well? What didn't go well? What did you learn about the process of baking?

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**Step 4: How might you want your next loaf to be different?** Describe characteristics of your bread that you'd like to improve. (For example, you might want a darker or thicker crust.)

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Name \_\_\_\_\_ Date \_\_\_\_\_

Challenge 2, step b: Designing an experiment

**Brainstorm Baking Variables**

**Step 1:** Think about all of the ingredients and different processes that go into baking bread. List as many as possible in the first column below, then fill in the other columns for each variable.

Variable	How could I change it?	How might my bread be different if I change this?

**Step 2:** Think back to your reflection on your first bake. Do any of these variables or changes help you improve your recipe the way you described?

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Name \_\_\_\_\_ Date \_\_\_\_\_

Challenge 3, step a: Write a testable question

## Write a Testable Question and Hypothesis

**Step 1:** Using your brainstorm from the previous step, choose one independent variable and one dependent variable to write your **testable question:**

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Remember, a testable question is often phrased like this: “**How does [independent variable] affect [dependent variable]?**”

The only thing you’ll change in the recipe is your independent variable. You’ll keep everything else the same.

**Step 2:** Using what you’ve learned about the science of bread, make a **hypothesis** that answers your question from step 1:

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A hypothesis is often written as an “if...then...because...” statement. For example, “If (I change this about my recipe), then (this will happen to my bread) because (of this reason).”

Keep in mind, you might make a hypothesis that ends up being false. This is completely okay! For now, make your best prediction.

Name \_\_\_\_\_ Date \_\_\_\_\_

Challenge 3, step b: Review a basic bread recipe

## Modify Your Original Recipe

**Step 1: Recall your testable question.** What is the independent variable in your question:

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**Step 2: Examine the original recipe.** Highlight every step or list in which your independent variable appears. Note where changes should occur to your variable.

**Step 3: Rewrite your recipe and plan your steps with changes to the independent variable.** Use the checklist below and the space on the next page to write your modified recipe. This rewritten recipe creates a record of your experiment.

### Ingredients

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_

### Kitchen tools

(bowls, measuring cups, etc.)

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_

**Name** \_\_\_\_\_ **Date** \_\_\_\_\_

Challenge 3, step b: Review a Basic Bread Recipe

## **Modify Your Original Recipe (cont'd)**

### **Recipe Steps**

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Name \_\_\_\_\_ Date \_\_\_\_\_

Challenge 3, step d: Reflect on the results of your bake

## Reflect on Your Experiment

Answer the questions below to record the results and your thoughts about your new bake.

### Step 1: Describe Your Experiment

What was the testable question? \_\_\_\_\_  
\_\_\_\_\_What was your hypothesis? \_\_\_\_\_  
\_\_\_\_\_How did you change the recipe? \_\_\_\_\_  
\_\_\_\_\_

### Step 2: Record the Results

Measure or describe your new loaf. Describe the result of the changed recipe on the dependent variable. \_\_\_\_\_  
\_\_\_\_\_Were there other changes compared to the control loaf (e.g., taste, bubble size, crust, texture)? \_\_\_\_\_  
\_\_\_\_\_

**Step 3: Interpret Your Results.** Was your hypothesis correct? Why or why not? \_\_\_\_\_  
\_\_\_\_\_

**Step 4: Record your thoughts about the process.** What went well? What didn't go well? What did you learn about the process of baking?  
\_\_\_\_\_  
\_\_\_\_\_

Name \_\_\_\_\_ Date \_\_\_\_\_

Challenge 3, step d: Reflect on the results of your bake

## My Final Recipe

Use the organizer below to write your best and final recipe, so you can make it again or share it with others.

This recipe was adapted from the following source: \_\_\_\_\_

\_\_\_\_\_

I made the following improvements to the original recipe: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Consider these suggestions for additional changes to this recipe:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

### My Recipe:

Ingredients:

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

5. \_\_\_\_\_

6. \_\_\_\_\_

Name \_\_\_\_\_ Date \_\_\_\_\_

### My Final Recipe (cont'd)

**Instructions** (Steps should include an explanation of what each step does for the final product.)

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Name \_\_\_\_\_ Date \_\_\_\_\_

## Prepare for Your Celebration

Use this tool to record your reflections on The Science of Bread.

**What have you learned** this month by doing **The Science of Bread** project? \_\_\_\_\_

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What did you think about your **abilities as a baker or scientist** before the project? \_\_\_\_\_

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What did you learn about **yourself** through this process? \_\_\_\_\_

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What was the **biggest challenge** you ran into during your project?

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What **strategies** did you use to overcome the challenge?

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What did you learn about how the **scientific process** can help us learn by experimenting?

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