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How Science Works

Student Workbook

7th Grade - Best Bread



Scientist Name: _____

Teacher Name: _____

SciTrek Mentor Name: _____

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Welcome to SciTrek!

Hey there! Welcome to SciTrek—we're so excited to have you join us! This workbook is your guide to all the cool science activities and experiments you'll be doing throughout the program. You'll get to dive into some amazing concepts, work in teams, and learn from SciTrek Mentors and Leads who are here to help you explore the world of science.

Here's what to expect:

- **Day 1:** You'll kick off the program with 1-3 SciTrek Leads who will guide you through the start of your adventure.
- **Day 2:** Get ready to roll up your sleeves! You'll work with a group of 8-10 SciTrek Mentors, diving into hands-on science activities and experiments in small teams.
- **Day 3:** It's your time to shine! Your teacher will lead the way as you explore and reinforce the key concepts you've been learning.
- **Day 4:** The SciTrek Mentors are back! You'll continue working on exciting experiments in small groups, with plenty of support from the mentors.
- **Day 5:** Time to wrap it all up! With SciTrek Leads, you'll close out your time in the program and reflect on everything you've discovered.

Remember, your teacher and the SciTrek team are here to help you every step of the way, so don't be afraid to ask questions or share your ideas. This is your chance to explore, experiment, and have fun with science! Let's make this an unforgettable experience!

What You'll Learn in the Best Bread Module

In this module, you're going to dive into awesome science concepts - some may be familiar, and some may seem brand new! - all while meeting the important goals that scientists follow every day. Here's what you'll be able to do by the end of your time in the program:

- **Cellular Respiration:** You'll be able to explain what cellular respiration is, why it is necessary for living organisms, and what its byproducts are.
- **Measure CO₂:** While not normally visible to our eyes, you will explore new ways to "see" or measure the CO₂ produced during cellular respiration.
- **Spotting Mistakes:** You'll learn how to identify errors in experiments and understand the limits of your measurements.
- **Hypothesis Testing:** You'll develop your own ideas, test them out, and see if your predictions were right.
- **Data Analysis and Presentation:** You'll learn how to analyze your results, create graphs, and share what you've discovered through presentations and posters.

Get ready to explore, experiment, and present like a real scientist!

Important Vocabulary

Cellular Respiration: Process where cells break down glucose to produce ATP (energy-carrying molecule), with carbon dioxide and water as byproducts.

Carbon Dioxide (CO₂): A waste product of cellular respiration, and exhaled by organisms.

pH: a measure of the acidity or basicity of a liquid solution, based on the concentration of hydrogen ions

Yeast: Single-celled organisms classified as part of the fungus kingdom, often used in experiments because of their capability of fermentation, aerobic respiration, and some similarities to human cells.

Fermentation: Anaerobic process converting sugars into either alcohol (ethanol) or lactic acid in order to generate ATP.

ATP (Adenosine Triphosphate): Main energy-carrying molecule in cells. ATP is produced during cellular respiration, is used for cellular activities, and is within the cells of living things.

Glucose: A simple sugar, and the primary energy source for cellular respiration.

Aerobic Respiration: Cellular respiration with oxygen, producing a large amount of ATP.

Anaerobic Respiration: Cellular respiration without oxygen, producing either lactic acid or ethanol buildup and a small amount of ATP.

Mitochondria: Organelles where most cellular respiration occurs, converting glucose and oxygen into ATP.

Energy: Powers cellular reactions. Released from glucose and stored in ATP during cellular respiration.

Hypothesis: A hypothesis is a testable guess or prediction about what will happen based on what you know.

Observation: information gathered using your 5 senses.

Opinion: belief that may or may not be based on facts.

Outliers: Data significantly different from other data in the same experiment.

Day 1

Breath of Life: Exploring Cellular Respiration

Objective

Today, we will dive into the art of cellular respiration and ways that scientists are able to “see” some of its invisible byproducts. We will investigate two of these byproducts - water vapor and CO₂ - by observing the effects of their breathing under different conditions, and experimenting with yeast. Ready for some cool experiments?

Your teacher will show you a few different demonstrations today. Pay attention, and see what you can learn about what happens as cells within and around you metabolize and produce!

Introduction to SciTrek

What’s the Plan?

- Meet the SciTrek Leads.
- Discover what SciTrek is all about.
- Learn about cellular respiration and its byproducts.

Activity:

Discuss with a classmate exactly what happens when a person breathes. What substances or compounds are moving in and out of the body? Can you ever see the effects of a person breathing, outside of their body? How does the body move while breathing? Why?



Exploring Cellular Respiration

Key Content

Cellular respiration is a process where cells break down glucose to produce ATP (energy-carrying molecule), with carbon dioxide and water as byproducts.

Activity 1: Observing Your Own Breath

Instructions:

1. **Exhale:** Breathe gently onto the mirror provided and observe any changes to the mirror's surface.
2. **Discuss:** What do you see on the surface of the mirror, if anything?
3. **Record:** After breathing onto the mirror, I observed:



Activity 2: Visualizing CO₂ Production with Phenolphthalein

Instructions:

1. **Discuss:** After exhaling on your mirror, what did you see?

2. **Define:** Carbon Dioxide (CO₂) is

Detecting Carbon Dioxide like a scientist! - Phenolphthalein activity

3. **Describe:**

Your teacher will hand out flasks to you and your group that contain a mixture including a chemical called phenolphthalein. What color is this solution when you get it?

4. **Exhale:** Now, submerge your straw in the solution and blow for about one minute.

5. **Record:** After blowing into the solution through the straw, the solution appeared:

6. **Discuss:** What happened to the solution when you blew into it through the straw? Why do you think this change took place?

7. **Explain:** The solution changed color, because:

Videos and Questions

Aerobic vs. Anaerobic Respiration

1. **Aerobic** respiration
 - a. **needs oxygen**
 - b. **does not require oxygen**
2. **Anaerobic** respiration
 - a. **needs oxygen**
 - b. **does not require oxygen**
3. Which type of respiration produces **more energy**?
 - a. **Aerobic** Respiration
 - b. **Anaerobic** Respiration

4. **Anaerobic** respiration in **yeast** is called: _____.
5. Glucose is broken down during fermentation in yeast to produce ethanol and _____.
6. Why do we want yeast to produce carbon dioxide during fermentation when making bread?

Discussion: Introduction to Yeast

Key Content

Yeast is a little animal – or, more precisely, a microorganism in the fungus kingdom – often used in experiments because of its capability of fermentation, aerobic respiration, and some similarities to human cells. Fermentation is an anaerobic process (without oxygen) where sugars are converted into either alcohol (ethanol) or lactic acid in order to generate ATP.

Yeast lives all around us - in the air and on surfaces everywhere. People discovered a long time ago that yeast can produce little bubbles in food, and make things taste a particular way. This is where bread, root beer, and lots of other foods that people enjoy every day come from.

In order to function, all cells - including yeast! - must process food, make energy, and expel waste. This process includes cellular respiration, which we discussed above. During cellular respiration, cells take in food and oxygen and turn them into energy, and the byproducts of this process are carbon dioxide and water. In the next activity and over the course of the next few days, we are going to observe yeast and its byproducts to learn more about cellular respiration and CO₂ production.

List at least three foods or drinks that contain yeast:



Activity 3: Yeast Growth Demonstration with Balloon

Instructions:

1. Prepare the Yeast Mixture:

- a. Measure 1 cup of warm water (about 100°F). Use a thermometer to ensure the water is not too hot, as this can kill the yeast.
- b. Pour the warm water into the flask or bottle.
- c. Add 2 tablespoons of granulated sugar to the water. Stir the mixture until the sugar is completely dissolved. This will serve as the food source for the yeast
- d. Open the packet of active dry yeast and add it to the sugar-water solution. Swirl the flask gently to mix the yeast into the solution.

2. Seal the Flask:

- a. Stretch the opening of a balloon and carefully fit it over the mouth of the flask or bottle, ensuring it is deflated, snug, and airtight. You may use a rubber band to secure the balloon if necessary.

3. Observe, and Record:

- a. Place the flask in a warm, draft-free area.
- b. Describe the balloon's appearance, using the table below:

Observation Table:

Time	Balloon Size/Appearance (Description)
Time when balloon is placed:	
End of Class (final observation):	

STUDENTS: You will come back to these questions at the end of class. **Skip now to Activity 4 below.** 😊⬇️

4. Explain:

- a. How did the balloon's appearance change over time?

b. What was happening inside of the flask? Why did the balloon begin to inflate?

The yeast consumed _____

The yeast produced _____

The balloon inflated because _____



Activity 4: Understanding the CO₂-Collection Apparatus

Instructions:

1. **Observe:** Watch as the teacher sets up and explains the apparatus that you will use to perform the Day 2 experiment.
2. **Draw the Apparatus:** Looking closely at the precise setup, **sketch the complete apparatus** including the 1000 mL beaker, graduated cylinder, Erlenmeyer flasks, stoppers, and tubes. Next, **label as many parts as you can**.
3. **CO₂-Collection Apparatus Drawing:**

4. Explain the Function:

Part	What is it for?
1000 mL beaker	
Graduated Cylinder	
Erlenmeyer Flask	

Heat and Stirring Plate	
Scale	
Tubes	
Stoppers	
Yeast	
Water	
Sugar	



Wrap-Up and Reflection

Recap:

- **Cellular respiration:** A process where cells break down glucose to produce ATP (energy-carrying molecule), with carbon dioxide and water as byproducts.
- **Carbon Dioxide (CO₂):** A waste product of cellular respiration, and exhaled by organisms.
- **Yeast:** Single-celled organisms classified as part of the fungus kingdom, often used in experiments because of their capability of fermentation, aerobic respiration, and some similarities to human cells.

Reflect:

Think about how cellular respiration is happening all around us, all the time - both within

your body, and outside of it. How can its byproducts, which are often “invisible,” be measured and studied?

Preview for Day 2:

Get excited for tomorrow’s session where we’ll dig deeper into cellular respiration and measuring CO₂ production with your UCSB Mentors. See you there!

End of Day 1

Day 2

Breathing Fast and Slow: Manipulating Yeast’s Environment

Welcome to Your Cellular Adventure!

Today, together with your SciTrek Mentors, you’re going to study CO₂ production up close and learn more about cellular respiration. Get ready to dive into two fun experiments where you’ll observe, change variables, and continue your journey as a true science detective. Which variables have the power to boost CO₂ production? Let’s get started!

Turn Up the Heat: How Does Heat Affect Yeast’s CO₂ Production?

Objective:

When it comes to yeast, do they like it warm? How warm? Does increasing the temperature lead to greater yeast growth and respiration, and therefore CO₂ production, or lesser CO₂ production? How can I be sure that my results are from temperature change, and not something else? Let’s find out!

Set up and conduct an experiment with two trials to test how temperature affects CO₂ production.

What You’ll Do With Your SciTrek Mentor:

1. Formulate a Hypothesis:

- If we increase the temperature, then the amount of carbon dioxide that the yeast generates will _____ (increase/decrease) because

_____.

2. **Choose Your Temperatures:**

- Choose two different temperatures between 30°C to 45°C (86°F to 113°F) for your trials. Write them down in the table below:

Temperature 1: _____ °C

Temperature 2: _____ °C

3. **Turn Up the Heat:**

- Using the materials and the laminated instruction sheet, as well as your diagram from yesterday, set up your experimental apparatus. Be prepared to track your data in the table below, and remember that your UCSB Mentor is there to help you.
- Measure and add **3 grams of yeast, 3 grams of sugar, and 100 mL of water to a 250 mL flask.**
- Set the stir speed to **800 RPM.**
- Make sure to keep the yeast, sugar, stir speed, and water the same in all trials.
- **Run the trial for 7 minutes.**

4. **Record Observations:**

- During the experiment, record your results on the data table below.

TEMPERATURE DATA TABLE

Trial	Temp.	Amount of Yeast (g)	Amount of Sugar (g)	Stir Speed (RPM)	Amount of Collected Water (mL)
1 for temp		3	3	800	
2 for temp		3	3	800	

5. **Interpreting Your Data:**

- Out of your two chosen temperatures, which resulted in higher CO₂ production and therefore a higher amount of water collected?

Circle one.

Higher Temperature

Lower Temperature

- Subtract the amount of water collected from your lower chosen temperature from the amount of water collected from your higher chosen temperature.

What is the **difference** between the two? _____ mL

6. **Why was it necessary to change only one variable at a time? Why was it necessary to conduct more than one trial?**

Now, your group will conduct your second experiment!



Turn Up the Sweet: How Does Amount of Sugar Affect Yeast's CO₂ Production?

Objective:

When it comes to yeast, does increasing the amount of sugar lead to greater CO₂ production, or lesser CO₂ production? How can I be sure that my results are from a change in the amount of sugar, and not something else? Let's find out!

Set up and conduct an experiment with two trials to test how the **amount of sugar** affects CO₂ production.

What You'll Do With Your SciTrek Mentor:

1. Formulate a Hypothesis:

- If we increase the amount of sugar, then the amount of carbon dioxide that the yeast generates will _____ (increase/decrease) because _____.

2. Choose Your Sugar Amounts:

- Choose two different amounts of sugar **between 1 g and 5 g** for your trials. Write them down in the table below:

Sugar Amount 1: _____ g

Sugar Amount 2: _____ g

3. Turn Up the Heat:

- Using the materials and the laminated instruction sheet, set up your experiment with the chosen amounts of sugar. Be prepared to track your data in the table below, and remember that your UCSB Mentor is there to help you.
- Make sure to keep the yeast, temperature, stir speed, and water the same in both trials.
- **Run the trial for 7 minutes.**

4. Record Observations:

- During the experiment, record your results on the data table below.

SUGAR DATA TABLE

Trial	Temp.	Amount of Yeast (g)	Amount of Sugar (g)	Stir Speed (RPM)	Amount of Collected Water (mL)

1 for sugar	37°C	3		800	
2 for sugar	37°C	3		800	

5. Interpreting Your Data:

- Out of your two chosen amounts of sugar, which resulted in higher CO₂ production and therefore a higher amount of water collected? Circle one.

More Sugar

Less Sugar

- Subtract the amount of water collected from your lower chosen sugar amount from the amount of water collected from your higher chosen sugar amount. What is the **difference** between the two? _____ mL

6. Why was it necessary to change only one variable at a time? Why was it necessary to conduct more than one trial?

Small group experiments are finished. Students should help tidy up and then return to their places, or simply attend to the teacher, who will do the wrap-up discussion.



Wrap-Up: What Did You Discover?

After your small group experiments today, it's time to think about what you've learned.

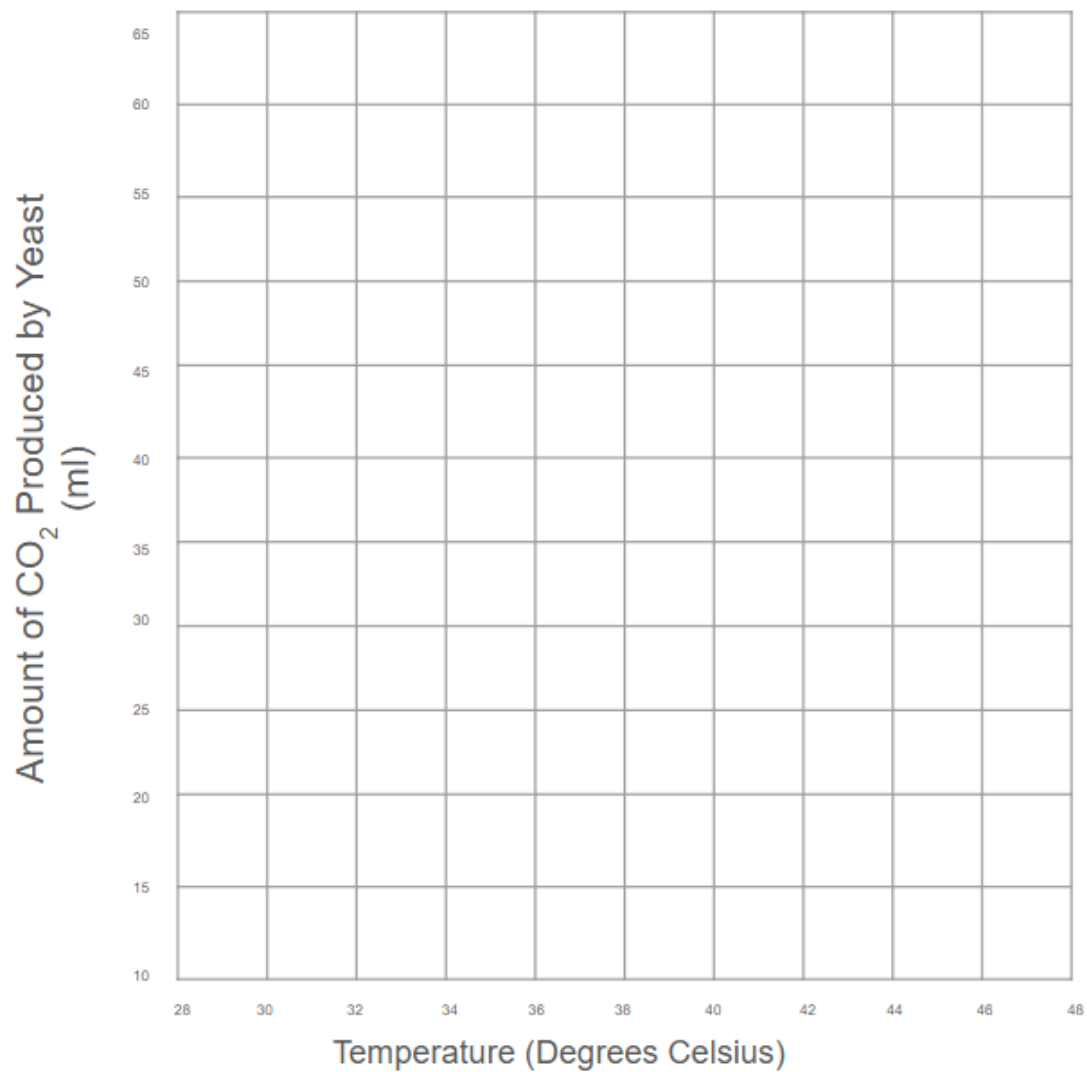
- **Reflection Questions:**

- Was your hypothesis correct for the temperature experiment? How about for the sugar experiment?
- How did each variable affect the amount of CO₂ produced by the yeast?
- If you wanted to create a situation where the yeast produced a lot of CO₂, how would you change the temperature and sugar to do this? Why?
- Which experiment was your favorite and why?
- What were some things that could have gone wrong in your experiment? How could you fix them next time?

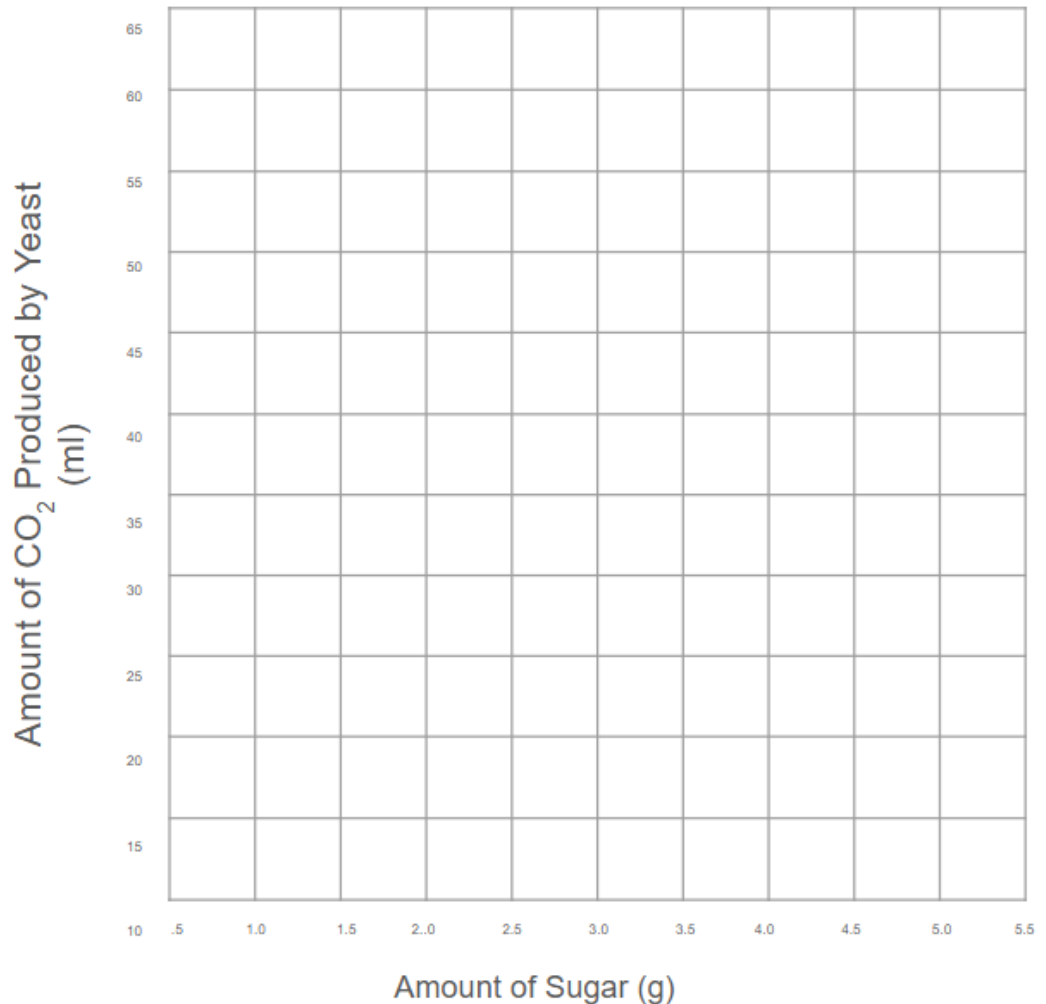
- **Graph Your Data With the Class:**

- Create and interpret graphs based on your data.
- Work with your teacher and classmates to plot the temperature on the X-axis and the amount of CO₂ (or water collected) on the Y-axis for graph 1 and sugar amount on the X-axis and the amount of CO₂ (or water collected) on the Y-axis for graph 2.

Effects of Temperature on CO₂ Production By Yeast



Effects of Sugar on CO₂ Production By Yeast



- What trends do you see in your graph 1 (temperature)?
- What trends do you see in graph 2 (sugar)?
- What does your graph tell you about the effects of temperature and sugar on yeast respiration?



Congratulations!

You've completed your journey in learning what "grows" the amount of CO₂ produced by yeast. Now, you know more about cellular respiration, and a brand new way to track one of its important byproducts!

End of Day 2

Day 3

Yeast at Work

Bringing Everyday Foods to Life!

Welcome, scientists!

Today, you're on a mission to get to know cellular respiration in a brand new way: what is the role of yeast and its byproducts in the foods and drinks we consume? It's time to take your understanding of yeast and use it to better understand its importance in everyday life!

Objective

You're going to discover how yeast makes bread rise and other ways that it enriches many of the food and drinks that we consume. You'll review previous experiments and demonstrations, key content, and plan your own yeast experiments. On Day 4, you'll build your own unique plan for yeast "happiness" and productivity with the SciTrek Mentors, compete with other small groups for the best growth environment, and further discuss how yeast functions in cellular respiration and its significance in everyday life. Ready to begin?

1. Recap & Review

Think back to the past day's experiments:

- **Turn Up the Heat:** Did increasing the temperature increase or decrease the amount of CO₂ produced by the yeast?
- **Turn Up the Sweet:** Did increasing the sugar increase or decrease the amount of CO₂ produced by the yeast?

Analysis Time!

1. **How did the CO₂ collection apparatus work? How were you able to measure CO₂ production and make comparisons while testing and changing your different variables?** Write down what you observed.

2. **How can variables be changed to help yeast to “grow,” and produce the most CO₂ during cellular respiration?**

- Fill in the table below. For each square, cross the variable in the right column with the variable on the top row and draw an emoji (either happy, neutral, or sad as pictured below) to show how yeast - meaning its “growth” and CO₂ production - would respond.

Temperature & Amount of Sugar Variables Pairing Table -

😊 - high CO₂ production

😐 - middle CO₂ production

😞 - low CO₂ production

	Higher amount of sugar	Lower amount of sugar
Higher temperature		
Lower temperature		



Activity 1: Yeast & Bread - Bubbles, Texture, and Culture

Your Mission:

Compare and contrast different varieties of bread, noticing the different levels of airiness or fluffiness of each.

Materials You'll Have:

- Various types of bread

Key Questions:

1. **Looking carefully at each variety of bread, what features differ and how?**
 - Color
 - Texture
 - Presence of air bubbles (airiness/fluffiness)
2. **Tasting a small piece of each type of bread, how do flavors differ?**
3. **What do you think causes the air bubbles or holes in the bread?** Write your thoughts in the space below:

4. **Share any experiences you have with baking bread, or eating bread, in your family.**
What kinds of bread do you eat most or make? Is yeast used in these breads? Write your thoughts in the space below:

5. **Write a short paragraph summarizing what you learned about yeast's role in baking bread** and any interesting facts you learned from your classmates. Write your thoughts in the space below:

Key Concept

The **observable effect of yeast in bread** is the presence of air bubbles or holes (airiness/fluffiness) within the bread's inner structure. These bubbles are formed by carbon dioxide gas, which is produced by yeast during the process of fermentation. As yeast consumes the sugars in the dough and “grows,” it releases CO₂. The CO₂ gets trapped in the dough, causing it to rise and creating the airy, fluffy texture characteristic of well-leavened bread.



Activity 2: Analyzing “Turn Up the Sweet” Data and Creating a Class Graph

Your Mission:

Record the class data collected from Day 2 “Turn Up the Sweet” experiment regarding the effect of amount of sugar on yeast’s CO₂ production.

Materials You’ll Have:

- Data from Day 2 experiments
- Student Workbooks
- Whiteboard and markers

Key Questions:

1. Looking carefully at your data on your chosen amounts of sugar from yesterday’s experiment, **what is that variable’s effect on yeast’s production of CO₂?**
2. Together with your group, the other groups in the class, and your teacher, you will **plot the data points that represent the results of the entire class from the conducted on Day 2.** Use the graph on page 18 of your student workbook.
3. **What trends** (patterns that arise from isolated changes made to one variable) **can you observe from the graph?**

-
4. **How do these trends help us understand the optimal conditions for yeast?** Write your thoughts in the space below:



Activity 3 (Optional): Yeast & Root Beer, Carbonation Station!

Your Mission:

Demonstrate yeast's role in the natural carbonation of root beer, and how its byproducts manifest differently in root beer than in bread.

Materials You'll Have:

- Root beer making kit (optional)
 - Ingredients for root beer: yeast, sugar, water, flavoring (e.g., root beer extract), bottles
- Root beer making instructions laminate

Key Questions:

1. Using the root beer making kit and instructions laminate to “brew” the soft drink with your small group, observe any movement of gas within the mixture. Knowing that yeast consumes sugar and produces carbon dioxide, sometimes in the form of bubbles, **how do you think that yeast fermentation contributes to the carbonation of root beer?** Write your thoughts in the space below:

2. **How is yeast's role in the carbonation of root beer similar to its role in the leavening of some varieties of bread?** Write your thoughts in the space below:



Wrap-Up: What Did You Discover?

After completing today's activities, it's time to think about what you've learned.

- **Reflect:**
 - Cellular respiration is constantly taking place all around us and is important for not only our breathing, but the production of many of the foods we enjoy.
 - Think about how you will tailor your variables to make your group's yeast the "happiest" and most productive in the class.

Great job today! Tomorrow, you'll strategize and work to see if you can create the "happiest" and most productive yeast in the class. Be ready to see if the unique differences in your variables create the very best environment for yeast, or not!

End of Day 3

Day 4

Mission: Who Can Grow the Happiest Yeast?

Welcome back, scientists!

Today you're going to further engage in the world of cellular respiration by designing and conducting your own experiments to maximize CO₂ production. You will use your knowledge from previous experiments and data collection to adjust the temperature and sugar amount to create the optimal environment for CO₂ production from the yeast. Who will find the best combination of variables to make the "happiest" yeast?

Introduction

Quick Review:

- **Considering Your Variables:** On Day 2, you tested how the variables of temperature and amount of sugar affected your yeast's production of CO₂. However, because of the importance of standardizing all other variables (by keeping them the same), you tested these variables separately.
- **Goal:** Use your knowledge from previous experiments and data collection to make strategic choices on how to grow the "happiest," most productive yeast in the class. At the end of the experiment, the amount of CO₂ produced by each small group's yeast will be shared and compared, and one group will be named the winner!
- In the space below, write out your group's hypothesis on what will make your yeast mixture produce more CO₂ than any other group, including a specific temperature and amount of sugar (in grams). Explain why you made these choices in specific levels, referencing what you have learned from previous experiments.

In order to create the "happiest," most productive yeast in the class, we are going to...



Growing the Happiest Yeast

Step 1: Choose Your Variable Levels

- Remember, it is important to follow scientific principles by changing only the variables of temperature and sugar amount, while keeping the others constant.
- Now, decide on the specific levels of the two variables for Trial 1:
 - Temperature: Choose between 30°C to 45°C (86°F to 113°F).
 - Sugar Amount: Choose between 1g and 5g.
- Record your first chosen temperature and sugar amount in the first row of the data table below:

Date:	Temperature	Amount of Yeast (g)	Amount of Sugar (g)	Stir Speed (RPM)	Amount of Collected Water (mL)
Trial 1		3g		800 rpm	
Trial 2		3g		800 rpm	
Observations:					

Step 2: Conducting the Trials

- Set up your experiment using the provided materials. Add 100 mL of water to the 250 mL Erlenmeyer flask, add 3g of yeast, add the first chosen amount of sugar, set the hotplate to the first chosen temperature, and adjust the stir speed to 800 RPM.
- Set your timer and allow the reaction to proceed for **7 minutes**. When you are done waiting, measure the amount of water displaced in the attached apparatus. Remember, this indicates CO₂ production.
- After this trial, record the amount of water collected in the first row of the data table above. Note any additional observations.

- Repeat Steps 1&2 above for Trial 2.

Step 3: Small Group Discussion

- Would you do anything differently if offered the chance to conduct a third trial? Why or why not?

- Describe potential sources of error in the experiment:



Group Discussion & Wrap-Up

- Record the trial data from all groups into the class data table below. Each group should only report the data from their most successful trial. This will allow you to compare results and look for trends or outliers in the data.

Sample Class Data Table

Best Trial	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Temp.								
Sugar								
Amount of CO ₂ Collected								

- Does using the maximum levels of all variables always produce the most CO₂? Why, or why not?

Conclusion and Reflection

- **Wrap-Up:** Today, you learned about what conditions make yeast the “happiest,” or most productive in terms of cellular respiration. Great job on your trials!
- **Final Thought:** What was the biggest challenge you faced, and what did you learn from it?

Write your reflection here:

End of Mission! Ready for Day 5? On this final program day, you will demonstrate what you learned earlier this week.

End of Day 4

Day 5

Poster Perfect: Showcasing Your Scientific Journey!

Hey, scientists!

Today, you get to show off all the hard work you did during your “Who Can Grow the Happiest Yeast?” experiment by creating a research poster. This poster will help you share your findings in an engaging and interesting way, just like real scientists do at conferences. Let’s get started on making your scientific findings stand out!

Introduction: Why Make a Research Poster?

- **Did you know?** Scientists use posters to share their experiments and discoveries with others. Your mission today is to create a poster that tells the story of how you experimented with creating maximally productive yeast by manipulating key variables.
 - **What goes on the poster?** You'll need a catchy title, a hypothesis, the procedure you followed, a picture of your apparatus, your results, and a conclusion.
-

Poster Creation

Step 1: Complete the sections of the poster.

Each group member should do at least one of the following from the Poster Template-

Poster Elements:

- **Project Title**
- **Names** of Students in Group
- **Graph of Key Results** from Day 4 Trials
- **Labeled Apparatus Set-up**
- **Data Table** (from Day 4, Student Workbook page 27)
- **Which Trial Made the Most CO₂ and Why**
- **Why Does Our Experiment Matter?** (Sentence starter: All living things....)

Step 2: Assemble the Poster

- **Put it all together:** Use the template pieces provided to make neat copies of all of the elements of the poster. Glue all your work onto the posterboard. Organize your information logically—make sure everything is clear and easy to read.
 - **Get Creative:** While your poster should be neat and easy to follow, feel free to add some flair with colors and designs!
-

Gallery Walk and Peer Feedback (If time permits)

Step 7: Present Your Poster

- **Showtime:** Display your poster in the classroom. Take a walk around to check out your classmates' work.
 - **Feedback:** Give and receive positive feedback. What did you like about other posters? What could be improved for next time?
-

Conclusion and Reflection

- **Wrap-Up:** Reflect on the poster-making process. Why is it important to communicate your scientific findings effectively?
- **Looking Ahead:** Think about how you can use these skills in future projects and presentations. Great job today!

Final Reflection: What did you learn from making your poster? Write it down here:

End of Day 5!

You did amazing—keep up the great work, and stay curious!



SciTrek is an educational outreach program that is dedicated to allowing 2nd - 12th grade students to experience scientific practices firsthand. SciTrek partners with local teachers to present student-centered inquiry-based modules that not only emphasize the process of science but also specific grade level NGSS performance expectations. Each module allows students to design, carry out, and present their experiments and findings.

If you would like to donate to the program or find out how you can get your company's logo on our notebooks please contact scitrekaadmin@chem.ucsb.edu.

SciTrek is brought to you by generous support from the following organizations:



For more information, please feel free to visit us on the web at <http://www.chem.ucsb.edu/scitrek/> or contact us by e-mail at scitrekaadmin@chem.ucsb.edu.