

Cause/Effect • Comparison (Compare and Contrast) • Change



Unit Essential Question

How can comparing and understanding physical and chemical changes help us to understand cause and effect in the world around us?

UNIT DESCRIPTION

Students will use theatre, music, movement, and the visual arts to observe, analyze and create physical and chemical changes. The unit's projects will lead students to making comparisons between physical and chemical changes and their various components. This unit and its projects will also focus on the cause and effect of the process of physical and chemical changes. Students will also strengthen their descriptive and opinion writing skills throughout the projects in this "Challenging Changes" unit. Roll up your sleeves and get ready to immerse in some engaging hands-on arts projects that will lead students to mastery of key science concepts and writing skills!

PROJECTS

- Project 1: Dance with Atoms
- Project 2: Thiebaud's Tasty Pastries
- Project 3: Rap Battles of Changes
- Project 4: Cooking Show with Mr. & Mrs. Changes



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Units provide differentiated ideas and activities aligned to a sampling of standards.

The units do not necessarily imply mastery of standards, but are intended to inspire and equip educators.

Unit Description	Table of Contents
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UNIT ESSENTIAL QUESTION

- How can comparing and understanding physical and chemical changes help us to understand cause and effect in the world around us?

CROSS-CUTTING INTERDISCIPLINARY CONCEPTS

Cause/Effect

Comparison (Compare and Contrast)

Change

REAL WORLD CONTEXT

We study physical and chemical changes because they are in the world around us on a daily basis. We experience changes in matter in many aspects of our life, from the classroom to cooking dinner. Understanding these changes can help us develop day-to-day life skills, and inform ourselves of timely topics such as change and sustainability within our environment.

STANDARDS

Curriculum Standards	Arts Standards
<p>S5P2 Students will explain the difference between a physical change and a chemical change.</p> <p>a. Investigate physical changes by separating mixtures and manipulating (cutting, tearing, folding) paper to demonstrate examples of physical change.</p> <p>b. Recognize that the changes in states of water (water vapor/steam, liquid, ice) are due to temperature differences and are examples of physical change.</p> <p>c. Investigate the properties of a substance before, during, and after a chemical reaction to find evidence of change.</p>	<p>DSCO.4 Demonstrates an understanding of dance as it relates to other areas of knowledge.</p> <p>D5FD.1 Identifies and demonstrates movement elements, skills, and terminology in dance.</p> <p>c. Demonstrates accuracy, focus, control, and coordination in performing and creating a spectrum of locomotor sequences performed to music that includes a range of tempos, rhythms, and qualities.</p> <p>d. Performs smooth transitions when connecting movements.</p> <p>M5GM.4 Improvising melodies, variations, and accompaniments.</p>

<p>CCSS-ELAW.5.2.a Write informative/explanatory texts to examine a topic and convey ideas and information clearly.</p> <p>ELACC5W3: Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences.</p> <p>b. Use narrative techniques, such as dialogue, description, and pacing, to develop experiences and events or show the responses of characters to situations.</p> <p>ELACC5W4 Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience.</p> <p>ELACC5W5 With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, and editing.</p> <p>ELACC5W6 With some guidance and support from adults, use technology, including the Internet, to produce and publish writing as well as to interact and collaborate with others; demonstrate sufficient command of keyboarding skills to type a minimum of two pages in a single sitting.</p> <p>ELACC5SL4 Report on a topic or text or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.</p>	<p>a. Improvise rhythmic patterns using a variety of sound sources and answers to given rhythmic questions</p> <p>M5GM.9 Understanding music in relation to history and culture.</p> <p>a. Perform, listen, move, and/or distinguish between music from various historical periods and cultures from the Civil War to present (different genres).</p> <p>VA5PR.3 Understands and applies media, techniques, and processes of three-dimensional works of art (e.g., ceramics, sculpture, crafts, mixed-media) using tools and materials in a safe and appropriate manner to develop skills.</p> <p>b. Creates ceramic objects demonstrating refinement of the additive or subtractive method. (e.g., pinch method, coil method, relief) and techniques (e.g., score and slip, wedging, slab method, surface texture).</p> <p>TAES5.3 Acting by developing, communicating, and sustaining roles within a variety of situations and environments.</p> <p>a. Uses vocal elements such as inflection, pitch, and volume, to communicate the thoughts, emotions, and actions of a character.</p> <p>e. Dramatizes literature and original scripts through various dramatic forms such as pantomime, process drama, puppetry, improvisation, plays, and readers' theatre.</p> <p>TAES5.2 Developing scripts through improvisation and other theatrical methods.</p> <p>a. Uses a playwriting process (e.g., pre-write/pre-play; prepare to write/plan dramatization; write; dramatize; reflect and edit; re-write/play; publish/perform).</p> <p>c. Creates an organizing structure appropriate for purpose, audience and context.</p> <p>TAES5.3 Acting by developing, communicating, and sustaining roles within a variety of situations and environments.</p> <p>a. Uses vocal elements such as inflection, pitch, and volume, to communicate the thoughts, emotions, and actions of a character.</p> <p>b. Uses body and stage movement to communicate the thoughts, emotions, and actions of a character.</p> <p>c. Uses imagination to make artistic choices in portraying characters.</p> <p>d. Collaborates with an ensemble to create theatre.</p>
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ASSESSMENTS**Summative Assessments**

- Pre/Post Test
- Compare and Contrast Writing Rubric
- Narrative Writing Point of View Rubric
- Physical and Chemical Change Rap Battle Rubric
- Cooking Show Script and Performance Rubric

CHARACTER EDUCATION COMPONENTS**CHARACTER ATTRIBUTES**

In “Cooking with P&C Changes,” the students will present their cooking show to a lower grade-level class. You could pair up your 5th grade class with a 2nd grade class learning “how-to” writing. The 5th grade students could perform their cooking show dramatizing the differences between physical and chemical changes. Then the 5th graders could be directed to assist the 2nd grade students with creating a “how-to” writing piece explaining how to make one of the recipes made on the “show.”

Also, in “Rap Battle,” the topic of respect is brought up throughout the lesson. It is addressed because even though we are “battling,” we still need to be respectful of each other and each other’s ideas.

Respect
Learning with others
Being good listeners
Kindness

PARTNERING WITH FINE ARTS TEACHERS

Music Teacher:

- Providing musical instruments for “Rap Battle” project
- Providing examples of Found Sounds prior to students doing “Dancing with Atoms” project
- Differentiation
- Rhyme scheme and pattern (ex. ABAB) in music in “Rap Battle” project

Visual Arts Teacher:

- Offer prints/lesson of Wayne Thiebaud Pastry Art (mini-lesson, or extension)

Dance Teacher:

- Mini-lesson prior to “Dancing with Atoms” project to teach locomotor, non-locomotor, vibratory, etc. (or reinforce if already taught in the classroom)

APPENDIX (See Downloads)

- Pre-test/Post-test

ADDITIONAL RESOURCES**Books**

- *Changing Matter: Understanding Physical and Chemical Changes* by Tracy Nelson Maurer
- *Make It Change!* by Anna Claybourne
- *The Solid Truth about Matter* by Mark Weakland
- *Pancakes, Pancakes!* by Eric Carle

Websites

- Virtual Physical and Chemical Changes Lab:
<http://vital.cs.ohiou.edu/steamwebsite/downloads/ChangeLab.swf>
- Glencoe Publishing Virtual Physical and Chemical Changes Observations Lab:
http://www.glencoe.com/sites/common_assets/science/virtual_labs/E03/E03.html
- Sunday Morning Interview with Wayne Thiebaud:
https://www.youtube.com/watch?v=vl_QJ5D9Qm8-CBS

CREDITS

U.S. Department of Education

Arts in Education--Model Development and Dissemination Grants Program

Cherokee County (GA) School District and ArtsNow, Inc.

Ideas contributed and edited by:

Carol Steele, Taylor Stewart, Melissa Joy, Shannon Green, Dr. Maribeth Yoder-White, Jessica Espinoza

Name: _____ Date: _____

Changes in Matter Pre-/Post-Test

Write whether each change is a physical (P) or chemical (C) change.

1. Rust forming on a car _____
2. Ice Melting _____
3. Water freezing _____
4. Cutting a piece of paper _____
5. Burning firewood _____

6. Which of these is an example of a change in the **state of matter?**
 - a. Crumbling crackers into a bowl of soup
 - b. Letting an ice cube melt into a glass of water
 - c. Crushing a cube of sugar into a powder
 - d. Stirring salt into a glass of water

7. China heated water until it became a gas (water vapor). Which term identifies this change?
 - a. Condensing
 - b. Melting
 - c. Boiling
 - d. Freezing

8. Which of the following is NOT a physical change that happens when water changes state?
 - a. Water boils
 - b. Water freezes
 - c. Ice sinks
 - d. Ice melts

9. **TRUE or FALSE?** A color change is a clue that a chemical change has occurred.

10. Give an example of a physical change.

11. Give an example of a chemical change.

12. What kind of change is grinding chalk into a powder?

- a. Chemical
- b. Mixture
- c. Physical
- d. Reaction

13. When a REACTION has occurred, that usually means a _____ change has occurred.

14. Your teacher mixes together two liquids. Together, the two liquids bubble. You just witnessed a:

- a. Transfer of energy
- b. Physical reaction
- c. Chemical reaction
- d. Force

15. Which mixture could you best separate with a filter?

- a. Salt and pepper
- b. Rocks and wood chips
- c. Sugar and iron fillings
- d. Sand and rocks

16. Jason dissolved a spoonful of salt in a glass of water. How can Jason know that the salt has gone through a physical change and not a chemical change? Explain.

A pancake is a common breakfast food that is eaten after mixing various ingredients together.

Part A: Is the change that occurs when mixing together the pancake ingredients physical or chemical? Explain why.

Part B: Describe a change that could be made to the pancake and it still remain a pancake.

Part C: When we cook the pancake on the griddle, or stove, is it undergoing a physical or chemical change? Explain why.



Project Essential Questions

- How do the molecules move in the three states of matter?
- How do the processes of melting, freezing, condensation/evaporation, and boiling change how the molecules move in matter?
- How can I write a comparison paragraph comparing the movement of molecules in solids, liquids, and gases?
- How can I use locomotor and non-locomotor movement to demonstrate how the molecules move in a solid, liquid, and gas?

PROJECT DESCRIPTION

In this project, students will be up on their feet moving and dancing with atoms! They will apply their previously taught knowledge of how molecules move in the three states of matter to represent the movement of the molecules in each state of water. Students should also be able to determine that these changes in matter are physical changes. This particular project goes deeper into analyzing how molecules move using dance integration strategies.

LEARNING TARGETS

“I Can...”

- Analyze how the molecules move inside of the three states of matter (solid, liquid, and gas)
- Use locomotor and non-locomotor movement to display how the molecules move in a solid, liquid, and gas
- Write a compare and contrast paragraph for the movement of molecules in each state of matter

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DURATION: 1-2 days

Project Description	Learning Targets
<p>In this project, students will be up on their feet moving and dancing with atoms! They will apply their previously taught knowledge of how molecules move in the three states of matter to represent the movement of the molecules in each state of water. Students should also be able to determine that these changes in matter are physical changes. This particular project goes deeper into analyzing how molecules move using dance integration strategies.</p>	<p>“I Can...”</p> <ul style="list-style-type: none"> Analyze how the molecules move inside of the three states of matter (solid, liquid, and gas) Use locomotor and non-locomotor movement to display how the molecules move in a solid, liquid, and gas Write a compare and contrast paragraph for the movement of molecules in each state of matter

ESSENTIAL QUESTIONS

- How do the molecules move in the three states of matter?
- How do the processes of melting, freezing, condensation/evaporation, and boiling change how the molecules move in matter?
- How can I write a comparison paragraph comparing the movement of molecules in solids, liquids, and gases?
- How can I use locomotor and non-locomotor movement to demonstrate how the molecules move in a solid, liquid, and gas?

STANDARDS

Curriculum Standards	Arts Standards
<p>S5P2 Students will explain the difference between a physical change and a chemical change.</p> <p>b. Recognize that the changes in state of water (water vapor/steam, liquid, ice) are due to temperature differences and are examples of physical change.</p> <p>ELAW.5.2.</p> <p>a. Write informative/explanatory texts to examine a topic and convey ideas and information clearly.</p>	<p>DSCO.4 Demonstrates an understanding of dance as it relates to other areas of knowledge.</p> <p>D5FD.1 Identifies and demonstrates movement elements, skills, and terminology in dance.</p> <p>c. Demonstrates accuracy, focus, control, and coordination in performing and creating a spectrum of locomotor sequences performed to music that includes a range of tempos, rhythms, and qualities.</p> <p>d. Performs smooth transitions when connecting movements.</p> <p>M5GM.4 Improvising melodies, variations, and accompaniment.</p> <p>a. Improvise rhythmic patterns using a variety of sound sources and answers to given rhythmic questions.</p>

KEY VOCABULARY

Content Vocabulary
<ul style="list-style-type: none"> Molecules Solids Liquids Gases

- Melting
- Freezing
- Condensation
- Boiling
- Evaporation
- Comparison
- Physical change

Arts Vocabulary

- Locomotor: movement that travels through space
- Non-locomotor: movement that does not travel through space
- Pathway: designs traced on the floor as a dancer travels across space; the designs traced in the air as a dancer moves various body parts
- Shape: an interesting and interrelated arrangement of body parts of one dancer; the visual makeup or molding of the body parts of a single dancer; the overall visible appearance of a group of dancers
- Vibratory: a quality of movement characterized by rapidly repeated bursts of percussive movements, like a jitter
- Legato: smooth, connected sounds (articulation)
- Marcato: stressed or accented sounds
- Ostinato: a repeated pattern
- Pitch: refers to the highness or lowness of sound
- Staccato: short, detached sounds
- Tempo: speed of the beat
- Unison: single melody; all instruments or voices sing/play the same notes

ASSESSMENTS

Formative	Summative
<ul style="list-style-type: none"> ● Teacher Observation of Student activity: Teachers will observe students throughout the molecule movement activity to check for understanding ● Quick Write Compare and Contrast of how the molecules move in a solid, liquid, and gas 	<ul style="list-style-type: none"> ● Compare and Contrast Writing Rubric (see Downloads)

MATERIALS

Paper, pencil (for activating strategy and compare/contrast quick write), **Fictional Water Stories** (See Downloads)

Activating Strategy

- Students will work individually to complete a 3-minute Brainstorming Session competition. Students will be given one minute to list as many solids as they can. This can be done in small groups of 3-5 students and on one large piece of chart paper given out to each individual group.
- Once completed, the students will then share with the class. The group who has the most solids listed correctly will win the competition! The class will then repeat this process with liquids and later gases. (You could also split the classroom into 3 groups and give each group a different state of matter to speed up this activity, if needed).

<ul style="list-style-type: none">• Remind students throughout that they will need to listen for accuracy of their classmates lists.
Main Activity
Part 1 <ul style="list-style-type: none">• Review the dance vocabulary that will be used in this particular project.
Part 2 <ul style="list-style-type: none">• The students will be split into various heterogeneous leveled teams where they will demonstrate the movement of molecules in solids, liquids, and gases.• The teacher will then instruct the students that they are to use movement to express molecules within a solid. The solid molecules will be close together and demonstrate vibratory, non-locomotor movement.• The teacher should be consistently reminding the students throughout of the definitions of locomotive, non-locomotive, vibratory, and other dance vocabulary.• The teacher will then instruct the students to act like the molecules in a liquid. The liquid molecules will move slightly farther apart using locomotive, fluid movement. Be sure to remind students to use whole body movements during the liquid and gas phases.• The teacher will then instruct the class to become the molecules in a gas. The gas molecules will move quickly, bouncing off of each other and the walls, moving very far apart.• After the students have mastered the movement of the molecules in each of the states of matter, the teacher will then instruct the students to begin moving between the states of matter as they are called out. For example, as the teacher yells "Melting!" the students must transition from the solid to the liquid.• Once this is demonstrated by multiple student groups, the students will then add a sound to their transitional movement. The students may use body percussion (i.e. using mouth, claps, pats, clicks, stomp) to demonstrate the transitions between phases and the tempo, as related to the molecule movement. (allegro = fast tempo = gas; moderato = medium tempo = liquid; adagio = slow = solid)
Part 3 <ul style="list-style-type: none">• The students will be instructed to write a compare and contrast quick-write, comparing how the molecules move inside of a solid, liquid, and gas, and their transitional states.• Also, students will compare and contrast the different movements used to act out the atoms in a molecule and include these in their writing.• Students will be assessed through a Compare and Contrast Writing Rubric (see Downloads).
Classroom Tips: <ul style="list-style-type: none">• Teachers should make sure that there is enough wide open space in the classroom where students can form groups and move around as needed.

REFLECTION

Reflection Questions
<ul style="list-style-type: none">• <i>How did my body movements help me to display the way that molecules move inside of a solid, liquid, and gas?</i>• <i>How did the sounds that I made help me to understand how molecules move inside of a solid, liquid, and gas?</i>

DIFFERENTIATION**Remedial/EL Students:**

- In the Activating Strategy of this project the teacher could use the technique of “Inspiration of Ideas” by using smaller groups, table groups, or pairs for remedial/EL to brainstorm together without the pressure of being timed. Perhaps you do this a day prior to the relay race.
- During the Reflection part of this project the following modifications could be made: place students in small groups, assist with Guided writing, provide sentence starters, provide graphic organizers, a word bank based on content vocabulary, a paragraph frame, or modify the length/writing assignment based on student needs.

Accelerated:

- These students could write their own story to demonstrate a drop of water transitioning through the three states of matter from the point of view of the water droplet. The student can write from the point of view of the water droplet and incorporate fine arts movement vocabulary in their story (such as locomotor, non-locomotor, tempo, etc.). See Downloads for examples of **Fictional Water Stories**.

ADDITIONAL RESOURCES**Books**

- *What Are Atoms?* by Lisa Trumbauer
- *Atoms and Molecules* by Molly Alaian

Online Book

- www.storyjumper.com/book/index/13299612/History-of-the-Atom

APPENDIX (See Downloads)

- **Compare and Contrast Writing Rubric**
- **Fictional Water Stories** (Accelerated Extension)

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Dance with Atoms: Compare and Contrast Writing Rubric

TASK: Create a dance that expresses the movement of molecules throughout the three states of matter.

Task	4	3	2	1
Comparing and Contrasting Science Content	Writer compares and contrasts movements of molecules clearly. Writer includes specific examples to illustrate the comparison. Writer includes only information relevant to the comparison.	Writer compares and contrasts movements of molecules clearly, but the supporting information is general. Writer includes only information relevant to the comparison.	Writer compares and contrasts movements of molecules clearly, but the supporting information is incomplete. Writer may include information that is not relevant to the comparison.	Writer compares and contrasts movements of molecules clearly, but does not include both. There is no supporting information, or information is incomplete.
Dance and Science Content Connection	Writer fully justifies how the movements were thoroughly reflective of the molecule movement within solids, liquids, and gases. The student offers a clear explanation of how their movements differ for each of the states of matter.	Writer somewhat justifies how the movements were thoroughly reflective of the molecule movement within solids, liquids, and gases. The student offers a clear explanation of how their movements differ for each of the states of matter.	Writer somewhat justifies how the movements were thoroughly reflective of the molecule movement within solids, liquids, and gases, but the student offers an incomplete explanation of how their movements differ for each of the states of matter.	Writer does not justify how the movements reflective of the molecule movement within solids, liquids, and gases, and the student gives no explanation of how their movements differ for each of the states of matter.
Ensemble Performance	Ensemble performance is coordinated, well-rehearsed and is performed using loud, clear voices, and strong bodies.	Ensemble seems mostly prepared but could have benefitted from more rehearsals. Voices are mostly loud and clear.	Ensemble is somewhat prepared, but it is clear that rehearsal was lacking. Voices are somewhat loud and clear.	Ensemble is not prepared to present. Students often mumble or can not be understood.
Writing Quality	Writer makes no errors in grammar or spelling that distract the reader from the content.	Writer makes 1-2 errors in grammar or spelling that distract the reader from the content	Writer makes 3-4 errors in grammar or spelling that distract the reading from the content	Writer makes more than 4 errors in grammar or spelling that distract the reader from the content.

Total Score: _____

STORY EXAMPLE ONE:

One rainy December day in Acworth, Georgia, Suzy and Cody wanted to play outside. The rain just kept pouring down, all day long. Suzy and Cody decided that they would just play inside for the day. Suzy and Cody played games, drank lemonade, and watched movies. The next morning, Suzy and Cody awoke to find that all the rain from the day before had turned into ice! They quickly put on their ice skates and ran outside to the local pond. They went ice skating all day long. By the end of the day, the sun was coming out from the clouds and the ice was slowly melting. They had such a fun day, even with all the ice!

STORY EXAMPLE TWO:

Heather was trying to decide what to cook for dinner for her family. She decided that she wanted to cook spaghetti. The first thing Heather did was to get water out of the kitchen faucet and put it in a pot. Once Heather put the pot of water on the stove, it quickly became heated and began to boil. Heather watched as the water slowly turned into steam and left the pot, adding moisture to the noodles and cooking them in the process. Once the noodles were cooked, Heather filled the glasses with ice, set the table for dinner, and served her delicious spaghetti.



Project Essential Questions

- What is the difference between physical and chemical changes?
- How do I utilize visual arts to investigate the properties of a substance before, during, and after a chemical reaction to find evidence of change?

PROJECT DESCRIPTION

Students will use visual arts and drama to explore the differences between physical and chemical changes. After learning about the visual art techniques of artist Wayne Thiebaud, students will create a polymer clay pastry. When the pastry art is complete, students will use prior knowledge learned about physical and chemical changes to write a narrative from the point of view of the pastry explaining the physical and chemical changes that are involved in the pastry art-making process.

LEARNING TARGETS

“I Can...”

- Identify the differences between physical and chemical changes
- Use the visual arts to create a 3D polymer clay pastry to demonstrate my understanding of the differences between physical and chemical changes
- Write a narrative from the point of view of an object to explain the physical and chemical changes in the art process

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Duration: 2-3 Days

Project Description	Learning Targets
<p>Students will use visual arts and drama to explore the differences between physical and chemical changes. After learning about the visual art techniques of artist Wayne Thiebaud, students will create a polymer clay pastry. When the pastry art is complete, students will use prior knowledge learned about physical and chemical changes to write a narrative from the point of view of the pastry explaining the physical and chemical changes that are involved in the pastry art-making process.</p>	<p>“I Can...”</p> <ul style="list-style-type: none"> Identify the differences between physical and chemical changes Use the visual arts to create a 3D polymer clay pastry to demonstrate my understanding of the differences between physical and chemical changes Write a narrative from the point of view of an object to explain the physical and chemical changes in the art process

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STANDARDS

Curriculum Standards	Arts Standards
<p>S5P2 Students will explain the difference between a Physical change and a chemical change.</p> <p>c. Investigate the properties of a substance before, during, and after chemical reaction to find evidence of change</p> <p>ELACC5W3 Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences.</p> <p>b. Use narrative techniques, such as dialogue, description, and pacing, to develop experiences and events or show the responses of characters to situations.</p> <p>ELACC5W4 Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience.</p> <p>ELACC5W5 With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, and editing.</p> <p>ELACC5W6 With some guidance and support from adults, use technology, including the Internet, to produce and publish writing as well as to interact and collaborate with others; demonstrate sufficient command of keyboarding skills to type a minimum of two pages in a single sitting.</p>	<p>VA5PR.3 Understands and applies media, techniques, and processes of three-dimensional works of art (e.g., ceramics, sculpture, crafts, mixed-media) using tools and materials in a safe and appropriate manner to develop skills.</p> <p>b. Creates ceramic objects demonstrating refinement of the additive or subtractive method (e.g., pinch method, coil method, relief) and techniques (e.g., score and slip, wedging, slab method, surface texture).</p> <p>TAES5.3 Acting by developing, communicating, and sustaining roles within a variety of situations and environments.</p> <p>a. Uses vocal elements such as inflection, pitch, and volume, to communicate the thoughts, emotions, and actions of a character.</p> <p>e. Dramatizes literature and original scripts through various dramatic forms such as pantomime, process drama, puppetry, improvisation, plays, and Reader's Theatre.</p>

KEY VOCABULARY

Content Vocabulary
<ul style="list-style-type: none"> • Physical change • Chemical change • Reaction • Substance • Evidence
Arts Vocabulary
<ul style="list-style-type: none"> • Polymer clay: type of clay that is manufactured and contains plastic rather than coming from the earth • Form: an element of art that is three-dimensional and encloses volume, i.e. cubes, spheres, and cylinders are examples of various forms • Coil: a curling of material in a circular fashion • Surface texture: the surface quality or “feel” of an object, such as roughness, smoothness, or softness. Actual texture can be felt while simulated textures are implied by the way the artist renders areas of the picture. • Additive: sculptural process of manipulating space by adding material to reveal a given form • Form: objects that are three-dimensional having length, width and height. They can be viewed from many sides. Forms take up space and volume. • Subtractive: a sculptural process of manipulating a solid mass by taking away material to reveal a given form • Monologue: a long speech by a given character • Diction: using a “crisp & clear” actor voice that can be understood by everyone watching and listening • Inflection: the modulation of intonation or pitch • Pitch: highness or lowness of sound • Volume: loudness or softness of sound

TECHNOLOGY INTEGRATION

- Students utilize technology to research a Wayne Thiebaud painting as a basis for their pastry art
- Students utilize technology to type the narrative writing piece
- Chatterpix

ASSESSMENTS

Formative	Summative
<ul style="list-style-type: none"> • Teacher can monitor students through observation for understanding the physical and chemical changes through the art process • Question to ask during the art process: <ul style="list-style-type: none"> • What piece of Wayne Thiebaud’s art influenced you most when creating your own pastry? • Why did you choose that particular piece of Wayne Thiebaud’s art? 	<ul style="list-style-type: none"> • Narrative Writing Piece: Students will write a monologue from the point of view of the clay explaining the physical and chemical changes the clay goes through in the art process • Narrative Clay Monologue Rubric (see Downloads) • Written Reflection (see Downloads)

<ul style="list-style-type: none">• What part of creating an art piece out of clay is a physical/chemical change?• What is the difference between a physical and chemical change?• How does a physical change and chemical change occur?	
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MATERIALS

Polymer clay, toaster oven, **Wayne Thiebaud's Paintings PowerPoint** (see Downloads) with information about the artist and examples of his paintings, **Narrative Clay Monologue Rubric** (see Downloads)

Activating Strategy (5-10 min)

- Teacher will introduce the artist Wayne Thiebaud and his paintings with a PowerPoint encouraging students to look at the Geometric forms represented in Thiebaud's work.
- Teacher will also ask students to notice the details in the pastries he depicted.
- Teacher will lead a discussion with students about how physical and chemical changes occur through cooking and baking and creating clay art.

Main Activity

Part 1

- The teacher will begin with a mini-lesson introducing the artist Wayne Thiebaud and his visual arts depicting pastries and various desserts.
- The students will research a Wayne Thiebaud painting to influence their own clay model.

Part 2

- Students will be given polymer clay and will create a mini-visual depiction of one of Wayne Thiebaud's art pieces.
- The teacher will explain to the students that working with polymer clay is different than working with clay that comes from the earth. Polymer clay contains plastic and is a different consistency.
- The teacher will demonstrate how to create forms out of the clay to create pastries.
- Then students will mold and mend their clay until they arrive at a completed piece of pastry art. The teacher will discuss with the students throughout the artistic process of how each step of the project is a physical or chemical change.
- To complete the process, the pastry art will be placed in a toaster oven to go through a chemical change (cooking the clay), becoming a new substance.

Part 3

- Students will write a narrative from the viewpoint of the clay using sensory details. Included in the narrative will be a description and identification of the physical and chemical changes that occurred during the making and baking of the pastry art. Student writing will be evaluated using the **Narrative Clay Monologue Rubric**. (see Downloads)

Part 4

- Students will present their clay monologue using vocal elements--inflection, pitch, and volume--to communicate the thoughts, emotions, and actions of the character (clay).
- Other classroom students may provide constructive feedback on theatrical delivery (diction, facial expression, tone, volume, pitch, etc.) using theatre arts vocabulary.

Classroom Tips:

- Teachers should monitor students during cooking times of clay pastries. Students who are waiting for clay to be baked may begin working on their monologue writing to accompany the clay pastries artwork.

REFLECTION**Reflection Questions**

- How did the art process help me understand the difference between physical and chemical changes?*
- The vocal element I used during the monologue was _____ . I made this choice because ...*

DIFFERENTIATION**Accelerated Students:**

- These students could design a menu depicting their pastries in a café based on the art of Wayne Thiebaud. The students could use clipart or other visual arts mediums.
- These students could also write a song to accompany their narrative story. The tempo of the song/sounds included in the song should accurately reflect the tempo changes that the molecules would go through during the process.

ADDITIONAL RESOURCES**Books**

- Changing Matter: Understanding Physical and Chemical Changes* by Tracy Nelson Maurer
- Make It Change!* by Anna Claybourne

Websites

- Sunday Morning Interview with Wayne Thiebaud:
https://www.youtube.com/watch?v=vl_QJ5D9Qm8-CBS

APPENDIX (See Downloads)

- Narrative Clay Monologue Rubric**
- Wayne Thiebaud's Paintings PowerPoint**

CREDITS

U.S. Department of Education

Arts in Education--Model Development and Dissemination Grants Program

Cherokee County (GA) School District and ArtsNow, Inc.

Ideas contributed and edited by:

Carol Steele, Taylor Stewart, Shannon Green, Jessica Espinoza

Narrative Clay Monologue Rubric

TASK: Create a clay pastry art. Write and perform a monologue of the clay's point of view through the art process including physical and chemical changes to the clay.

Standards: ELACC5W3b, ELACC5W4, ELACC5W5, ELACC5W6, S5P2c, VA5PR.3b, TAES5.3a and e

Task	4	3	2	1
Writing Process	Students devote a great deal of time and effort to the writing process (prewriting, drafting, reviewing, and editing). Student works hard to make the monologue the best it can be.	Students devote sufficient time and effort to the writing process (prewriting, drafting, reviewing, and editing).	Students devote some time and effort to the writing process, but overall more revisions are needed.	Students devote little time and effort to the writing process.
Point of View of the Character (Clay)	The point of view of the character (clay) portrayed in the monologue is clearly developed. There is evidence that the point of view has been analyzed thoroughly.	Most of the monologue is written from the point of view of the character (clay). The monologue wanders off at one point, but the reader can still learn something about the topic.	Some of the monologue is in the point of view of the character (clay), but the reader does not learn much about the topic.	No attempt has been made to relate the writing to any particular point of view.
Accuracy of Science Content	All facts presented in the monologue are accurate. The facts are fully developed and allow the audience to understand much more about the differences between physical and chemical changes.	Almost all facts presented in the monologue are accurate.	Most facts presented in the monologue are accurate (at least 70%).	There are several factual errors in the monologue.
Preparedness	Student is completely prepared, and the monologue is performed using a loud, clear voice.	Student seems mostly prepared, but could have benefitted from more rehearsals. Voice is mostly loud and clear.	Student is somewhat prepared, but it is clear that rehearsal was lacking. Voice is somewhat loud and clear.	Student is not prepared to present. Student often mumbles or can't be understood.

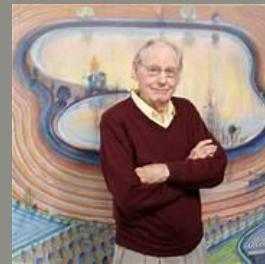
Total Score: _____

COOKING PASTRIES WITH WAYNE THIEBAUD

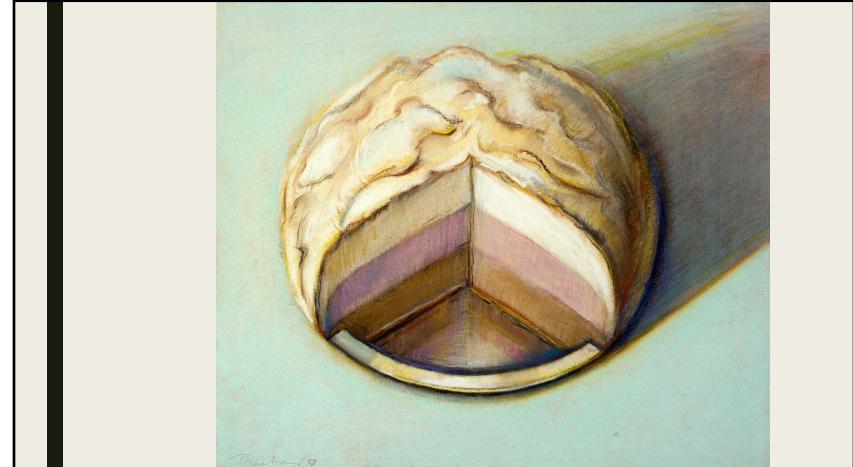
By Carol Steele and Taylor Stewart

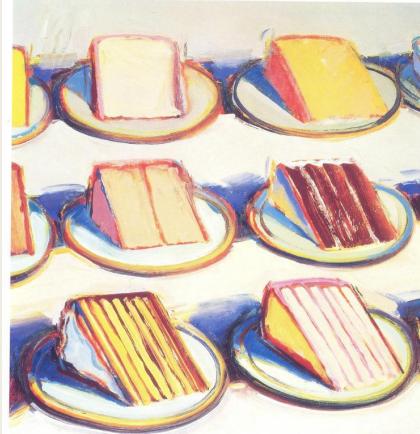


Wayne Thiebaud
Painter
Born 11-19-20



- American painter and printmaker widely known for his colorful works depicting commonplace objects including pies, lipsticks, paint cans, ice cream cones, pastries, and hot dogs, as well as for his landscapes and figure paintings
- Artistic techniques-Uses real life objects, not images to create his paintings, paints objects with rich, bright colors to bring attention to form, uses loose, thick brushstrokes and exaggerated colors to depict his subjects, includes well-defined shadows characteristic of advertisements in his work
- Associated with the Pop art movement because of his interest in objects of mass culture
- Worked in animation department at Walt Disney Studios, also worked as a cartoonist, sign painter, illustrator, teacher
- In 1994, Thiebaud received the National Medal of Arts, the highest award given to an artist by the U.S. government.





Art Terms



- **polymer clay**-a type of clay that is manufactured and contains plastic rather than coming from the earth
- **form**-an element of art that is three-dimensional and encloses volume (cubes, spheres, and cylinders are examples of various forms)
- **coil**-a curling of material in a circular fashion
- **surface texture**-the surface quality or “feel” of an object, such as roughness, smoothness, or softness. Actual texture can be felt while simulated textures are implied by the way the artist renders areas of the picture.
- **Additive**-a sculptural process of manipulating space by adding material to reveal a given form
- **Form**--objects that are three-dimensional having length, width and height. They can be viewed from many sides. Forms take up space and volume.
- **Subtractive**-a sculptural process of manipulating a solid mass by taking away material to reveal a given form



Theater Terms

- **Monologue**-a long speech by a given character
- **Diction**-using a “crisp & clear” actor voice that can be understood by everyone watching and listening
- **Inflection**-the modulation of intonation or pitch
- **Pitch**-highness or lowness of sound
- **Volume**-loudness or softness of sound





Project Essential Questions

- How can I use music to show the differences between a physical and chemical change?
- How can I analyze the differences between a physical and chemical change?

PROJECT DESCRIPTION

In this project, students will use music to explore physical and chemical changes in matter. The project will lead students in comparing and contrasting physical and chemical changes. Students will also strengthen their social skills by working together in groups and developing interpersonal relationship skills by cooperating to work collaboratively on a rap that demonstrates mastery of the science concept.

LEARNING TARGETS

"I Can..."

- Explain that a physical change is a change that is reversible and does not result in a new substance
- Explain that a chemical change is a change that cannot be reversed and results in the creation of a new substance
- Use music to demonstrate my understanding of physical and chemical changes

www.artsnowlerning.org

Units provide differentiated ideas and activities aligned to a sampling of standards.

The units do not necessarily imply mastery of standards, but are intended to inspire and equip educators.

Challenging Changes

Rap Battle of Changes

5th Grade

DURATION: 3-4 days

Project Description	Learning Targets
In this project, students will use music to explore physical and chemical changes in matter. The project will lead students in comparing and contrasting physical and chemical changes. Students will also strengthen their social skills by working together in groups and developing interpersonal relationship skills by cooperating to work collaboratively on a rap that demonstrates mastery of the science concept.	"I Can...": <ul style="list-style-type: none">Explain that a physical change is a change that is reversible and does not result in a new substanceExplain that a chemical change is a change that cannot be reversed and results in the creation of a new substanceUse music to demonstrate my understanding of physical and chemical changes

ESSENTIAL QUESTIONS

- How can I use music to show the differences between a physical and chemical change?
- How can I analyze the differences between a physical and chemical change?

STANDARDS

Curriculum Standards	Arts Standards
S5P2 Students will explain the difference between a physical change and a chemical change a. Investigate physical changes by separating mixtures and manipulating (cutting, tearing, folding) paper to demonstrate examples of physical change. b. Recognize that the changes in state of water (water vapor/steam, liquid, ice) are due to temperature differences and are examples of physical change. c. Investigate the properties of a substance before, during, and after a chemical reaction to find evidence of change. ELAW.5.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.	M5GM.9 Understanding music in relation to history and culture. a. Perform, listen, move, and/or distinguish between music from various historical periods and cultures from the Civil War to present (different genres).

KEY VOCABULARY

Content Vocabulary
<ul style="list-style-type: none">Physical changeChemical changeReactionMoleculesAtomsMatterStates of matter

Arts Vocabulary

- Beat: the pulse felt underlying the music
- Body percussion: sounds produced by striking or scraping parts of the body; typically includes snapping, clapping, patting, or stamping
- Rhythm: combinations of long and short, or even or uneven sounds that establish a musical continuum and convey a sense of movement
- Tempo: the speed at which a music piece is performed

TECHNOLOGY INTEGRATION

- Possible differentiation: Quaver to make the beats for accelerated students (composition)

ASSESSMENTS

Formative	Summative
<ul style="list-style-type: none"> • Teacher Observation of students during process of writing and performing 	<ul style="list-style-type: none"> • Physical and Chemical Change Rap Battle Rubric (see Downloads)

MATERIALS

Whiteboard/SmartBoard/ActivBoard (for whole group T-Chart), poster board/white paper (one for each group to use when students create the T-Chart in their small groups before putting ideas together as a class), notebook paper, pencil/pen

Activating Strategy (5-10 min)

- The teacher will split the students into groups and have the students work collaboratively to create a T-Chart comparing and contrasting physical and chemical changes. Students will need at least 3 comparisons on each side of the T-Chart. Once some time has passed, the teacher will lead the students in compiling their ideas into a large whole group T-Chart. This activating strategy serves the purpose of reminding the students what they have learned from this unit, all in one culminating chart, making it easier for the students to process and see visually. Some examples of differences that students might compare are burning wood (chemical change), or tearing paper (physical change).

Main Activity**Part 1**

- The teacher will ask all the students to get into groups of 3-5 students.
- The teacher will then ask the students to come up with 2 different body movements, or sounds. (At this time, the teacher can remind students of the definition of locomotor, non-locomotor, and body percussion.)
- Once the students have their two movements as a group, the teacher will instruct the students to put these movements into some kind of pattern: AB, AB, AA, BB, etc... For example, if students snap and stomp as their two movements, their pattern can be “snap, stomp, snap, stomp” or “snap, snap, stomp, stomp,” etc.
- The teacher will then instruct the students about the rhyme scheme in which they have created. For example, the students could have created an “ABAB” pattern, or a “AABB” pattern, etc. (Teachers can reference poetry unit if it has been previously taught). Remind students that these types of patterns are seen throughout music.

- The teacher will then explain that each group of students will either be writing a rap referring to physical changes or chemical changes and that, once completed, the students will battle with their created songs. The teacher will instruct that all students are to use an “AABB” pattern within their rap.

EX. Physical change or chemical change [A]

May seem so very strange. [A]

But think about it just like this [B]

And then you'll never miss! [B]

Part 2

- Students will then get together in their groups and analyze the T-Chart from the previous part of the lesson. Each group must come up with 2-4 different points that they feel are the most important about their change (1/2 class is physical and 1/2 class is chemical). For example, the physical change group of students might feel like they need to focus on an example, the fact that a physical change can be reversed, and shape change as some of their points of importance.

Part 3

- Students will then work collaboratively to create various stanzas into a rap, using an AABB pattern in each stanza about their specific type of change.
- Each group must have 4 lines in each stanza using the AABB pattern, and must have 4 stanzas in their entire rap.
- The students will work on completing these together in their group.
- The teacher will explain that on the day of performance, that one group will perform one stanza, then the next group, and back to the original group, etc.—until both groups have completed their entire rap composition. (EX. chemical change stanza, physical change stanza, chemical change stanza, physical change stanza, etc.)

Part 4

- Students will share their raps about physical, or chemical changes, and will “battle” back and forth, with each group sharing a stanza at a time, as mentioned above.
- As a writing activity, the students will be required to write a quick 2-minute-write informational paragraph containing at least 3 facts about the other type of change that was presented. For example, if I was writing for physical change, I would have to write a quick-write presenting three facts about chemical changes from the other team’s rap.

Classroom Tips:

- A character education component could be addressed around the concept of being an ensemble when performing in a large group. This includes listening to one another, taking turns listening and speaking, and most importantly respecting your peer’s ideas and abilities. These ensemble skills take us far inside and outside the classroom.

REFLECTION

Reflection Questions

The teacher will give each group of students the following questions and ask them to discuss their answers orally as a group, before sharing orally with the whole class.

- 1. How did writing a rap help me process and better understand the information about my type of change (physical or chemical)?*
- 2. How did listening to the other groups rap help me better understand either a physical, or chemical change?*

3. *What would I change about my rap to make the other group better understand physical, or chemical, changes?*

DIFFERENTIATION**Remedial/EL Students:**

- Some of the stanzas of the rap, such as the chorus could be written by the teacher. Students still need to learn and perform the verses (integrating their science vocabulary). By having some already pre-written may help make the task at hand feel manageable and support students reaching success.

Accelerated Students:

- These students could come up with a rap that demonstrates a substance that first goes through a physical change and then a chemical change. For example, first ripping a piece of paper and then burning it. The students would have to identify which change was physical and which was chemical and what attribute would characterize it as such.
- These students could add music through found sounds, instruments, or Quaver (an online music production source) along with movements to accompany their rap.
- These students could also write a persuasive essay about why either a chemical or physical change is “better.” They would have to identify criteria on what makes the change better and evaluate each change on how it fits the criteria.

APPENDIX (See Downloads)

- Physical and Chemical Changes Rap Battle Rubric**

CREDITS

U.S. Department of Education

Arts in Education--Model Development and Dissemination Grants Program

Cherokee County (GA) School District and ArtsNow, Inc.

Ideas contributed and edited by:

Carol Steele, Taylor Stewart, Dr. Maribeth Yoder-White, Jessica Espinoza

Physical and Chemical Changes Rap Battle Rubric

TASK: Create a rap that expresses the differences between physical or chemical changes, depending on which side you are battling.

Task	4	3	2	1
Writing Process	Students devote a great deal of time and effort to the writing process (prewriting, drafting, reviewing, and editing). Group works collaboratively to make sure their rap is the best it can be.	Students devote sufficient time and effort to the writing process (prewriting, drafting, reviewing, and editing).	Students devote some time and effort to the writing process, but overall more revisions are needed.	Students devote little time and effort to the writing process.
Rehearsal Process: Tempo, Rhythm, Response	The rehearsal process includes taking the written rap and fully applying musical choices to it for performance. Careful attention is paid to establishing a rhythm for the rap, a tempo for each line, and movement if necessary.	The rehearsal process includes taking the written rap and most of the time applying musical choices to it for performance. Some consideration is paid to establishing a rhythm for the rap and a tempo for each line.	The rehearsal process includes taking the written rap and seldom applying musical choices to it for performance.	No musical choices were made or applied to the rap.
Accuracy of Science Content	All facts presented about physical/chemical changes in the rap are accurate. The facts are fully developed and allow the audience to understand much more about the similarities and differences of physical and/or chemical changes.	Almost all facts presented in the rap are accurate. The facts are almost fully developed to understand the comparison of physical and/or chemical changes.	Most facts presented in the rap are accurate (at least 70%), but the rap is only somewhat developed in regards to comparing/contrasting physical and chemical changes.	There are several factual errors in the rap.
Ensemble Performance	Ensemble performance is coordinated, well-rehearsed and is performed using loud, clear voices, and strong bodies.	Ensemble seems mostly prepared but could have benefitted from more rehearsals. Voices are mostly loud and clear.	Ensemble is somewhat prepared, but it is clear that rehearsal was lacking. Voices are somewhat loud and clear.	Ensemble is not prepared to present. Students often mumble or can not be understood.

Total Score: _____



Project Essential Questions

- What is the difference between a physical change and a chemical change?
- How can I utilize the theater to analyze a substance before, during, and after chemical reaction to find evidence of change?

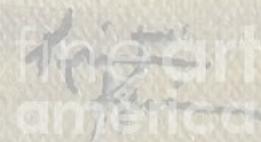
PROJECT DESCRIPTION

Students will use elements of drama to create a cooking show to dramatize the process of preparing and making foods in the kitchen. This drama will include highlighting the process of foods going through both physical and chemical transformations as they are prepared for an audience to taste. Each student will write their own script for the part they play in the production of the cooking show. Another class will be invited to partner with the class to participate as the audience.

LEARNING TARGETS

“I Can...”

- Identify the difference between a physical change and a chemical change
- Use theatrical arts to demonstrate my understanding of the properties of a substance before, during, and after chemical reaction to find evidence of change



www.artsnowlerning.org

Units provide differentiated ideas and activities aligned to a sampling of standards.

The units do not necessarily imply mastery of standards, but are intended to inspire and equip educators.

DURATION: 3-4 Days

Project Description	Learning Targets
<p>Students will use elements of drama to create a cooking show to dramatize the process of preparing and making foods in the kitchen. This drama will include highlighting the process of foods going through both physical and chemical transformations as they are prepared for an audience to taste. Each student will write their own script for the part they play in the production of the cooking show. Another class will be invited to partner with the class to participate as the audience.</p>	<p>“I Can...”:</p> <ul style="list-style-type: none"> Identify the difference between a physical change and a chemical change Use theatrical arts to demonstrate my understanding of the properties of a substance before, during, and after chemical reaction to find evidence of change

ESSENTIAL QUESTIONS

- What is the difference between a physical change and a chemical change?
- How can I utilize the theater to analyze a substance before, during, and after chemical reaction to find evidence of change?

STANDARDS

Curriculum Standards	Arts Standards
<p>S5P2 Students will explain the difference between a physical change and a chemical change.</p> <p>a. Investigate physical changes by separating mixtures and manipulating cutting, tearing, folding) paper to demonstrate examples of physical change.</p> <p>c. Investigate the properties of a substance before, during, and after chemical reaction to find evidence of change.</p>	<p>TAES5.2 Developing scripts through improvisation and other theatrical methods.</p> <p>a. Uses a playwriting process (e.g., pre-write/pre-play; prepare to write/plan dramatization; write; dramatize; reflect and edit; rewrite/play; publish/perform).</p> <p>c. Creates an organizing structure appropriate for purpose, audience and context.</p>
<p>ELACC5W4 Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience.</p>	<p>TAES5.3 Acting by developing, communicating, and sustaining roles within a variety of situations and environments.</p>
<p>ELACC5W5 With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, and editing.</p>	<p>a. Uses vocal elements such as inflection, pitch, and volume, to communicate the thoughts, emotions, and actions of a character.</p>
<p>ELACC5SL4 Report on a topic or text or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.</p>	<p>b. Uses body and stage movement to communicate the thoughts, emotions, and actions of a character.</p> <p>c. Uses imagination to make artistic choices in portraying characters.</p> <p>d. Collaborates with an ensemble to create theatre.</p>
	<p>e. Dramatizes literature and original scripts through various dramatic forms such as pantomime, process drama, puppetry, improvisation, plays, and Reader's Theatre.</p>

KEY VOCABULARY**Content Vocabulary**

- Physical change
- Chemical change
- Mixture
- Evidence
- Reaction
- Molecules
- Atoms
- Matter

Art Vocabulary

- Script: the piece of writing that shows direction to the cast within a theater piece
- Character: the actor or actress in a specified role
- Props: items that actors use in a performance to depict real-life objects. Props can also be used to help students brainstorm for their writing or character study
- Dialogue: a conversation between two or more persons
- Inflection: the modulation of intonation, or pitch in the voice
- Volume: the loudness or softness of sound
- Diction: using a “crisp & clear” actor voice that can be understood by everyone watching and listening

TECHNOLOGY INTEGRATION

- Technology will be used to record and edit the cooking show for students to view.

ASSESSMENTS

Formative	Summative
<ul style="list-style-type: none"> ● Teacher can monitor students through anecdotal notes for understanding of theater elements, the differences between physical and chemical changes, and teamwork. ● Prompts for after the cooking show has been performed: <ol style="list-style-type: none"> 1. Compare and contrast making a fruit salad and waffles discussing the physical and chemical changes that occur in both. 2. Analyze the importance of teamwork in the production of a cooking show. 	<ul style="list-style-type: none"> ● Cooking Show Script and Performance Rubric (See Downloads)

MATERIALS

Student scripts, various types of fruits cut into pieces, 2 bowls, 2 spoons, waffle ingredients, waffle iron, small bowl and spoons for samples

Activating Strategy (5-10 min)

The teacher will lead a discussion about cooking shows. During this discussing use large chart paper to capture notes on what is discussed. If desired, the teacher can show a short clip of a cooking show and discuss the various elements seen. For example, the students might notice that they are having conversation and explaining what they are doing throughout the cooking process. The teacher might also have students note that the cooking show has different parts such as a host, a chef, an assistant, camera crew, etc...The teacher also should highlight how the performers are using pitch, volume, diction, and other theater strategies within the cooking show.

Main Activity**Part 1**

- Cooking Show Brainstorming Activating Strategy (see above for directions)
- The students will write a script using various theater techniques to work on a cooking show that they will present to another grade level. The students will explain the physical and chemical changes that occur in the cooking process (ex: fruit salad—physical; cooking waffles—chemical change). Direct students to think of a meal and its courses that include some physically changed courses and some courses that underwent chemical changes.
- The students will be placed into jigsaw groups based on their tasks in the cooking show. For example: The groups could be waffle makers, fruit salad makers, Coffee makers, and scrambled egg makers.
- In those groups, the students will write their scripts including how they plan to prepare their part of the breakfast for their portion of the show.
- Once the scripts are completed, the students will jigsaw into their filming groups, which will consist of the different courses within the meal being dramatized.

Part 2

- The students will then pair with a 2nd grade class to share their cooking shows.
- There will be multiple cooking shows happening at the same time within the classroom (this will be more time effective). The students will use their written scripts to present using inflection, pitch, and volume. Partnering with a 2nd grade class would allow them to incorporate one of their standards by having them create a how-to writing explaining the process for making the food that they observed being created.

Classroom Tips:

- If classroom space with multiple presentations is an issue, consider finding common space, such as the cafeteria, gym, or library for multiple groups to present.
- The 2nd grade class should also be split into multiple groups to watch and preview the cooking shows.

REFLECTION**Reflection Questions**

- *How did using theater elements to create a cooking show help me understand the differences between physical and chemical changes?*
- *My role in the cooking show was _____ . My role was important to the production of the cooking show because...*

DIFFERENTIATION**Remedial/EL Students:**

- These students could use drawings and gestures to express their own ideas.
- These students could also use picture examples with words on the back for reading support.

Accelerated Students:

- These students could design a menu for a restaurant and have foods in categories such as physical changes and chemical changes. Students should have at least 3 foods in each category. In order to tie in to a previous lesson, the menu art could mimic that of Wayne Thiebaud. If possible, a third category of foods could include those that go through both a physical and chemical change.
- These students could also create a theme song for their cooking show. The theme song should include statements about the different foods that will be used in the show (fruit salad and waffles) and how the preparation of these foods will demonstrate physical and chemical changes.

ADDITIONAL RESOURCES**Books**

- *The Solid Truth About Matter* by Mark Weakland
- *Pancakes, Pancakes!* by Eric Carle

Websites

- interactivesites.weebly.com/matter-chemical-physical.html
- www.gamequarium.org/dir/Gamequarium/Science/Physical_and_Chemical_Changes/

APPENDIX (See Downloads)

- **Cooking Show Script and Performance Rubric**

CREDITS

U.S. Department of Education

Arts in Education--Model Development and Dissemination Grants Program

Cherokee County (GA) School District and ArtsNow, Inc.

Ideas contributed and edited by:

Carol Steele, Taylor Stewart, Jessica Espinoza, Susie Spear Purcell

Cooking Show Script and Performance Rubric

TASK: Write a script for a role in a cooking show to analyze how mixing and cooking foods causes physical and chemical changes. Use elements of drama to perform for an audience.

Task	4	3	2	1
Writing Process	Students devote a great deal of time and effort to the writing process (prewriting, drafting, reviewing, and editing). Student works hard to make the script the best it can be.	Students devote sufficient time and effort to the writing process (prewriting, drafting, reviewing, and editing).	Students devote some time and effort to the writing process, but overall more revisions are needed.	Students devote little time and effort to the writing process.
Script Construction and Writing	The script depicting the physical and chemical changes within cooking is clearly developed. There is evidence that the attributes of physical and chemical changes are clearly stated.	Most of the script depicting the physical and chemical changes within cooking is clearly developed. There is evidence that the attributes of physical and chemical changes are clearly stated.	Some of the script depicting the physical and chemical changes within cooking is clearly developed. There is little evidence that the attributes of physical and chemical changes are clearly stated.	The script depicting the physical and chemical changes within cooking is not at all developed. There is no evidence that the attributes of physical and chemical changes are clearly stated.
Accuracy of Science Content	All facts presented in the script are accurate. The facts are fully developed and allow the audience to understand much more about the differences between physical and chemical changes.	Almost all facts presented in the script are accurate.	Most facts presented in the script are accurate (at least 70%).	There are several factual errors in the script.
Preparedness	Student is completely prepared and the script is performed using a loud, clear voice.	Student seems mostly prepared but could have benefitted from more rehearsals. Voice is mostly loud and clear.	Student is somewhat prepared, but it is clear that rehearsal was lacking. Voice is somewhat loud and clear.	Student is not prepared to present. Student often mumbles or can't be understood.

Total Score: _____