

Liquid • Solid • Gas



STEAM MODULE DESCRIPTION

In this series of STEAM activities, students will use movement and visual arts to investigate the properties of matter. Students will begin by having fun moving and generating choreography to understand the different states of matter. Emphasizing multiple learning styles will allow students to explore concepts in a different, innovative way. Students will also look at works of art identifying the states of matter, create drawings illustrating states of matter, and then animate their illustrations integrating the use of the iPad app Chatterpix.

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Modules provide differentiated ideas and activities aligned to a sampling of standards. The modules do not necessarily imply mastery of standards, but are intended to inspire and equip educators.

Description	Learning Targets
<p>In this series of STEAM activities, students will use movement and visual arts to investigate the properties of matter. Students will begin by having fun moving and generating choreography to understand the different states of matter. Emphasizing multiple learning styles will allow students to explore concepts in a different, innovative way. Students will also look at works of art identifying the states of matter, create drawings illustrating states of matter, and then animate their illustrations integrating the use of the iPad app Chatterpix.</p>	<p>“I Can...”</p> <ul style="list-style-type: none"> ● Use the fine arts to investigate the properties of matter ● Observe and analyze artwork that illustrates different states of matter ● Create original illustrations of the different states of matter ● Animate my drawings using the Chatterpix app ● Compare and contrast the different states of matter by using movement

ESSENTIAL QUESTIONS

- How can movement enhance my understanding of the various states of matter?
- How can I animate my visual artwork to explain how the properties of matter interact with one another?

STANDARDS

Curriculum Standards	Arts Standards
<p><u>GA Performance Standards:</u> S2CS1. Students will be aware of the importance of curiosity, honesty, openness, and skepticism in science and will exhibit these traits in their own efforts to understand how the world works.</p> <p>S2CS5. Students will communicate scientific ideas and activities clearly.</p> <p>S2P1. Students will investigate the properties of matter and changes that occur in objects. a. Identify the three common states of matter as solid, liquid, or gas.</p> <p><u>National Standards:</u> 2.P.2.1. Understand properties of solids and liquids and the changes they undergo.</p>	<p><u>GA Performance Standards:</u> DFD.1. Identifies and demonstrates movement elements, skills, and terminology in dance.</p> <p>VA2MC.1. Engages in the creative process to generate and visualize ideas.</p> <p>VA2MC.3. Selects and uses subject matter, symbols, and ideas to communicate meaning.</p> <p>VA2CU.2. Views and discusses selected artworks.</p> <p>VA2PR.2. Understands and applies media, techniques, and processes of two-dimensional art processes (drawing, painting, printmaking, mixed-media) using tools and materials in a safe and appropriate manner to develop skills.</p> <p><u>National Standards:</u> Visual Arts VA:Cr1.1.2. Make art or design with various materials and tools to explore personal interests, questions, and curiosity.</p> <p>VA:Pr.4.1.2. Categorize artwork based on a theme or concept for an exhibit.</p>

	<p>Dance: DA:Cr1.1.2. a. Explore movement inspired by a variety of stimuli (for example, music/sound, text, objects, images, symbols, observed dance, experiences) and suggest additional sources for movement ideas.</p>
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KEY VOCABULARY

Content Vocabulary

- **Investigate:** Carry out research or study into a subject, typically one in a scientific field, so as to discover facts or information.
- **Properties:** Frequently used to describe the attributes or traits of a substance. These properties are used to understand how a substance behaves in different situations.
- **Matter:** Physical substance in general, as distinct from mind and spirit; (in physics) that which occupies space and possesses rest mass, especially as distinct from energy.
- **Liquid:** In the liquid phase, the particles of a substance have more kinetic energy than those in a solid. The liquid particles are not held in a regular arrangement, but are still very close to each other so liquids have a definite volume.
- **Solid:** In a solid, particles are packed tightly together so they are unable to move about very much. Particles of a solid have very low kinetic energy.
- **Gas:** Particles have a great deal of space between them and have high kinetic energy.

Arts Vocabulary

Dance Arts

- **Locomotor movement:** Movement that moves through space.
- **Non-locomotor movement:** Movement that does not move through space.
- **Segue:** A series of movements.
- **Pattern:** A repeating sequence.
- **Sustained:** A quality of movement that is smooth and unaccented; there is no apparent start or stop, only a continuity of energy.
- **Percussive:** A quality of movement characterized by sharp starts and stops; staccato jabs of energy.
- **Vibratory:** A quality of movement characterized by rapidly repeated bursts of percussive movements; like a jitter.
- **Swinging:** A quality of movement established by a fall with gravity, a gain in momentum, a loss of momentum, and the repeated cycle of fall and recovery, like that of a pendulum.
- **Suspended:** A quality of movement that occurs in a moment of resistance to gravity, such as the instant in which a dancer hangs in space at the top of a leap.
- **Tempo:** The pace or speed of movement.

Visual Arts

- **Illustration:** Is a decoration, interpretation or visual explanation of a text, concept or process, designed for integration in published media, such as posters, flyers, magazines, books, teaching materials, animations, videogames and films.
- **Animation:** Is the process of making the illusion of motion and the illusion of change.
- **Elements of Art :** https://www.getty.edu/education/teachers/building_lessons/elements_art.pdf

ASSESSMENTS

Formative	Summative
<ul style="list-style-type: none"> • Evaluate student knowledge based on class movement activity and discussion. • Evaluate student knowledge based on student illustrations. • Anecdotal notes during students' immersion in the art activities. 	<ul style="list-style-type: none"> • Students must be able to identify the state of matter, when performed. • Students must be able to compare and contrast the various states of matter and describe the properties present in each state. • Students could write the pattern as each group performs and submit for additional assessment. • Student illustrations of the various states of matter. • Students will use informational writing and voice animation to show their understanding of the states of matter.

MATERIALS**Dance Arts:**

Music/sound source (CD player, iPod, MP3, computer speakers, etc.)
 Cogni-tiles (or make your own using poster board/large paper and markers)

Visual Arts:

8.5 x 11 drawing paper (3 sheets per student)
 Pencils
 Colored pencils, crayons or markers
 iPad with Chatterpix app

MOVEMENT**Activating Strategy**

- The Name Game: Direct the class to form a circle.
- Pick a person to go first and have them say their name while making a movement or gesture to accompany their name.
- The circle then collectively repeats the person's name and gesture.
- Continue with the next person stating their name and making a gesture.
- The circle repeats the new person's name and gesture.
- Then, starting with the person of origin, repeat all the names and gestures shared to that point.
- Continue until everyone in the circle has been included.

Main Activity**PART I**

- Identify movements from the name game that were locomotor and non-locomotor.
- Divide participants into smaller groups, assigning locomotor or non-locomotor movements to each group.
- Create a movement phrase using 4 movements.
- Perform for whole group.
- Identify movement type (locomotor/non-locomotor) of each group and place on chart and/or graph.

PART 2

- Discuss the 3 states of matter (solid, liquid and gas).
- Explore each state of matter by first exploring tempo (speed) of atoms moving in each state: solid, liquid, or gas.
- Then explore how each state moves paying careful attention to the movement quality that fits best for each state (sustained, percussive, vibratory, swinging, or suspended).
- Then explore how the formations of dancers may change when depicting each state.
- Divide into groups and assign each group two different states of matter (solid, liquid or gas).
- Create a movement phrase that will represent how atoms move in one state and then to the other state, demonstrating understanding of both states of matter.
- Perform for the group, while audience members observe and make notes about the performance.
- After each group has performed, audience members will identify the group's state, offering rationale for their identification.

VISUAL ARTS:**Activating Strategy**

- Review the states of matter as a whole group.
- Show students works of Art from the Google Cultural Institute. Use the Artful thinking routines See-Think-Wonder.
- http://www.visiblethinkingpz.org/VisibleThinking_html_files/03_ThinkingRoutines/03c_Core_routines/SeeThinkWonder/SeeThinkWonder_Routine.html
- Ask the students to identify the states of matter in each work. Below are some examples. You can also make your own gallery on the site.
 - <https://www.google.com/culturalinstitute/beta/asset/rainy-season-in-the-tropics/FgEWDU2Lt9aDKA>
 - <https://www.google.com/culturalinstitute/beta/asset/purissima/rwGlj7LxuFbFYw>
 - <https://www.google.com/culturalinstitute/beta/asset/glacier-of-rosenloui/bgGvfCBtCtKA9A>
 - <https://www.google.com/culturalinstitute/beta/asset/niagara-falls-from-the-american-side/qQE5jAFm16XHjQ>

Main Activity**Part 1**

- Introduce students to the project. They will be creating drawings illustrating the states of matter: Liquid, Solid, and Gas. Instruct students to make careful design choices. Review the **Elements of Art**. (see Appendix)
- Allow students time to brainstorm ideas for their drawings.
- Instruct students to create drawings, working first in pencil before adding color.

Part 2

- Introduce students to the Chatterpix app. Check out this link: <https://www.fractuslearning.com/2014/10/23/classroom-fun-chatterpix/>
- Explain to the students that they will be giving their drawings a voice through animation.
- Give students time to write a brief script for each drawing. You only have 30 seconds to record!
- These animations can be pieced together in iMovie, emailed out to parents or played directly from an iPad.
- Students can share their pieces of art in a whole group interactive gallery setting as well.

REFLECTION

Reflection Questions

- *How did engaging in the arts support and build upon your understanding of the states of matter?*
- *How did you decide what to draw to symbolize each of the states of matter?*
- *How are the images related? Let's compare and contrast them. (Ex: ice, water, steam)*

ADDITIONAL RESOURCES & EXTENSION ACTIVITIES**Technology Extension**

- Create a Thinglink (via app or website) on the states of matter as individuals or in groups. Two examples can be seen at: <https://www.thinglink.com/scene/570767653518442498> and <https://www.thinglink.com/scene/500020081275699200>

Technology Resources

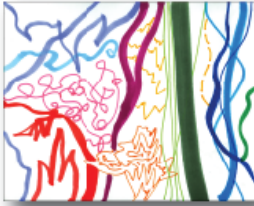
- Brain Pop Jr. Changing States of Matter, Educator Lesson Plan Guide available at: <http://educators.brainpop.com/lesson-plan/changing-states-of-matter-activities-for-kids/>
- Video viewable for schools with subscriptions at: <https://jr.brainpop.com/science/matter/changingstatesofmatter/>
- Scholastic Study Jams! StudyJams! Solids, Liquids and Gases Teacher's Guide: <http://www.scholastic.com/teachers/lesson-plan/studyjams-solids-liquids-and-gases-teachers-guide>
- Interactive Student Activity: <http://studyjams.scholastic.com/studyjams/jams/science/matter/solids-liquids-gases.htm>
- BBC Interactive Activities Changing States: http://www.bbc.co.uk/schools/scienceclips/ages/9_10/changing_state.shtml
- Changing States: http://www.bbc.co.uk/bitesize/ks2/science/materials/changing_states/play/

APPENDIX

- **Elements of Art & Principles of Design**
- **State of Matter Rubric**

Elements of Art

These are the basic elements that are used by Artists in creating Art; they are what you use to create an aesthetically pleasing work. When we make Art, we need to understand and apply these seven Elements of Art.



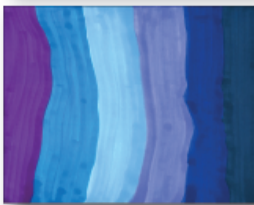
Line

A mark made by a pointed tool such as a brush, pen or stick; a moving point.



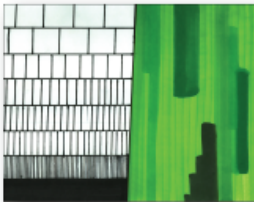
Shape

A flat, enclosed area that has two dimensions, length and width. Artists use both geometric and organic shapes.



Color

Is one of the most dominant elements. It is created by light. There are three properties of color; Hue (name,) Value (shades and tints,) and Intensity (brightness.)



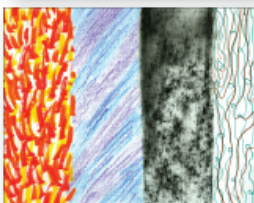
Value

Degrees of lightness or darkness. The difference between values is called value contrast.



Form

Objects that are three-dimensional having length, width and height. They can be viewed from many sides. Forms take up space and volume.



Texture

Describes the feel of an actual surface. The surface quality of an object; can be real or implied.



Space

Is used to create the illusion of depth. Space can be two-dimensional, three-dimensional, negative and/or positive.

Principles of Design

These are the standards or rules to be observed by Artists in creating works of Art; they are how to create and organize Artwork. When elements are utilized with the principles in mind, outstanding Artwork is created.



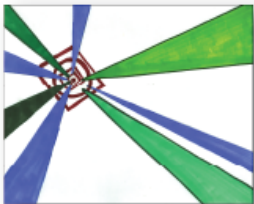
Balance

A distribution of visual weight on either side of the vertical axis. Symmetrical balance uses the same characteristics. Asymmetrical uses different but equally weighted features.



Contrast

The arrangement of opposite elements (light vs. dark, rough vs. smooth, small vs large, etc...) in a composition so as to create visual interest.



Emphasis

Used to make certain parts of an Artwork stand out. It creates the center of interest or focal point. It is the place in which an Artist draws your eye to first.



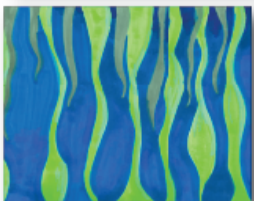
Movement

How the eye moves through the composition; leading the attention of the viewer from one aspect of the work to another. Can create the illusion of action.



Pattern

The repetition of specific visual elements such as a unit of shape or form. A method used to organize surfaces in a consistent regular manner.



Rhythm

Regular repetition of, or alternation in elements to create cohesiveness and interest.



Unity

Visually pleasing agreement among the elements in a design; It is the feeling that everything in the work of Art works together and looks like it fits.

Rubric for States of Matter STEAM Module

Task	4	3	2	1
Writing Process	Student demonstrates a thorough understanding of the three states of matter: liquid, gas, and solid. The attributes of each state were described and comparisons were drawn between the states. Informational writing was written in complete sentences.	Student mostly demonstrates an understanding of the three states of matter: liquid, gas, and solid. Most of the attributes of each state were described and comparisons were drawn between the states. Informational writing was written in mostly complete sentences.	Student somewhat demonstrates an understanding of the three states of matter: liquid, gas, and solid. Some of the attributes of each state were described. Informational writing was written in mostly complete sentences.	Student rarely demonstrates an understanding of the three states of matter: liquid, gas, and solid. The attributes of each state were not described. Informational writing was not written in complete sentences.
Creation of Illustration	Each state of matter was clearly illustrated with detail first using pencil and then adding color. All elements of design were present in the three illustrations, including line, shape, forms, space, color, and texture.	Each state of matter was mostly illustrated with detail first using pencil and then adding color. Most of the elements of design were present in the three illustrations, including line, shape, forms, space, color, and texture.	Each state of matter was illustrated with some detail first using pencil and then adding color. Some elements of design were present in the three illustrations, including line, shape, forms, space, color, and texture.	The illustrations of the states of matter was incomplete and included little to no detail. The elements of design were rarely present in the three illustrations, including line, shape, forms, space, color, and texture.
Voice Animation	Student's informational writing was recorded using a very strong, clear voice. All words were understood and the student read with great expression.	Student's informational writing was recorded using a mostly strong, clear voice. Most words were understood and the student mostly read with great expression.	Student's informational writing was recorded using a clear voice some of the time. Some words were understood but vocal expression was needed.	Student's informational writing was recorded but the words were not understood because the recording lacked clarity and vocal expression.
Integration of Technology	Student worked appropriately with the iPad app Chatterpix, staying on task all of the time. Student gave positive feedback to peers. Student shared materials appropriately.	Student worked well with the iPad app Chatterpix most of the time. Student gave positive feedback to peers most of the time. Student mostly shared materials appropriately.	Student worked well with the iPad app Chatterpix some of the time. Student gave positive feedback to peers some of the time. Student somewhat shared materials appropriately.	Student did not work well with the iPad app Chatterpix. Student did not give positive feedback to peers. Student did not share materials appropriately.