

Fireworks and Performance Art

How is a firework show planned using science, technology, and art?

Grades 9-12 Lesson: Fireworks and Performance Art

Grade Band: 9-12

Arts Subject: Visual Arts

Other Subject: History

SUMMARY

In this 9-12 lesson, students will discuss the work of artist Cai Guo-Qiang. They'll examine the science, engineering, planning, logistical, and artistic factors when creating fireworks. Students will create original art demonstrating a sequence of fireworks for an event.

PREPARATION

Learning Objectives

Students will:

- Describe how factors of time and place (such as climate, resources, and technology) influence visual characteristics that give meaning and value to a work of art.
- Analyze traditional Chinese brushwork and artworks by Cai Guo-Qiang.
- Apply organizational principles (i.e., repetition, balance, contrast, etc.) in original works.
- Analyze Cai Guo-Qiang's "tornado explosion event" in relation to existing art genres.
- Using an online interactive activity, communicate original ideas through the creation of a composition for their own firework event.
- Plan and design a sequence of fireworks for an event through a select visual arts medium.
- Write artistic statements based on analysis of their own work.
- Discuss how scientific ideas and technology have been developed to influence artistic methods, genres, or processes.

Standards Alignment

National Core Arts Standards

[VA:Cr1.2.IIa](#) Choose from a range of materials and methods of traditional and contemporary artistic practices to plan works of art and design.

[VA:Cr2.1.IIIa](#) Experiment, plan, and make multiple works of art and design that explore a personally meaningful theme, idea, or concept.

[VA:Re.7.2.IIIa](#) Determine the commonalities within a group of artists or visual images attributed to a particular type of art, timeframe, or culture.

Common Core State Standards

[ELA-LITERACY.W.9-10.2](#) Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.



[ELA-LITERACY.W.11-12.2](#) Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

Recommended Student Materials

Editable Documents: *Before sharing these resources with students, you must first save them to your Google account by opening them, and selecting “Make a copy” from the File menu. Check out [Sharing Tips](#) or [Instructional Benefits](#) when implementing Google Docs and Google Slides with students.*

- [Organizational Principles in Visual Arts](#)
- [Rubric: Firework and Performance Art](#)

Video

- [Chapter 1: The Making of Cai Guo-Qiang’s “Tornado”](#)
- [Chapters 2-12: The Making of Cai Guo-Qiang’s “Tornado”](#)

Websites

- [Landscape Album](#)
- [Gunpowder Drawings](#)
- [Cai Guo-Qiang: I Want to Believe](#)
- [Fireworks Simulator](#)
- [Transient Rainbow \(2002\)](#)
- [Black Rainbow: Explosion Project for Valencia \(2005\)](#)

Teacher Background

Teachers should familiarize themselves with the principles of art, chemistry, fireworks, and the work of Cai Guo-Qiang using the following sources.

Disclaimer: This lesson is an explanation of the science behind fireworks, not a “how to” make fireworks. Firework performance art is a carefully engineered and scientific process constructed by experts. For your safety and the safety of others, only sketches, classroom-based art materials, and digital renderings of fireworks should be created in this lesson. The making and use of fireworks is not advised, and the Kennedy Center does not endorse the use of fireworks by non-professionals.

Student Prerequisites

Students should have a general understanding of the principles of artistic composition (color, form, shape, space, timing, etc.).

Accessibility Notes

Modify handouts, text, and utilize assistive technologies as needed. Allow extra time for task completion.



INSTRUCTION

Engage

1. On chart paper, write the question: *What is art?* Give students a sticky note to respond to the question. Tell students they'll return to the definitions after exploring contemporary works of art.

2. Distribute or display the resource, [Organizational Principles in Visual Arts](#). Have students read and discuss the vocabulary terms.

3. Display or share the [Landscape Album](#) by Bada Shanren (Zhu Da) to explore Chinese brushwork. Give students a blank piece of paper and have them divide it into quarters. Then they'll title the box with one of the following headings: repetition, balance, emphasis, and contrast. Ask: *How does the composition employ the principles of repetition, balance, emphasis, and contrast?* Then pair up students and have them discuss their findings with each other.

4. Engage students in a class discussion. Ask: *What shapes are repeated throughout the work? What is the area of emphasis in the composition? Why are our eyes drawn to this area (i.e., contrast in textures of the detailed mountain top vs. the white space to the left of the mountain)? Does Bada Shanren employ symmetrical balance (elements are similar on both sides of the design), asymmetrical balance (elements are different but balance is still achieved), or radial balance (elements are arranged around a central point)? How does white space create balance and contrast?*

Build

1. Tell students contemporary artist Cai Guo-Qiang (pronounced tsai gwoh-tsian) creates [Gunpowder Drawings](#) influenced by Chinese traditional painting. Show students [Chapter 1: The Making of Cai Guo-Qiang's "Tornado"](#). Discuss with students how the drawings are different (i.e., Guo-Qiang's work is abstract) or similar (i.e., use of white space and sense of balance) to gunpowder art.

2. Explain to students that artists use different media or materials to create art. Paint, clay, bronze, and pencils are media that have been used in art for centuries. Guo-Qiang uses the medium of gunpowder to create his drawings.

3. Have students read the section, "About the Artist" from [Cai Guo-Qiang: I Want to Believe](#) to explore why Guo-Qiang uses gunpowder in his work. Discuss the history of gunpowder and note that it came into being as a form of medicine but evolved over time and across cultures into a material for combat.

4. Tell students that Guo-Qiang often creates gunpowder drawings in conjunction with his famous “explosion events,” ephemeral works that incorporate pyrotechnic technologies. Show students [Chapter 2-12: The Making of Cai Guo-Qiang’s “Tornado”](#). Ask: *How does Cai's explosion event differ from works commonly studied in art classrooms? How is it similar?* Discuss how balance, repetition, emphasis, and contrast are working in Tornado. Compare the drawings from [Chapter 1](#) of the actual event.

5. Return to the students’ definitions of art. Ask students if they would like to add to or revise any of these definitions based on their discussions of Cai Guo-Qiang’s work.

6. Explain to students that the creation of art is often reliant on advances in science and technology, as seen in Guo-Qiang’s work. For example, photography exists as an art form only because cameras were invented. Ask: *How has technology influenced artistic methods, genres, or processes?* (Advances in the creation of paint would lead to different effects on the canvas, the use of video in installations, product innovations such as new bonding techniques in glues and new casting materials for sculpture, etc.)

7. Share the [Fireworks Simulator](#) resource with students. Have students design a firework show by carefully planning each element: Physics, Launch, and Explosion.

8. Reinforce the concept that chemical elements and compounds create colors by working with a science teacher and conducting a flame test with students in a science lab. Inform students that, just as each chemical element has characteristics such as a specific melting point and a particular atomic configuration, chemical compounds emit a characteristic color when exposed to heat.

9. Discuss how scientists, like artists, must use creativity and imagination to make advances in technology. Pyrotechnics must try different combinations of chemicals to create different colors and effects. Because a bright blue is the most difficult color to achieve, inform students that a bright blue firework is the mark of a talented and innovative scientist.

Apply

1. Tell students they are going to plan a firework event. They will sketch a sequence of fireworks, noting any symbolic meaning, special colors, and/or shapes. Students can explore more of Guo-Qiang’s work to generate ideas: [Transient Rainbow \(2002\)](#), [Black Rainbow: Explosion Project for Valencia \(2005\)](#), and [The Ninth Wave \(2014\)](#). Remind students that they should describe their thought process behind the shapes they create. If they choose to create a circle, for instance, *why are they creating this shape? What does the symbol of the circle mean to them? What are they trying to communicate through their work?*

2. Distribute art supplies so students can create an artistic rendering of their firework show. Students can use mixed media powders, charcoal, pens, markers, paint, cinnamon or

herb powders, chalk, digital art software, and/or other supplies. Students should pay attention to the principles of organization when designing their firework events. Their events must demonstrate knowledge of repetition, balance, emphasis, and contrast.

3. Write an artistic statement about the artwork. Students should pick a few experiences, ideas, events, or people that have influenced and inspired their concept for a firework event. Tell students that the goal in writing their artistic statements is to make others interested in their artwork. Encourage students to incorporate anecdotes and concrete examples of experiences, events, and/or people that have influenced their work. Review and provide feedback on the students' artist statements.

Reflect

1. Present the artist statements and sequence of firework artwork to an audience. Have students display their sketches, final works of art, and statements. Invite other classes, parents/guardians, or teachers to visit the display.

2. Assess the students' knowledge with the [Rubric: Firework and Performance Art](#). Provide feedback to students in the "Notes" section.

Credits

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