

## **Designing a Three-Dimensional Kinetic Toy**

### **Activity statement –**

Kinetic art is “art that contains movement perceivable by the viewer or depends on motion for its effect.” Alexander Calder revolutionized the kinetic sculpture, making mobile or free-standing sculptures that could move depending on the air currents. His creation of mobiles led to his creation of a traveling circus made out of balanced kinetic toys he could actively navigate for performances. Students will engineer their own kinetic toy that must be able to stand freely, balance, yet move slightly. The creation of kinetic toys and Calder’s performance ties into the bigger themes of science, visual art and physicality all balancing and complementing each other.

### **Goals – Students should...**

#### Understand:

- The definition of kinetic art.
- How to manipulate supplies to create kinetic art using scientific systems such as simple machines and trial and error.
- How to connect the kinetic movement of fine art, design, and toy creation to the movement of dance.
- How kinetic art, science and creative dance combine in real world settings.

#### Know:

- Who Alexander Calder was and why he was important
- Understand how to construct and create kinetic toy
- The relationship between science, visual art, physicality and dance and how they complement one another

#### Be able to:

- Recognize Calder’s work
- Describe kinetic art
- Create their own kinetic toy
- Present their toy using dance/movement

### **Objectives –**

#### Students will:

- Explore the work of Alexander Calder, especially his kinetic circus
- Explore creative strategies and supplies for construction of their kinetic toy
- Integrate movement with balance and design to create kinetic toy
- Comprehend the connections between kinetic movement and dance

Please allow your class to watch the demonstration video before starting the designing aspect. Each student should fill out and sketch on their design sheet before selecting supplies.

The following didactics are included in the ArtKits to help facilitate a safe a creative atmosphere. Some are front and back copies. These can be shared between students and are to be handed out under the instructor's guidance:

- Wire Safety
- Wire Sculpture Animals
- Wire Sculpture Person
- Wire techniques
- Art of balance
- Kinetic sticks How - to
- Simple machines

As an added aspect, a critique worksheet is included to be used as needed.

- The Art of the Sandwich (critique worksheet)

Supplies:

The following material are included in your ArtKit to be shared between your school's classrooms and students:

- Metal armature wire
- Pipe cleaners
- Twistees (colorful wire)
- Kinetic sticks & bands
- Cardboard
- Toilet paper rolls
- Corks
- Egg cartons
- Construction paper
- Repurposed Paper Bag
- Beads
- Buttons
- Straws
- Toothpicks
- String
- Glue
- Brads

Additional supplies to be utilized depending on the comfortability of instructors:

- Low temperature hot glue gun
- Low temperature hot glue sticks
- Wire cutters

Any leftover supplies can be repacked and returned. Please return all hot glue guns and wire tools.

**Each school will determine which projects will be selected for the Toy Exhibit at the Stephens Performing Art Center.**

If you have any questions about supplies or any concerns on designing kinetic toys, please email Bekah Coleman, Curator of Education, [education@samfa.org](mailto:education@samfa.org)

From 1926 to 1933 the famous artist Alexander Calder created this miniature circus using wire and scraps from his art studio and around the house. He carried his circus with him in suit cases and put on performances for his friends.

Students will watch a video demonstration on Calder and his circus and be asked the following questions to stimulate creative thought:

**What materials would you use if you could create your own miniature circus?**

**Look at the unique whimsical circus characters that Calder built. Can you identify some of the materials and common household objects he used?**

**One of the tests for creativity is a person's ability to take a common household object and use it in an unconventional way. Where other people saw junk, Calder saw possibilities. What objects can you find around your house to create your own miniature world?**

After introducing information about materials and construction, maybe pause video for either a group discussion or a worksheet to further drive home the points above.

The second aspect introduced via video: drawing a line of reference from the movement of Calder's kinetic toys to the dancer's movements in Ballet San Angelo's *Batteries Not Included: The History of Play*. Both use the art of balance, design and creativity. Students will be able to make a stronger connection while enjoying in-person performances at Stephens Performing Arts Center. The interdisciplinary combination of fine art and performance art should be emphasized.

Challenge students to observe the creative choices made in *Batteries Not Included* with these prompts:

- What material does a choreographer use to create kinetic artwork?
- Do any of the characters in this production move in a similar way to your toy design?
- How are props used in choreography to create more kinetic energy?
- How does the type of game being played on stage effect the way the dancers move?
- How to the type of toy being portrayed on stage effect the way the dancers move?

**SHARING DANCE DAY**

BALLET SAN ANGELO

**BATTERIES NOT INCLUDED**  
**THE HISTORY OF PLAY**

The graphic features a photograph of a stage performance with several dancers in colorful, whimsical costumes. A QR code is located in the bottom right corner of the image.





Alexander Calder, *Elephant and Trainer*, from, *Calder's Circus*, 1926–31. Painted wood, cloth, rubber tubing, wire, fur, pipe cleaners, cork, and nails, [Whitney Museum of American Art, New York](https://www.whitney.org/learn/whitney-museum-of-american-art);





### **Evaluation –**

#### **Did students:**

Understand and describe the meaning of kinetic art?

Recognize the connection between science, visual and performance art?

Integrate deliberate use of shape, balance and movement in a free standing, kinetic toy?

Informal:

- Group discussions
- Oral responses to essential questions
- Personal focus and risk-taking
- Class evaluation of one another's artwork

### **§112.15. Science, Grade 4, Texas Essential Knowledge and Skills**

#### **(a)** Introduction.

(1) Science, as defined by the National Academy of Sciences, is the "use of evidence to construct testable explanations and predictions of natural phenomena, as well as the knowledge generated through this process."

(4) In Grade 4, investigations are used to learn about the natural world. Students should understand that certain types of questions can be answered by investigations and that methods, models, and conclusions built from these investigations change as new observations are made. Models of objects and events are tools for understanding the natural world and can show how systems work. They have limitations and based on new discoveries are constantly being modified to more closely reflect the natural world.

#### **(b)** Knowledge and skills.

(2) Scientific investigation and reasoning. The student uses scientific inquiry methods during laboratory and outdoor investigations. The student is expected to:

(A) plan and implement descriptive investigations, including asking well-defined questions, making inferences, and selecting and using appropriate equipment or technology to answer his/her questions;

(3) Scientific investigation and reasoning. The student uses critical thinking and scientific

problem solving to make informed decisions. The student is expected to:

(A) in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student;

(4) Scientific investigation and reasoning. The student knows how to use a variety of tools, materials, equipment, and models to conduct science inquiry. The student is expected to:

(6) Force, motion, and energy. The student knows that energy exists in many forms and can be observed in cycles, patterns, and systems. The student is expected to:

(D) design an experiment to test the effect of force on an object such as a push or a pull, gravity, friction, or magnetism.

#### §117.114. Art, Grade 4, Texas Essential Knowledge and Skills

(a) Introduction.

(1) The fine arts incorporate the study of dance, music, theatre, and the visual arts to offer unique experiences and empower students to explore realities, relationships, and ideas. These disciplines engage and motivate all students through active learning, critical thinking, and innovative problem solving. The fine arts develop cognitive functioning and increase student academic achievement, higher-order thinking, communication, and collaboration skills, making the fine arts applicable to college readiness, career opportunities, workplace environments, social skills, and everyday life. Students develop aesthetic and cultural awareness through exploration, leading to creative expression. Creativity, encouraged through the study of the fine arts, is essential to nurture and develop the whole child.

(2) Four basic strands--foundations: observation and perception; creative expression; historical and cultural relevance; and critical evaluation and response--provide broad, unifying structures for organizing the knowledge and skills students are expected to acquire. Each strand is of equal value and may be presented in any order throughout the year. Students rely on personal observations and perceptions, which are developed through increasing visual literacy and sensitivity to surroundings, communities, memories, imaginings, and life experiences, as sources

for thinking about, planning, and creating original artworks. Students communicate their thoughts and ideas with innovation and creativity. Through art, students challenge their imaginations, foster critical thinking, collaborate with others, and build reflective skills. While exercising meaningful problem-solving skills, students develop the lifelong ability to make informed

judgments.

(b) Knowledge and skills.

(1) Foundations: observation and perception. The student develops and expands visual literacy skills using critical thinking, imagination, and the senses to observe and explore the world by learning about, understanding, and applying the elements of art, principles of design, and expressive qualities. The student uses what the student sees, knows, and has experienced as sources for examining, understanding, and creating artworks.

(A) Creative expression. The student communicates ideas through original artworks using a variety of media with appropriate skills. The student expresses thoughts and ideas creatively while challenging the imagination, fostering reflective thinking, and developing disciplined effort and progressive problem-solving skills. The student is expected to:

(2) integrate ideas drawn from life experiences to create original works of art;

(3) create compositions using the elements of art and principles of design; and

(4) produce drawings; paintings; prints; sculpture, including modeled forms; and other art forms such as ceramics, fiber art, constructions, mixed media, installation art, digital art and media, and photographic imagery using a variety of art media and materials.

(5) connect art to career opportunities for positions such as architects, animators, cartoonists, engineers, fashion designers, film makers, graphic artists, illustrators, interior designers, photographers, and web designers; and

(6) investigate connections of visual art concepts to other disciplines.

(7) (4) Critical evaluation and response. The student responds to and analyzes artworks of self and others, contributing to the development of lifelong skills of making informed judgments and reasoned evaluations.



