BioEd℠

Think like an Engineer

TEACHER'S GUIDE

Kinetic Art

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Baylor College of Medicine

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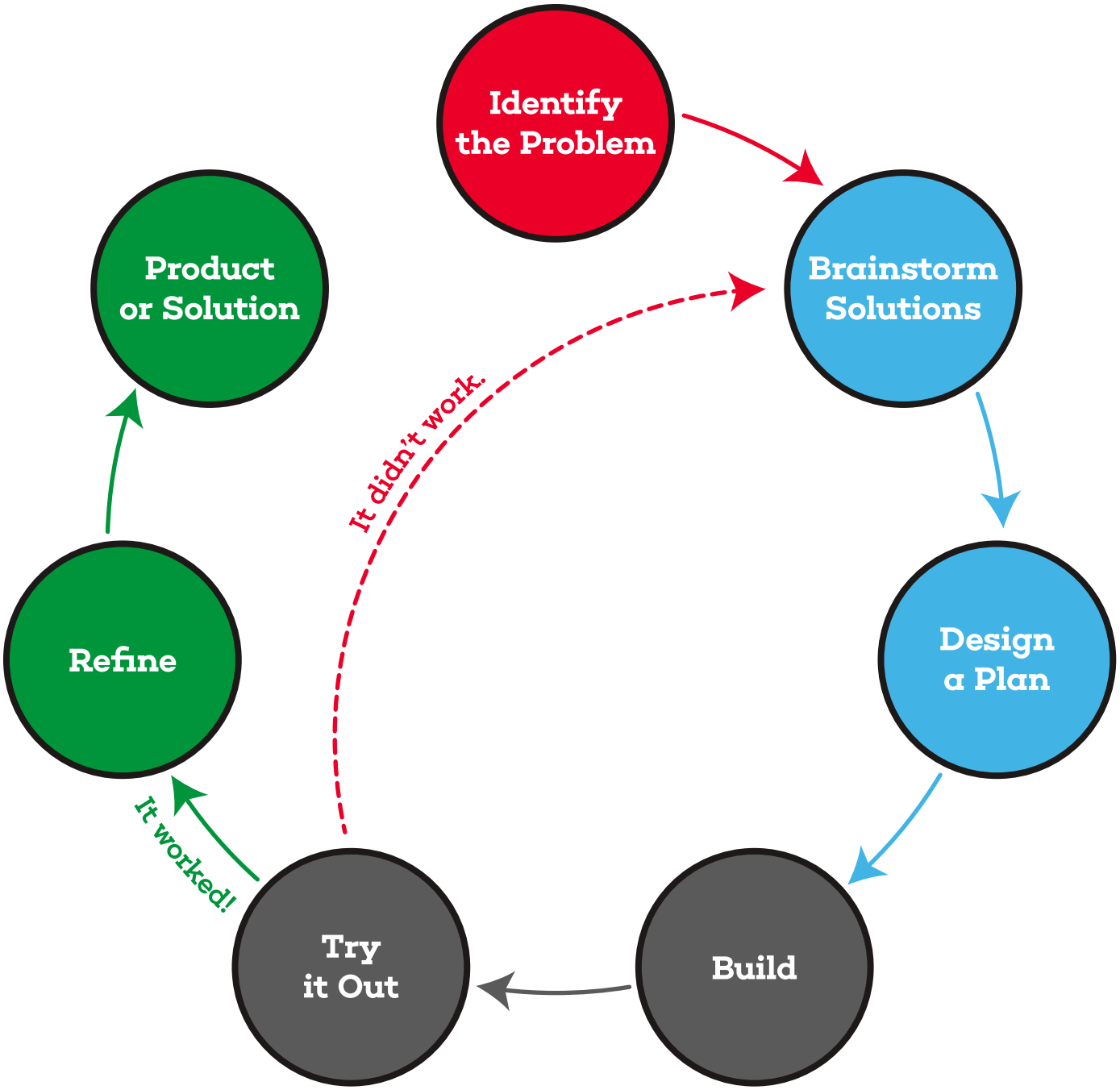
An Engineer's Approach



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Kinetic Art
Sculptures in Motion

Time
1–2 sessions

Before You Start
Gather a variety of recycled materials (see list below).

You Need This Stuff
Teacher Materials
- Computer with projector and Internet access
- Online videos of kinetic artists and sculptures (select 1 or more from 7 videos)

Per Class
- Crepe or tissue paper strips
- Electric fan
- Metal washers
- Nails, straight pins, or other devices to serve as pivot points
- Recycled materials (e.g., cardboard, cans, cups, etc.)
- Skewers
- String
- Tape

Per Student Group
- 10-cm x 10-cm sheet of paper (up to 15-cm x 15-cm square)
- Colored markers, crayons or decorative stickers
- Pair of scissors
- Pencil with full eraser
- Ruler
- Straight pin
- Copy of "Make a Kinetic Pinwheel" page

What It's About
On blustery days, we commonly hear people use the phrase, "Look at the wind." Have you ever wondered what it actually means? When air is moving, we feel wind, but of course, we don't actually "see" it. Instead, we observe the movement it causes in the objects around us. Flags wave, leaves rustle, and if the wind is very strong, rain may even fall sideways. In this investigation, students will create and study unique sculptures that move in interesting ways when acted upon by the force of the wind.

"Tyne Anew" by Mark di Suvero combines artistic design with engineering skills. Three huge tripod-style legs support a top piece that twists, dips and moves with the wind.

What's the Question?
How does a kinetic sculpture work?

What to Do
1. Begin the activity by asking students, *Do you know what a kinetic sculpture is?* (It's a special kind of sculpture that moves.)
2. To increase students' comfort with, and understanding of kinetic sculptures, have them

start by making a mini-sculpture (a pinwheel), using the "Make a Kinetic Pinwheel" page as a guide. Instruct students to hold their pinwheels in front of the fan, or take them outside to observe their movement in the wind.

3. Project one or more of the videos below (see "Viewing YouTube Videos," right).

   - **Anthony Howe's Otherworldly Kinetic Sculptures (The Creators Project)**
     http://www.youtube.com/watch?v=RshSaF_juGs
   - **Kinetic Sculptor Puts Cyber Dreams in Motion (The Creators Project; subtitled)**
     http://www.youtube.com/watch?v=FoM8U-oMuvl8
   - **Reuben Margolin (MAKE: television)**
     http://www.youtube.com/watch?v=dehXio-MIKg0
   - **Reuben Heyday Margolin: Waves**
     http://www.reubenmargolin.com
   - **Theo Jansen: Strandbeest Evolution**
     http://www.youtube.com/watch?v=MYGJ9jrb-pvg
   - **Theo Jansen's Strandbeests (BBC One)**
     http://www.youtube.com/watch?v=HSKyHm-jyrkA
   - **Time-Lapse: Mark Di Suvero Installation**
     http://www.sfmoma.org/explore/multimedia/videos/563

4. Show students the materials available for them to design and build their own kinetic sculptures. Encourage teams to collaborate on the design. Recommend that they draw their planned sculptures on a sheet of paper, label the parts, indicate sizes of parts, etc.
5. Have teams gather materials and create their kinetics sculptures.
6. Let teams present their sculptures to the class and explain what they want their sculptures to do when the wind is blowing. After each presentation, ask the rest of the class, *Do you think it will do what the team says it is designed to do? Can you suggest improvements?*
7. Use the fan to test each team's sculpture. Begin each test with the sculpture located a specified distance from the fan. Gradually, move the sculptures incrementally closer to the fan. Ask, *Do the parts move as expected? Is the sculpture stable? If not, does it need a wider or heavier base? Is it top-heavy?*
8. Discuss the videos with the class. Make sure students understand that movement is imperative for their sculptures, but that aesthetics also should be considered. Ask, *Why is this important?*
9. Have students brainstorm ways to improve their original designs. Students may suggest adding or removing weight, changing shapes, using other types of materials, etc.
10. You may want student teams to design new or improved kinetic pinwheels, perhaps with even more moving parts. Again, students should draw diagrams and label the parts. They also should consider how each new design element might improve the sculpture's motion.
11. Have teams select materials from those offered, build and test their new sculptures, and adjust as necessary.
12. Finally, have each team explain how it planned, built and tested its sculpture, and provide a brief summary of outcomes. ■

Viewing YouTube Videos

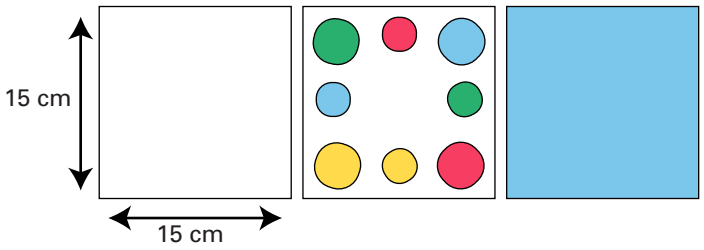
To download and view YouTube videos, install the KeepVid Video Downloader (free web application), or play the video immediately at www.keepvid.com.

- **On YouTube, highlight the url of the page on which the desired video is loaded.**
- **Open keepvid.com and paste the url in the box at the top.**
- **Click either "Download" or "Play Now."**
- **If you are downloading the file, KeepVid will ask you to choose the format in which you want to save the video, and where to save it on your computer.**

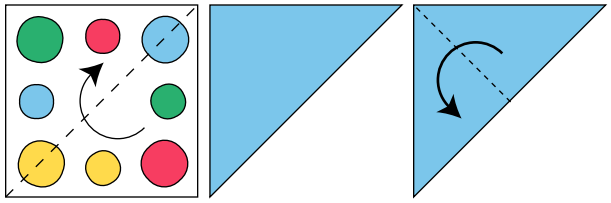
Make a Kinetic Pinwheel

Read the instructions below and refer to the illustrations to build a kinetic pinwheel sculpture. Keep in mind that your sculpture does not have to look exactly like this one.

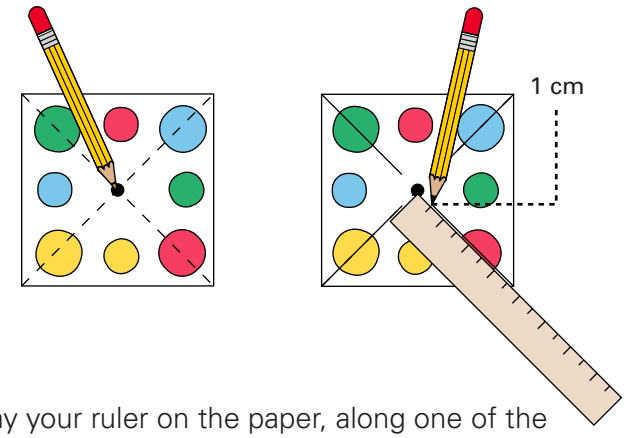
1. Start with a 15-cm square piece of paper. Decorate both sides of the sheet of paper.



2. Fold the square in half to make a triangle. Then fold the triangle in half, to make a smaller triangle.

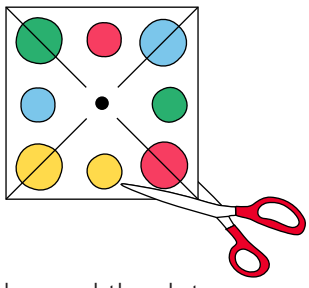


3. Unfold the paper. Use your pencil to put a dot in the center of the square, where the four fold lines meet.



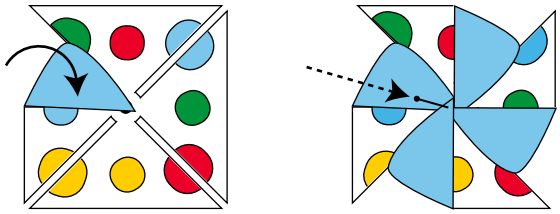
4. Lay your ruler on the paper, along one of the folds. The top of the ruler should be on the center dot. Starting 1 cm below the dot, draw a line to the corner of the paper. Repeat this step to draw a line to each remaining corner.

5. Cut along the lines you have drawn. Be sure to stop cutting before you reach the center dot at the end of each line.



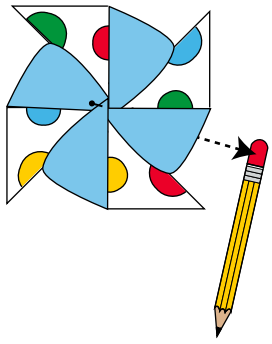
6. Fold every other point in toward the center. The points should reach a little beyond the dot.

7. With four points folded down over the center, push a straight pin through all four points and the center dot.



8. Push the pin into—but not all the way through—the eraser on your pencil.

9. Smooth out the creased edges a little, to open and puff out the pinwheel.



Consider this. *What kind of power makes the wheel go around? What real-life machines work the same way?*