DUKE ENERGY SCIENCE NIGHT

Boat Builders

Supplies

- 1 sheet of aluminum foil
- glass stones
- tub of water

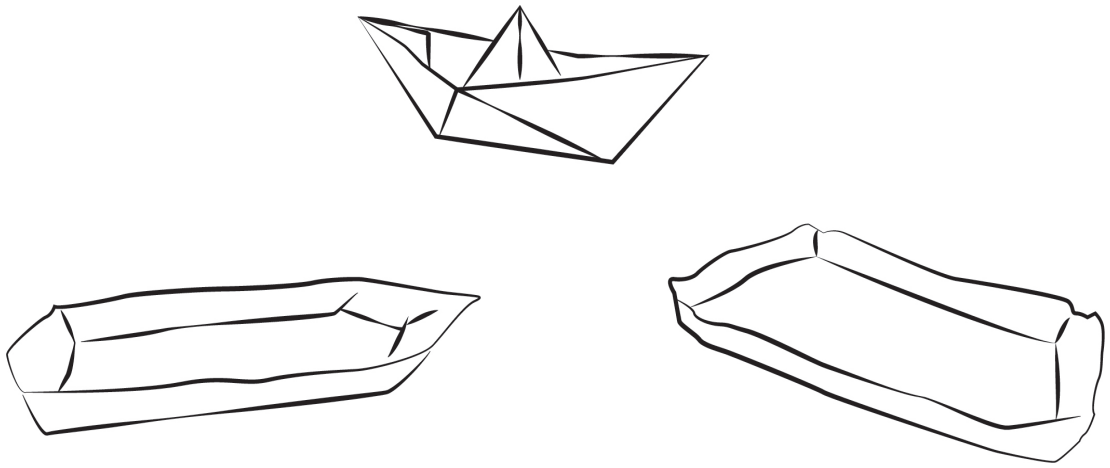
What to do

- Question – What do you think makes a boat float?
- Plan – What do you want your boat's shape to be?
- Build – Go ahead and put your plan in motion!

Test your boat

- Test – Place your boat in a tub of water. Slowly and carefully count and add glass beads to the boat until it sinks from the weight.
- Improve – Think about how you might rebuild your boat with a different plan to hold even more glass beads before sinking.

You can redesign and retest your boat as long as you don't rip the foil!



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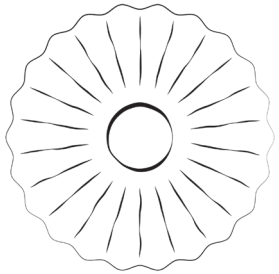
Capillary Flowers

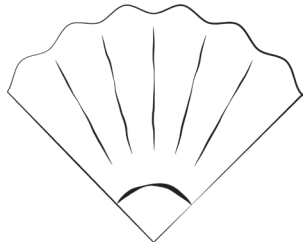


Supplies

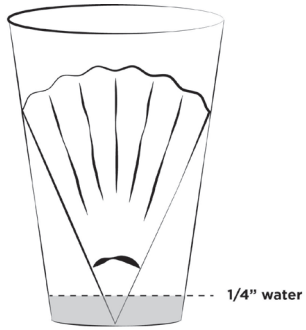
- 1 cup with water
- 1 coffee filter
- 1 washable marker
- 1 pipe cleaner

What to do

1. Stretch open the circular coffee filter and draw a circle about an inch away from the center of the filter.
2. Fold the paper in half and then in quarters, so that it looks like a pizza slice.



Note: Make sure the marker line is above the water line by placing the quartered filter paper OUTSIDE of the cup, point down. If the ink is below the water, the ink will simply wash into the water and this experiment won't work as well.



3. Place the filter paper point down in the water and watch the capillary action.
4. Observe the paper for a few minutes: What is happening to the water? The marker line?
5. When the water has nearly reached the top, lift the filter paper out of the water and let any extra water drip back into the cup.
6. Gently open the filter paper and allow it to dry for 5-10 minutes. (Perhaps go do another activity and then come back!)
7. When the paper is dry enough to handle without ripping, gently fold the filter paper back into quarters and wrap a pipe cleaner around the point to make the flower stem.

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Fingerprint Patterns

Arch

Ridges form a hill or tent-shaped pattern

Loop

Ridges form an elongated loop pattern

Whorl

Ridges form a circular pattern

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DUKE ENERGY SCIENCE NIGHT

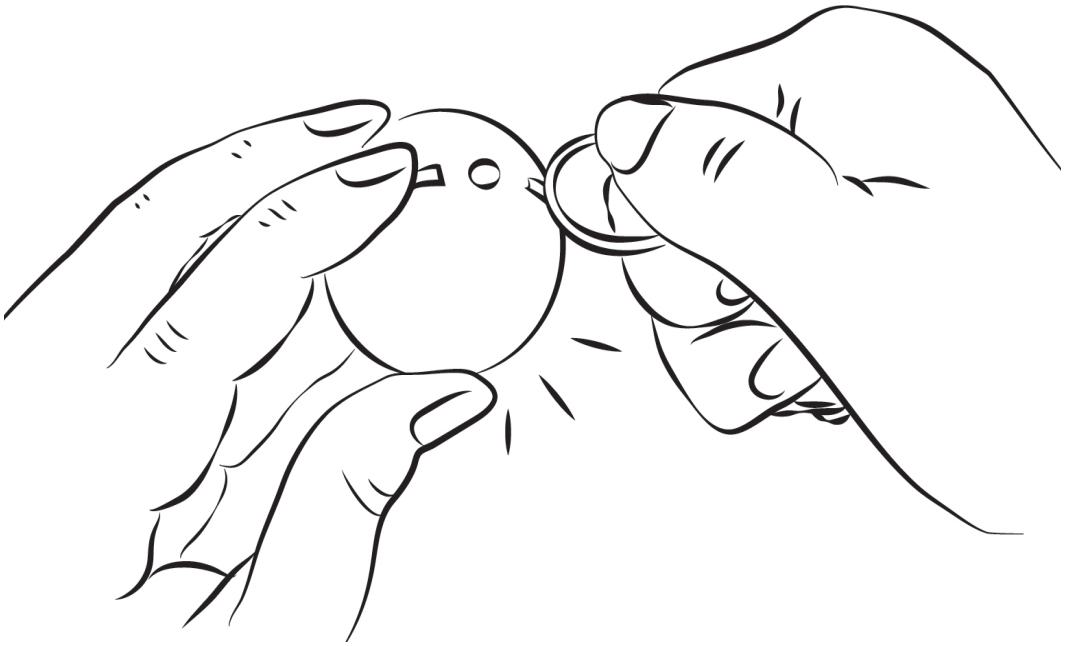
Light It Up

Light It Up challenges

- What happens if you place the ball between two people and each person touches one of the metal strips?
- What happens if you hold hands?
- What happens if you do not hold hands?
- Using the ball, create the largest human circuit possible by adding more people to the circle.

What to do

1. Test objects made of different materials - even try using your fingers.
2. Touch objects to the two pieces of metal on the Energy Ball.
3. If the object isn't able to touch both pieces of metal, touch it to one piece of metal while touching the other piece of metal with your finger.
4. Some materials will allow the electricity to transfer through them and "complete the circuit."



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DUKE ENERGY SCIENCE NIGHT

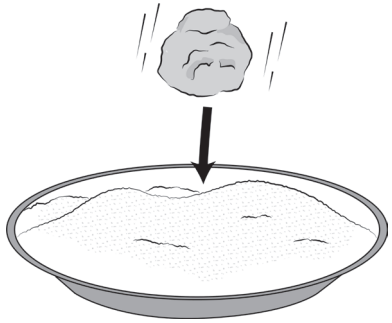
Moon Craters

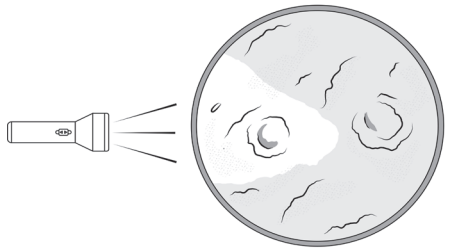
SAFETY NOTE

- In this activity, “asteroids” will be dropping on the Moon!
- Do not throw the rocks up in the air or at any people!

What to do

1. The “Moon Pan” represents a small area of the Moon’s surface.
2. The Moon’s surface is not completely smooth. Make a mountain range or two.
3. The rocks represent asteroids that bombarded the Moon early on in the Moon’s history (and sometimes still do.)
4. Volunteers should stand with their backs to the pan and gently drop the rocks over their shoulders. Only some of the “asteroids” will hit the “Moon”.
5. Observe the Moon surface with the flashlight (the “Sun”) shining straight down on the “lunar surface”. What do you see?
6. Observe the Moon surface with the flashlight (the “Sun”) shining from the side. Now what do you see?





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Moon Craters

SKYWATCHER'S GUIDE TO THE MOON

Impact!

The Moon's cratered surface tells a violent story. Bright areas are ancient crust that make up the highlands. Dark areas are newer regions of lava that formed after asteroid impacts.

Copernicus

This crater (left) is easy to spot. It formed about 800 million years ago, and is 57 miles (92 km) wide. Note central peaks and terraced walls, caused by impact.

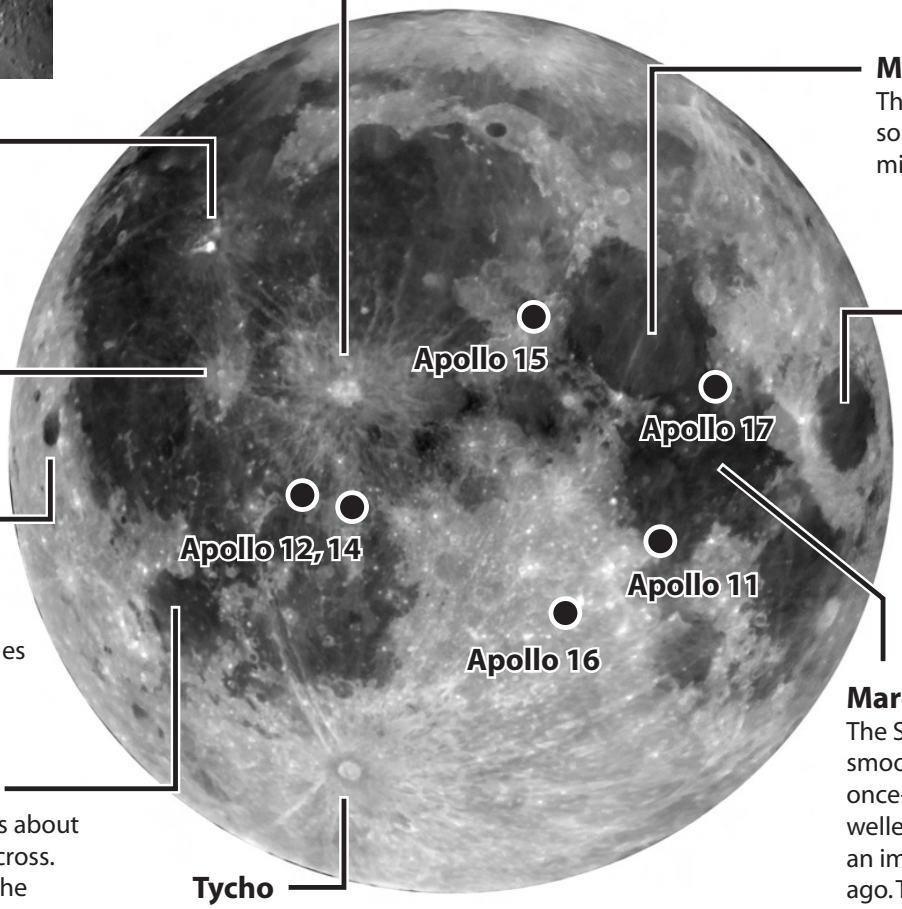
What do you see on the Moon?

Face south and look up in the sky.

Can you find the Moon?

Compare the Moon in the sky to the large Moon map below. The Moon map shows the side of the Moon that is always facing us. How much of the Moon in the sky is lit up right now? You will only see the features on the part of the Moon that is lit up.

Through a telescope, you may need to turn the map to match your view of the Moon in the eyepiece. Some telescopes will flip the image, so the Moon might look like the image to the right through a telescope.



Aristarchus
Young crater. So bright that Sir William Herschel thought it was an active volcano.

Kepler
Small version of Copernicus

Grimaldi
Lava-filled crater is one of the darkest spots you can see on the Moon. It's 145 miles wide (233 km).

Mare Humorum
The Sea of Moisture is about 220 miles (350 km) across. You can spot it with the naked eye. With a telescope, you might notice two craters along its edge.

Tycho
Young crater best seen during a full Moon. Rays of bright material are ejecta blasted out of the crust when a large asteroid struck about 109 million years ago.

Mare Serenitatis
The Sea of Serenity is solid lava, some 380 miles (610 km) across.

Mare Crisium
The Sea of Crisis is about 340 miles wide (550 km) and visible to the naked eye.

Mare Tranquillitatis
The Sea of Tranquility is a smooth plain filled with once-molten lava that welled up from below after an impact billions of years ago. The first humans to walk on the Moon, Apollo 11 astronauts, landed near the edge.

SOURCES: NASA; ADVANCED SKYWATCHING; CAMBRIDGE ATLAS OF ASTRONOMY; DK VISUAL ENCYCLOPEDIA

Photos: James Scala. Layout and text for Moon map used with permission: Robert Roy Britt/SPACE.com.

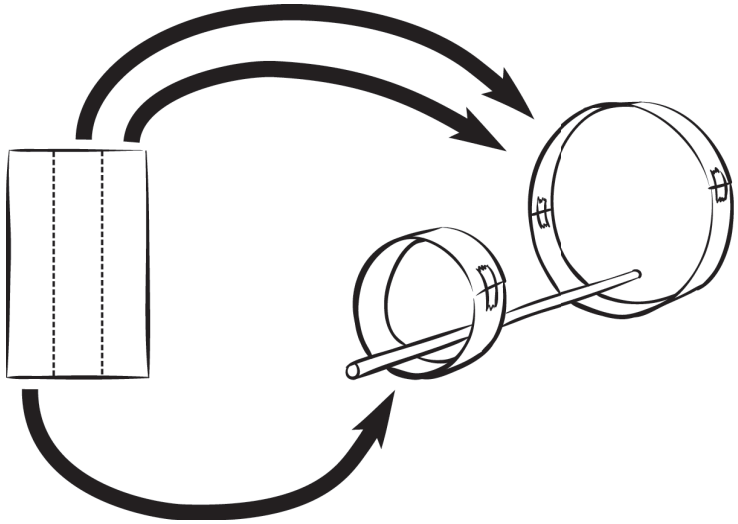
NASA Night Sky Network (nightsky.jpl.nasa.gov) administered by Astronomical Society of the Pacific (www.astrosociety.org)

DUKE ENERGY SCIENCE NIGHT

Paper Flying Machines

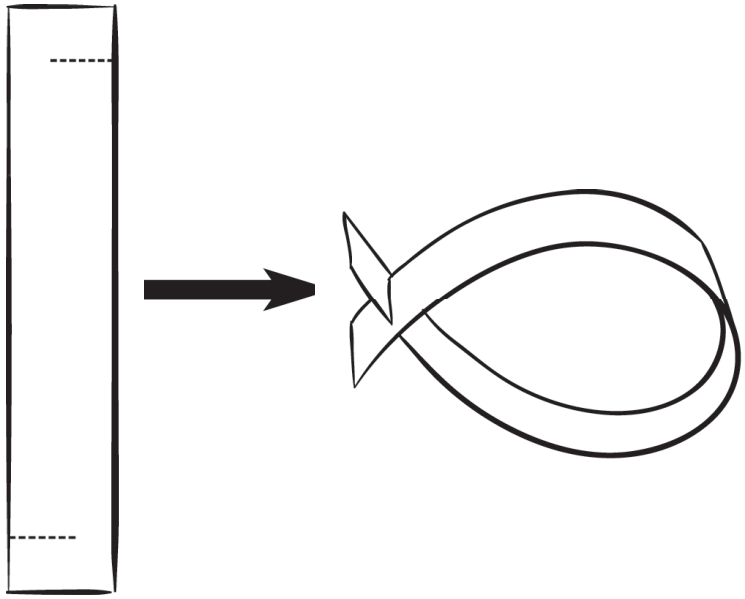
Straw Glider

1. Cut an index card into three vertical pieces.
2. Roll one piece into a small loop and tape it shut.
3. Tape the other two pieces together, then make a large loop and tape it shut.
4. Place your straw inside the two loops.
5. Tape the straw to the inside of the loops.
6. To fly, hold the straw, then throw it like a spear with the little loop in front and both loops pointing up.



Whirligig

1. Cut a strip of paper longer than it is wide.
2. Cut notches near each end from opposite sides of the paper.
3. Fold the strip into a loop and connect the notches.
4. Hold your Whirligig high above your head.
5. Let go and watch it twirl as it floats down.
6. Experiment: how should you hold it to make it twirl?



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DUKE ENERGY SCIENCE NIGHT

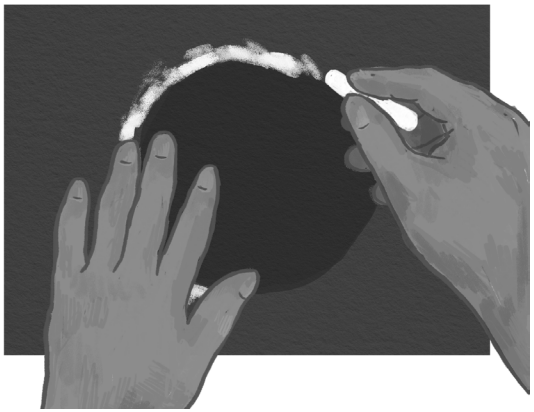
Solar Eclipse Art

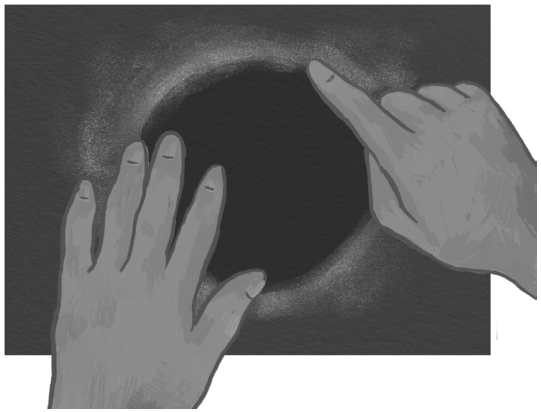
Supplies

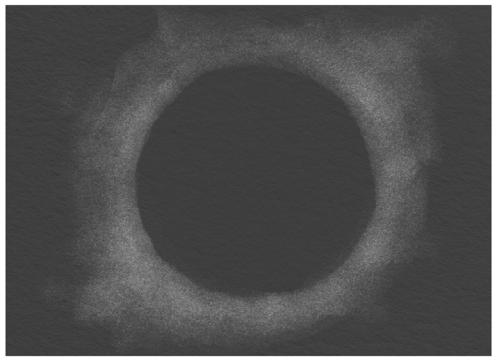
- 1 sheet of construction paper
- chalk
- plastic lid
- pencil
- scissors

What to do

1. Use a plastic lid and pencil to trace a circle on one half of your paper, then cut out the circle with the scissors.
2. Place the circle template on the other half of your paper. Hold it down with one hand while using chalk to draw a thick circle around it. The circle does not need to be neat!
3. Still holding the template in place with one hand, use a finger to smudge the chalk away from the center of the circle.
4. Remove the circle template to reveal your work of art. This is what a total solar eclipse looks like!
5. You can also use the chalk to add words, pictures, or fun designs to your artwork.







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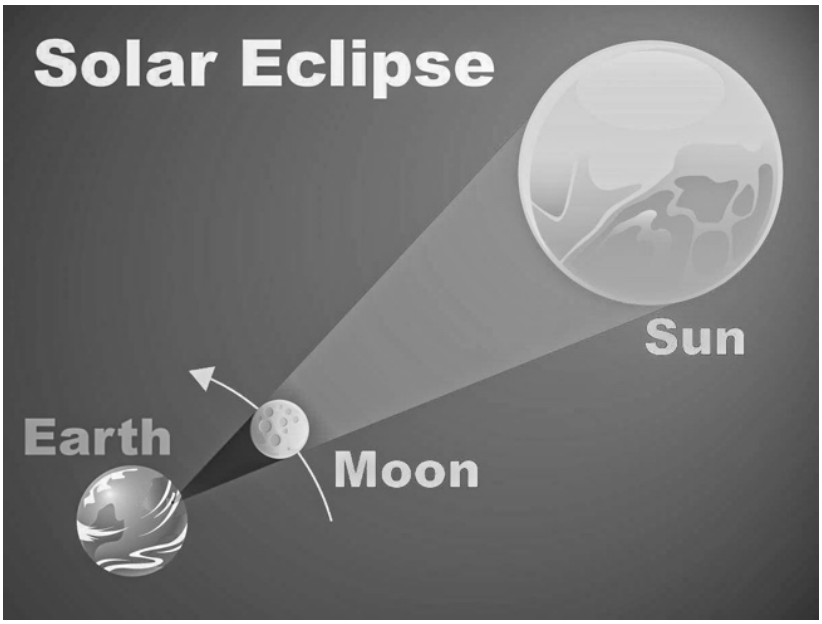
Solar Eclipse Art

SOLAR ECLIPSE INFORMATION (from www.nasa.gov/eclipse)

Sometimes when the Moon orbits Earth, it moves between the Sun and Earth. This doesn't happen every month, because the Moon doesn't orbit in the exact same plane that the Sun and Earth do. When it happens, the Moon blocks the light of the Sun from reaching Earth. This causes an eclipse of the Sun. During a solar eclipse, the Moon casts a shadow onto Earth.



It is NEVER safe to look directly at the Sun's rays – even if the Sun is partly blocked. You must use special eclipse glasses to look at any type of solar eclipse.

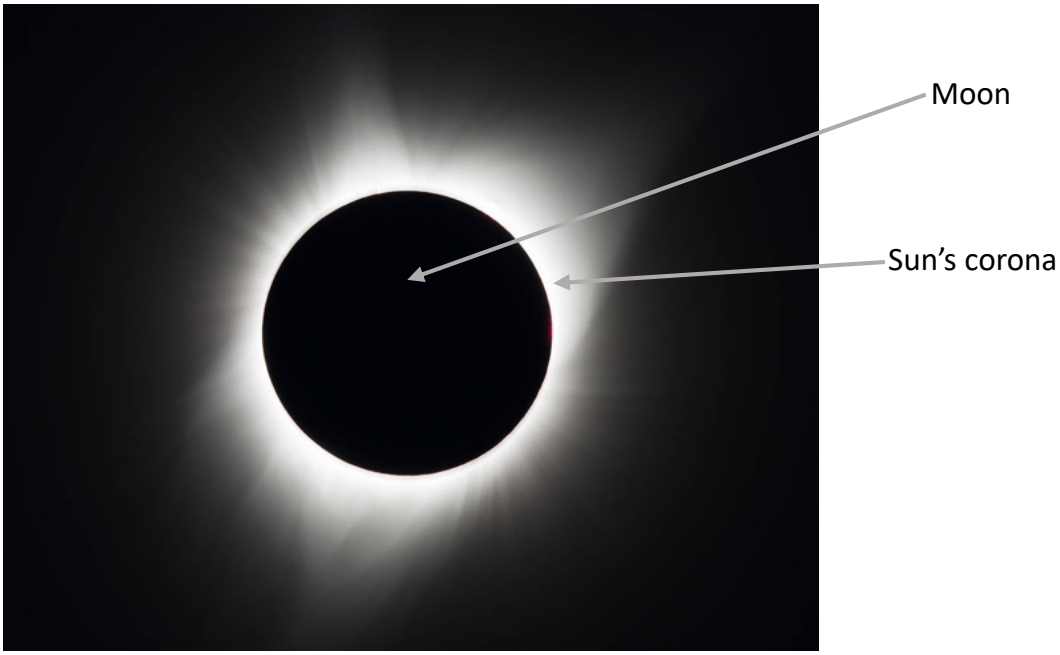


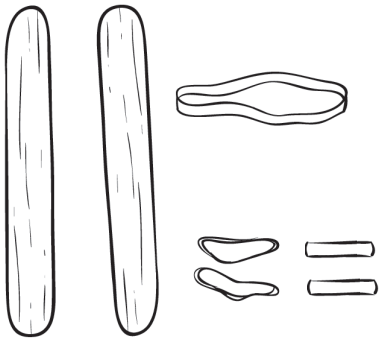
Photo of a Solar Eclipse (NASA/Aubrey Gemignani)

DUKE ENERGY SCIENCE NIGHT

Sound Sandwiches

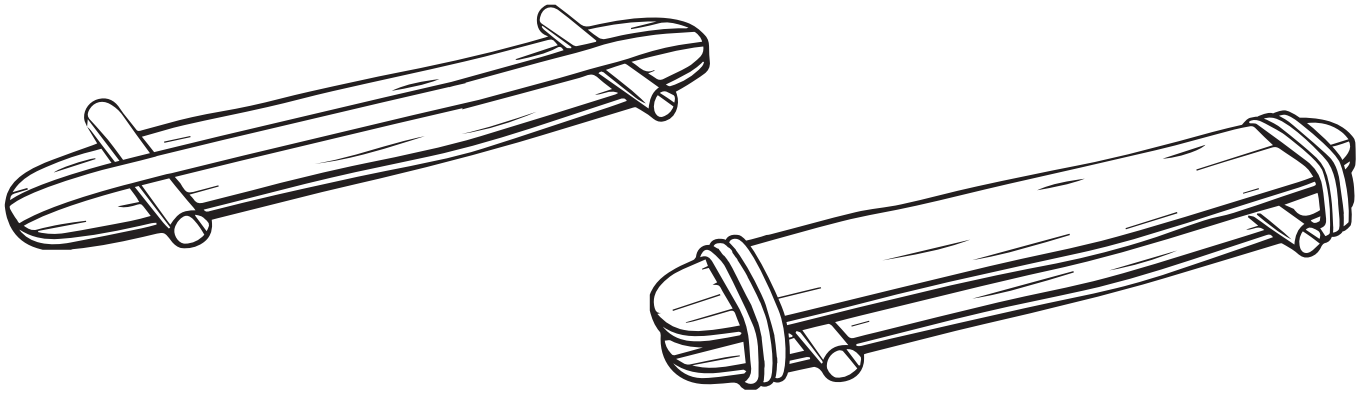
Supplies

- 2 jumbo craft sticks
- 1 big rubber band
- 2 little rubber bands
- 2 inch-long straw pieces



What to do

1. Wrap the big rubber band long-ways around one of the jumbo craft sticks.
2. Slide the two straw pieces under the rubber band and push one toward each end of the craft stick.
3. Stack the second craft stick on top of the straws.
4. Wrap the little rubber bands around the ends of the craft sticks to hold the stack together.



Play your Sound Sandwich

Purse your lips (like you are about to say “pop”) and blow between the two craft sticks.

Experiment with your Sound Sandwich

Try moving the straws closer together and blow through the middle again. Did moving the straws change anything?

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DUKE ENERGY SCIENCE NIGHT

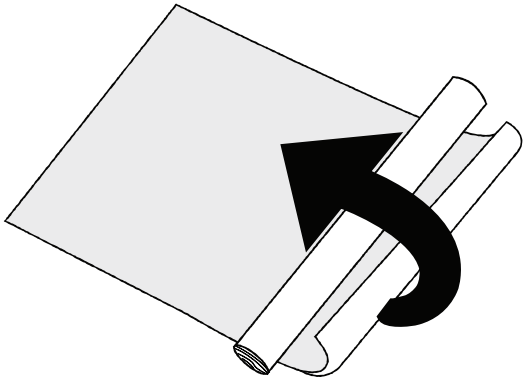
Stomp Rockets

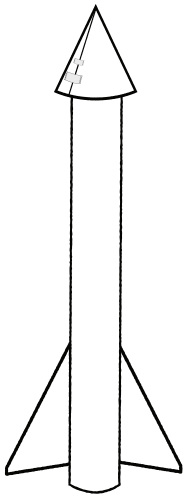
Supplies

- wooden dowel
- construction paper
- tape
- scissors

What to do

1. Wrap a piece of construction paper tightly around the dowel. Once completely wrapped, tape to hold in place.
2. Make a nose cone and attach to the top of your rocket. Make sure your nose cone is air-tight for a successful launch.
3. Slide the rocket off the dowel and try a test launch!
4. Try attaching fins to the back of your rocket – does it change the way it flies?





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DUKE ENERGY SCIENCE NIGHT

UV Bracelets

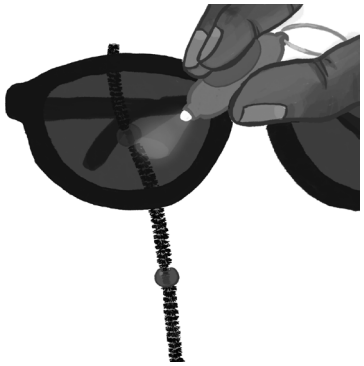
Supplies

- 1 pipe cleaner
- 2 UV-sensitive beads*
- UV light source
- Test materials

*UV stands for ultraviolet. It is invisible to us and so we are using special beads that change color when UV light is present.

What to do

1. String two beads onto one pipe cleaner and twist or tie the ends together.
2. Expose the beads to UV light and observe the beads.
3. Remove the beads from the UV light and observe the beads.
4. Hold one of the test materials between the bead and the UV light and observe the bead. Hold the material over only one of the beads and make sure you can observe how each bead is responding to the UV light.
5. Try another material between the bead and the UV light and observe the bead. Do you have a hypothesis about what will happen?



Fun fact:

This is called a controlled experiment. The bead that does not have the material over it is the “control” and the bead that does is the “test” in this kind of experiment. This helps us to see any differences more easily.

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