

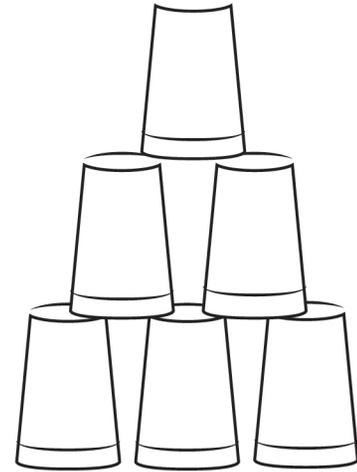
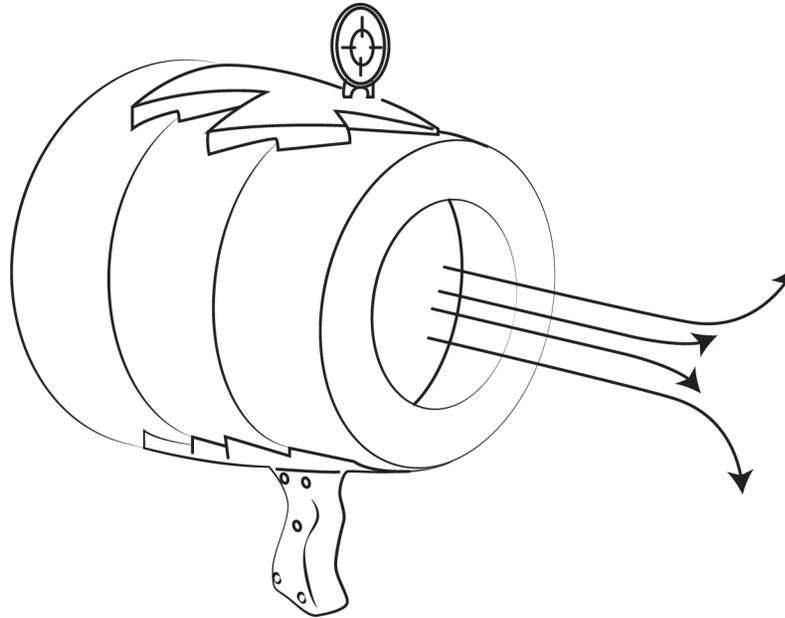
Air Power

Air Power Challenges:

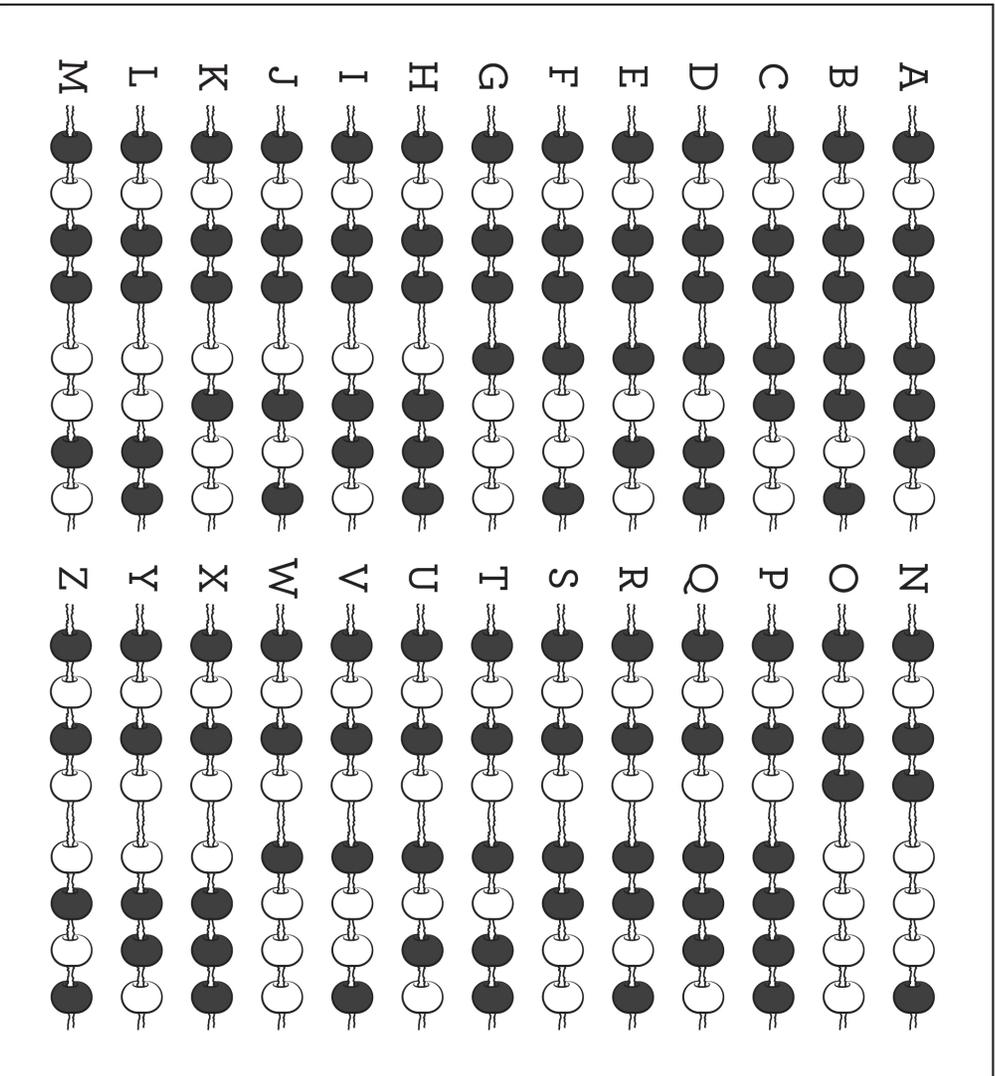
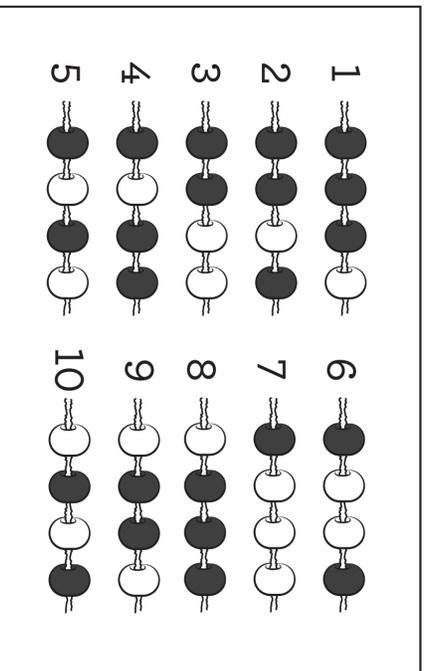
- What happens if you step back farther?
- Is the force still great enough to knock over the cups?

What to do

1. Use the Airzooka to shoot air molecules out of the cannon with a great force.
2. Try to knock over a stack of cups!



Binary Alphabet & Numbers



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Binary Place Value

Placing 1's and 0's in the place value spots can make a number in binary.

Can you make your age?

eights	fours	twos	ones		
0	0	0	1	=	1
0	0	1	1	=	3
1	1	0	0	=	12
				=	
				=	

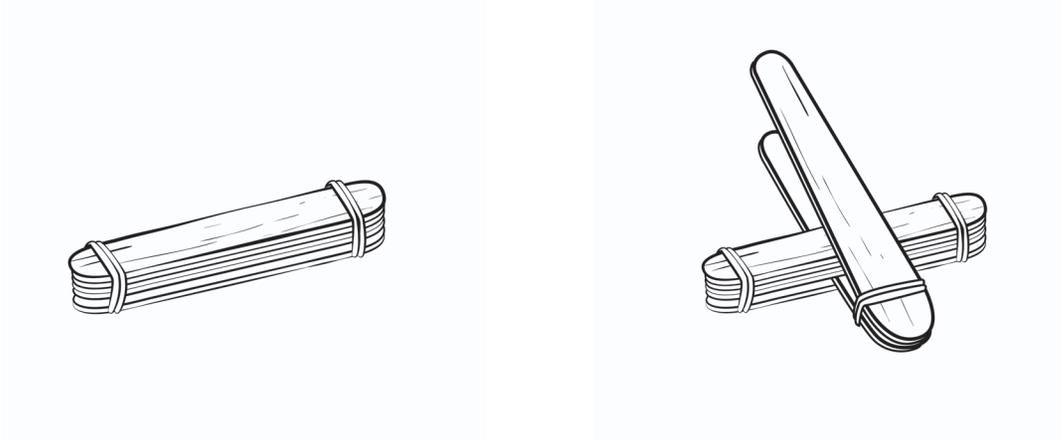
Catapults

Supplies

- 5 small craft sticks
- 4 rubber bands
- 2 jumbo craft sticks
- 1 plastic spoon
- pom poms

What to do

1. Stack five small craft sticks and wrap a rubber band around each end. This creates the fulcrum.
2. Insert a jumbo craft stick into the base, between the bottom two craft sticks in the fulcrum.
3. Next take the second jumbo craft stick and rubber band it to the other jumbo craft stick. This makes the launching arm.
4. Place the handle end of the spoon under the launching arm rubber band. Then wrap another rubber band around the spoon and launching arm to hold it in place.



Test your catapult

Place a pom pom on the spoon, pull back the launching arm, and release!
How close to the target can you land your pom pom?

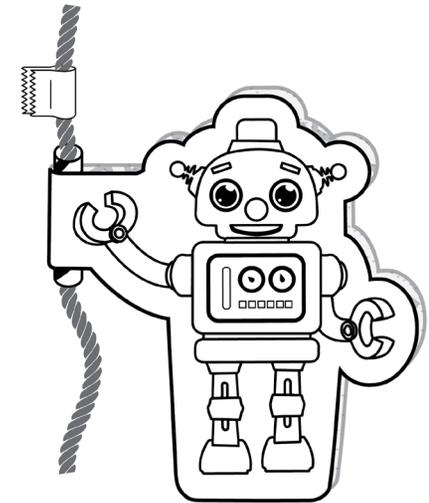
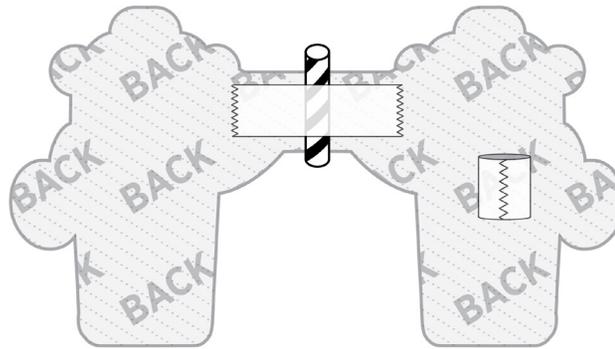
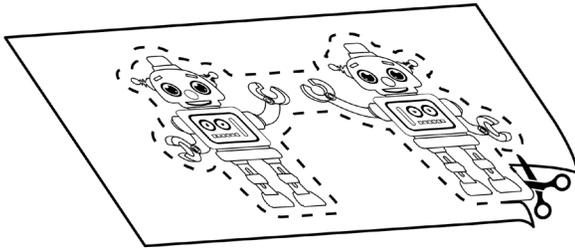
Climbing Robot

Supplies

- 1 Climbing Robot template
- crayons
- 1 piece of straw
- 1 piece of yarn
- 2-4 pieces of masking tape

What to do

1. Color the robot (if desired) then cut the template along the dotted lines.
2. Flip the robot over. Tape the piece of straw and create a tape ring as shown in the illustration.
3. Fold and tape the two sides of the robot together. Thread the yarn through the straw and either tie knots or add a piece of tape to each end so the yarn will not slip out of the straw.



Test your climbing robot

Hold the yarn at each end and gently stretch it straight up and down and tight enough so that it is not slack. Pull the robot to the top of the yarn and then carefully release so it can maneuver down.

Note: It may be easier for two people to do this together, with one person holding the yarn while the other holds and releases the robot.

Computer Vision

Supplies:

- Computer with internet connection and webcam

Computer vision is a type of Artificial Intelligence where people train a computer to recognize objects.

You can experiment with this!

What to do

1. Choose an object, such as a pencil, to identify as Class 1. Hold it up so the camera can see it.
2. Click the Webcam button and HOLD to record many images. Be sure to move the object around so the computer can see it from many sides and angles.
3. Take at least 100 image samples, 200 is best!
4. Do this again for Class 2, use a different object like an eraser.
5. You can also add more classes by scrolling down the page and choosing Add a Class.
6. After you have at least two classes (3 or more is even more fun!), click Train Model.
7. Wait Patiently! The computer takes a minute to learn how to identify the objects you've taught it. Stay on the page.
8. When it says Model Trained, hold up one of your objects. Does it correctly identify your item? What happens when you try new items, like a different colored pencil?

Can you:

- Try hand signals and facial expressions?
- Have different people hold the objects?
- Move closer or further away?

Signed out?

- go to <https://teachablemachine.withgoogle.com/>
- choose Get Started, then Image Project, and Standard Image Model

This activity produced in partnership with:



North Carolina
School of Science
and Mathematics

Gas-Powered Rockets

Supplies

- 1 plastic canister
- 1 snap cap
- 1 quarter antacid tablet
- water

SAFETY NOTE

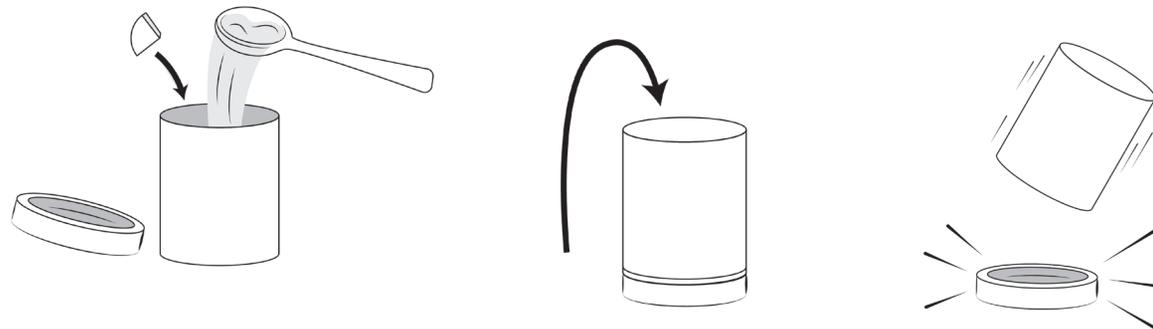
In this activity, canisters will be launching in the air! Be sure you are at a safe distance from other people and from the canister when it is on the launch pad!

Never direct the rocket at another person.

What to do

1. Fill the canister about a third of the way with water.
2. Drop a quarter of a tablet into the canister.
3. QUICKLY snap the cap TIGHTLY onto the canister.
4. QUICKLY put the canister on the launch pad CAP SIDE DOWN.
5. Step back a couple of feet from the launch pad.
6. About 10 seconds later, you should hear a POP and the canister will launch into the air!

Note: If it does NOT launch, wait at least 30 seconds before having an ADULT examine the canister. Usually the cap was not on tight enough and the gas leaked out before building up enough pressure to pop off the cap.



I Spy with my Microscope Eye

Supplies:

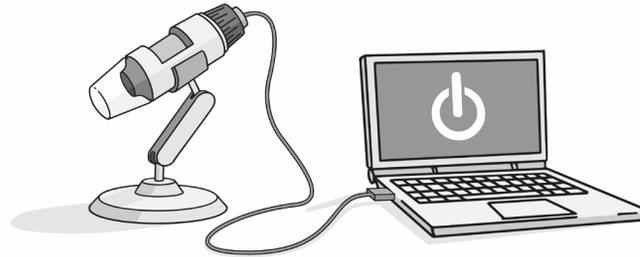
- Digital Microscope interfaced with a computer

Notes:

- The scope can be used when held in your hand or clipped into the stand.
- Make sure the cap has been removed from the plastic tip.
- Take care to ensure objects (including fingers) do not come into contact with the microscope lens.
- The buttons on the scope will not work with most computers.

What to do

1. Hold the microscope right up against an object. The clear plastic tip will help prevent the object from coming directly into contact with the microscope lens. Do not touch the lens.
2. Turn the small wheel on the cord to adjust the brightness of the lights on the scope.
3. You should be able to see an image on the computer screen. You may need to move the scope or the object to ensure it is in the viewing field of the microscope lens.
4. Turn the big silver wheel on the scope until the object comes into focus.
5. To get a clear image, you may also need to move the scope either closer to or farther away from the object.



I Spy Challenges:

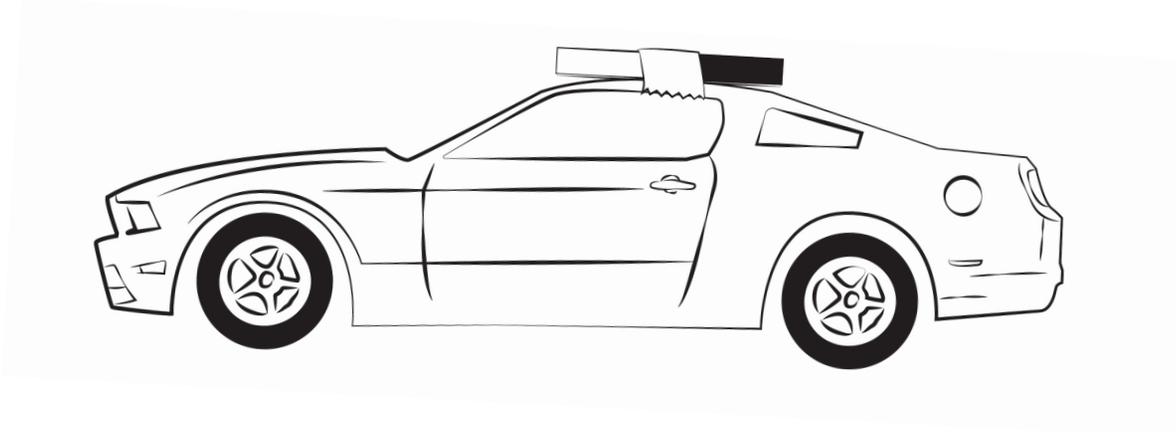
What do you see if use the microscope to look at:

- Your skin
- Your fingerprint
- Your fingernail
- Your hair
- Your clothing

Magnetic Racers

Without touching the car can you...

- make the car move forward?
- make the car move backward?
- race the car on a straight track?
- move the car around a tricky course?



Marshmallow Towers

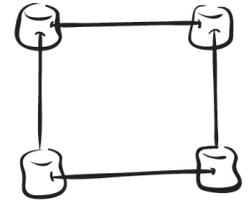
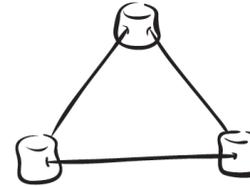
Marshmallow Challenges:

Try to build:

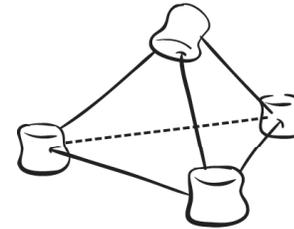
- a tower taller than you
- a tower with a narrow base
- a bridge
- a new wing on someone else's building
- a building with a hole big enough for your arm to fit through

What to do

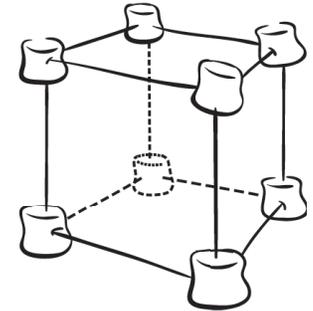
1. Make triangles and squares.
2. Then try putting them together.



Can you make a shape out of 1 square and 4 triangles?

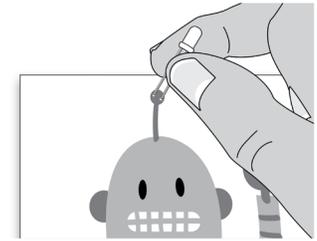
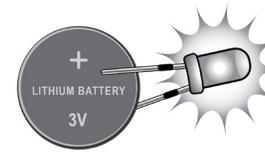


4 triangles



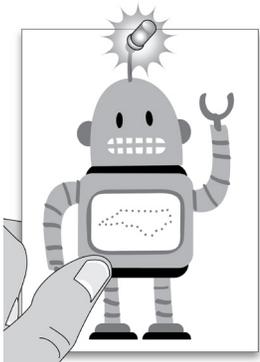
6 squares

Paper Circuit Robot



Supplies

- 1 Paper Circuit Robot template
- 1 LED
- 1 pencil
- 3 strips of aluminum foil
- 5 pieces of tape
- 1 battery (note: batteries will remain on the table)



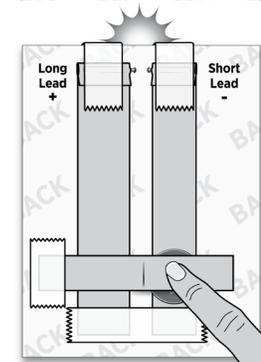
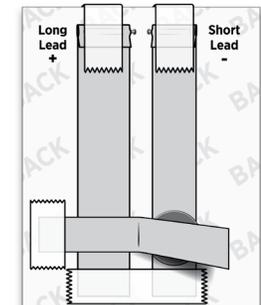
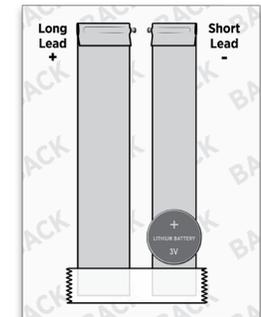
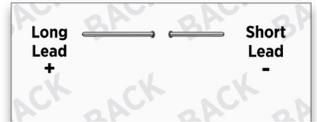
What to do

1. Test the LED by touching the long lead on the positive (+) side of the battery and the short lead on the negative (-) side of the battery to be sure it lights up.
2. Position the long lead to the right and the short lead to the left, then poke the leads through the robot's antenna on the template.
3. Flip the template over. Bend the leads to open them and confirm the long lead is now on the left and the short lead is now on the right. Label the two sides of the circuit with a + and - as shown on the illustration.
4. Wrap one end of a strip of aluminum foil tightly around each lead and lay both foil strips flat and vertical on the template. Tape down the bottoms of both vertical strips. Place a battery on top of the negative (-) side of the circuit, making sure it is not on top of the tape and that the positive (+) side of the battery is facing up.
5. Place a third strip of aluminum foil so it is horizontal across the vertical strips and the battery, but not on top of any tape. Then tape the left side of the third strip, making sure the tape does not touch the vertical strip.
6. Make sure the aluminum foil is still tight around each lead and tape the tops of the vertical strips such that the tape is only touching foil and not directly on the leads.

Test your paper circuit robot

Touch the horizontal aluminum foil strip onto the positive (+) side of the circuit and on the top (+) side of the battery. This creates a closed circuit which allows the electricity to flow and the LED light bulb to convert electrical energy into light energy.

Lifting the foil out of contact with the battery will break (or open) the circuit so the LED is no longer lit.



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Reading Trees

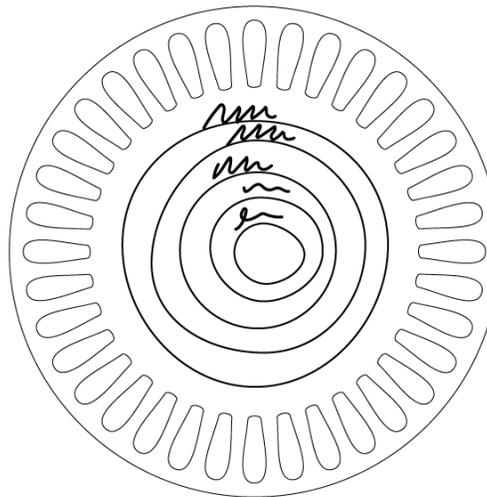
Supplies:

- 1 paper plate
- 1 marker

What to do

1. Draw a small circle in the center of your paper plate. This is to represent your brith.
2. The bumpy ridges of the paper plate are the bark of the tree cookie and will not be a year of growth.
3. Draw circles around the center circle, out toward the bumpy edge. There will be one circle for every year old you are.
4. Include important events in your life - like moving to a new place, when you started school, when you broke a bone, and so on.

What would these events look like as a mark on a tree ring?



This activity produced in partnership with:

