



SPARK
guide

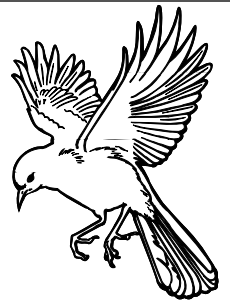
BIRDS

AVIAN WONDERS

FLYING HIGH

FLYING FAR

OWLS



what is S.P.A.R.K.?

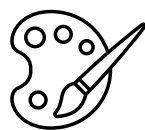
A free project-based curriculum incorporating 5 things we're passionate about:
STEM, Playful projects, Art, Reading, and acts of Kindness



S TEM learning



P layful projects



A rt



R eading



K indness

full unit at a glance

WEEK  **S**TEM learning  **P**layful projects  **A**rt  **R**eadings  **K**indness

1

Avian Wonders

Build-A-Bird project

block printing

read about birds

make pinecone feeders

2

Flying High

clothespin automaton

Charley Harper bird collages

read about flight

participate in Lights Out or Backyard Bird Count

3

Flying Far

Chimney Swifts marble run

Audubon nature journal

read about migration

participate in World Migratory Bird Day

4

Owls

cranky automaton

air dry clay owl

read about owls

build a nest box

birds

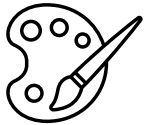
AVIARY WONDERS



Watch the video **Avian Wonders**



Create a set of 'Build-A-Bird' pieces



Styrofoam block prints



Choose a book about birds to read together



Create a bird feeder



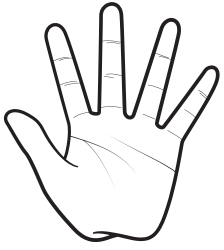
Watch the video **Avian Wonders**



What makes birds unique?

notes

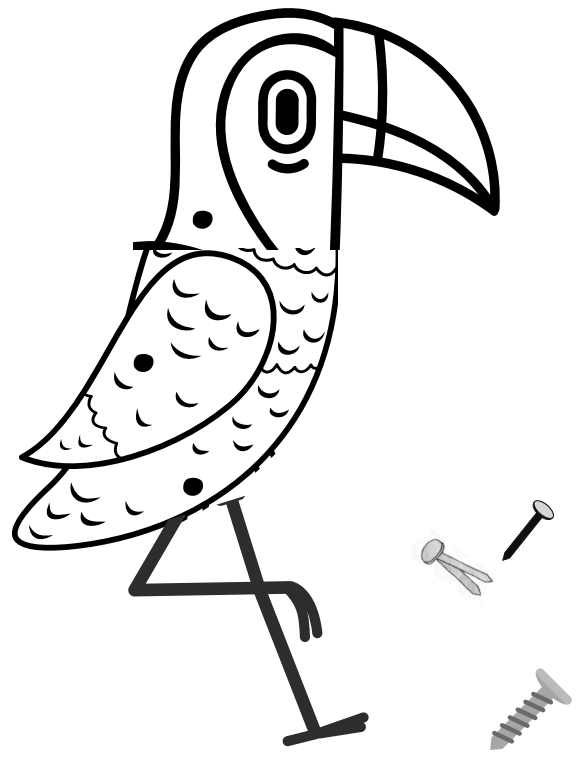




Build-a-bird

materials

- cardboard scraps
- scissors
- pencil
- markers or tempera paint sticks
- *Makedo Scrus (optional) or brad fasteners

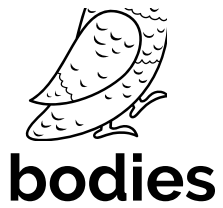
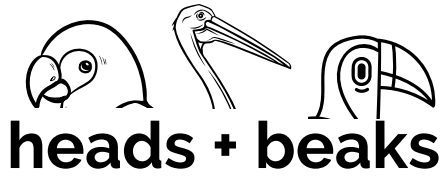


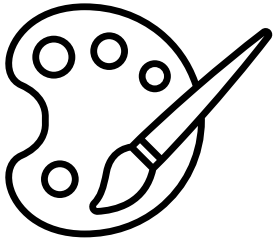
directions

Make a list of 6 or 7 of your favorite birds and look online for some visual references of each bird. On the ideas sheet, sketch out various heads, wings, bodies, legs, etc. When ready, sketch onto the cardboard, cut out each piece and pierce small holes where pieces should overlap. Continue until all pieces are completed. Decorate with markers or tempera paint sticks. To assemble, overlap cardboard pieces so that holes will align and thread with a fastener.

*Makedo scrus and screwdriver are really helpful to have in this project, but not necessary. Visit www.make.do for more.

ideas 

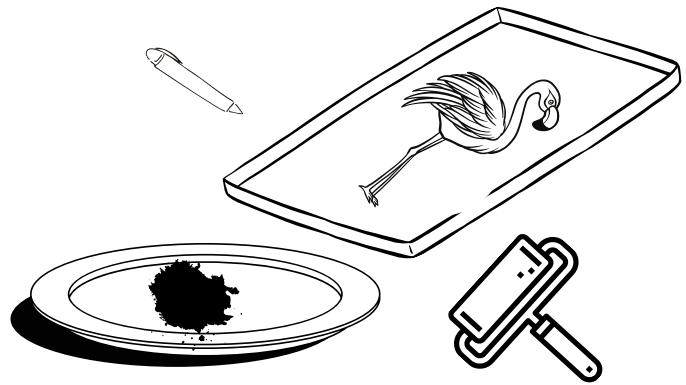




Styrofoam block prints

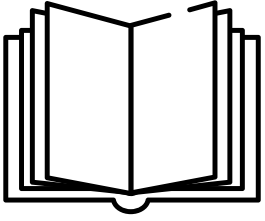
materials

styrofoam tray (from Dollar Store or reused, clean meat tray)
block printing ink or washable paint
paper plate
brayer
cardstock paper
pencil or pen



directions

Styrofoam provides a soft, pliable base for etching designs and is great for making quick block prints! Using a dull-pointed pencil or a ballpoint pen, draw your bird design onto the styrofoam tray. Be sure the etch lines are crisp and deep without piercing through the tray. Spread ink or paint onto a paper plate and roll onto the styrofoam tray in a light, even layer with the brayer. Press onto paper to create a print.



book list

Superlative Birds by Leslie Bulion

Big Book of Birds by Yuval Zimmer

Fly With Me: A Celebration of Birds Through Pictures, Poems and Stories

by Jane Yolen

Birds of a Feather: Bowerbirds and Me by Susan L. Roth

Bird Watch by Christie Matheson

Birds by Carme Lemniscates

Curiositree: Natural World by Amanda Wood

Paddle Perch Club: Bird Feet are Neat by Laurie Angus

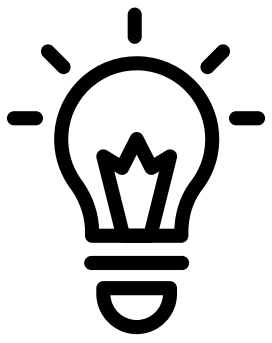
Peterson Guide to Bird Identification by Steve N.G. Howell

Everything Bird: What Kids Want to Know About Birds by Cherie Winner

A Nest is Noisy by Diana Hutts Aston and Slvia Long

An Egg is Quiet by Diana Hutts Aston and Slyvia Long

Bird Songs: 250 North American Birds in Song by Les Beletsky

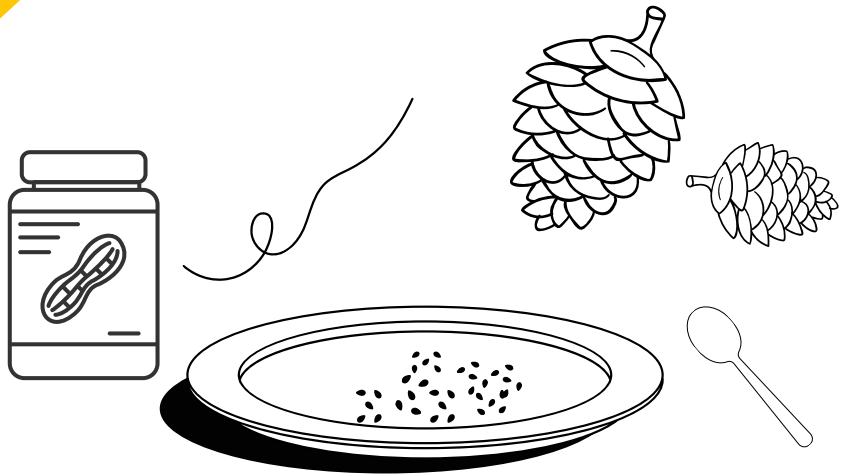


create a bird feeder

Help feed the feathered friends in your own backyard with this simple pinecone bird feeder.

materials

pinecones
wire
wirecutters
smooth peanut butter
spoon
bird seed
paper plate



directions

Collect pinecones from your yard or neighborhood. Wrap a piece of wire around the top part of each pinecone and bend into a hook shape (to attach to a tree branch). Use a spoon to slather peanut butter generously all over each pinecone. Spread bird seed out onto a paper plate and roll each pinecone into the birdseed. Hang feeders at various heights on tree branches.

birds

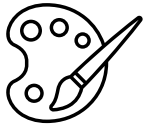
FLYING HIGH



Watch the video **Flying High**



Make a Clothespin Automaton



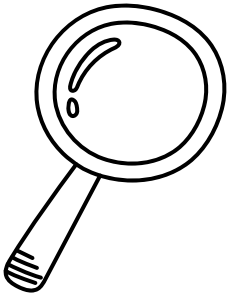
Create a Charley Harper inspired collage



Choose a book about flight to read together



Read about and participate in one of Audubon's programs like Lights Out or the Backyard Bird Count



Watch the video **Flying High**

Can you explain:

Airfoil

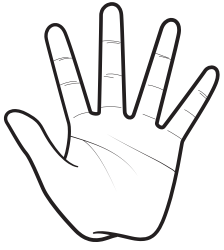
Lift

Thrust

Drag



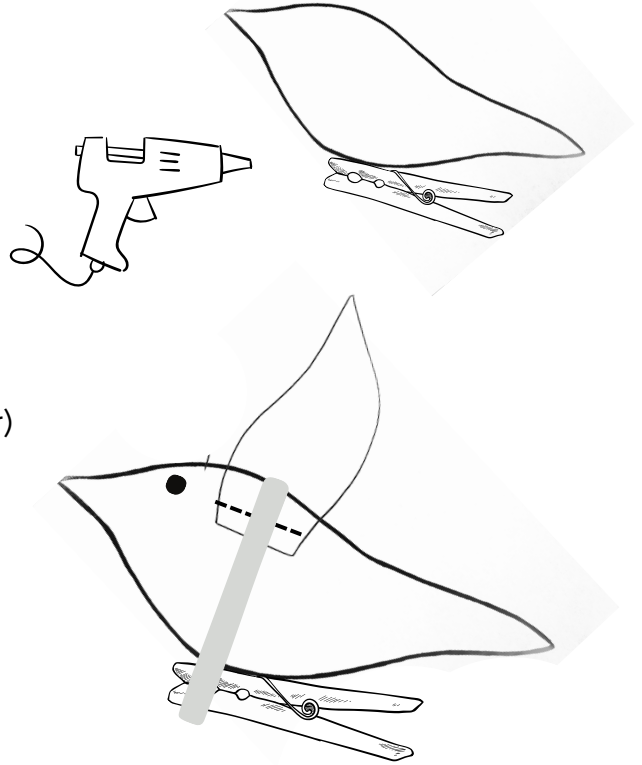
notes



clothespin automaton

materials

- pencil
- scissors
- hot glue gun with glue or tape
- clothespin
- printed templates (on heavy cardstock paper)
- markers or colored pencils



directions

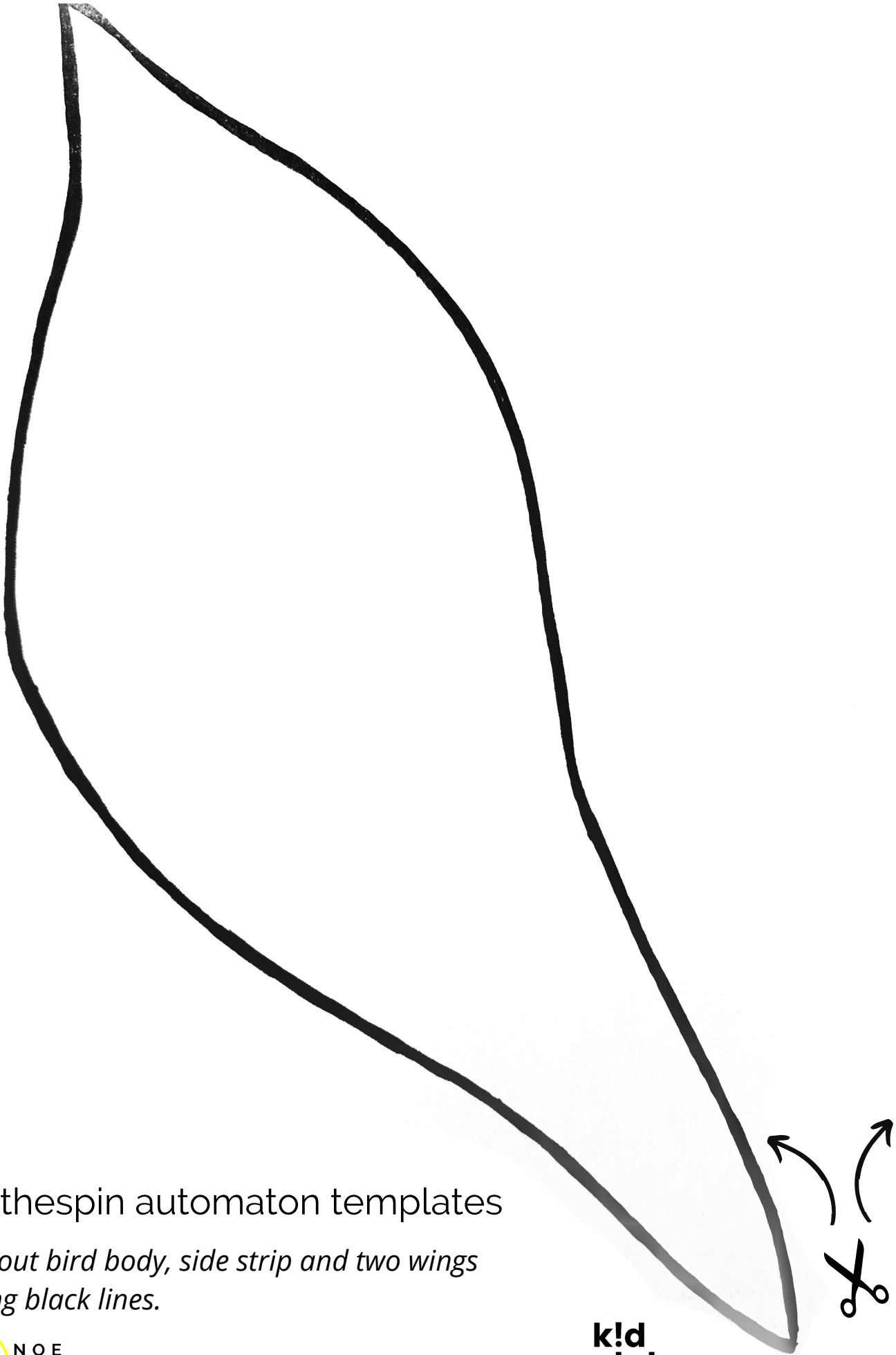
Print templates on heavy cardstock paper. Cut out each item along the black solid lines. Decorate your bird pieces however you'd like. Glue the main body segment to the clothespin as shown.

Fold wing pieces along the dotted lines and apply glue to the folded area to attach to the bird body. Repeat for the second wing.

Find the middle of the long paper strip and apply a small amount of glue to the bottom of the clothespin to attach the paper strip. (Important note: this paper strip should be placed near the front of the clothespin in order for the apparatus to work.).

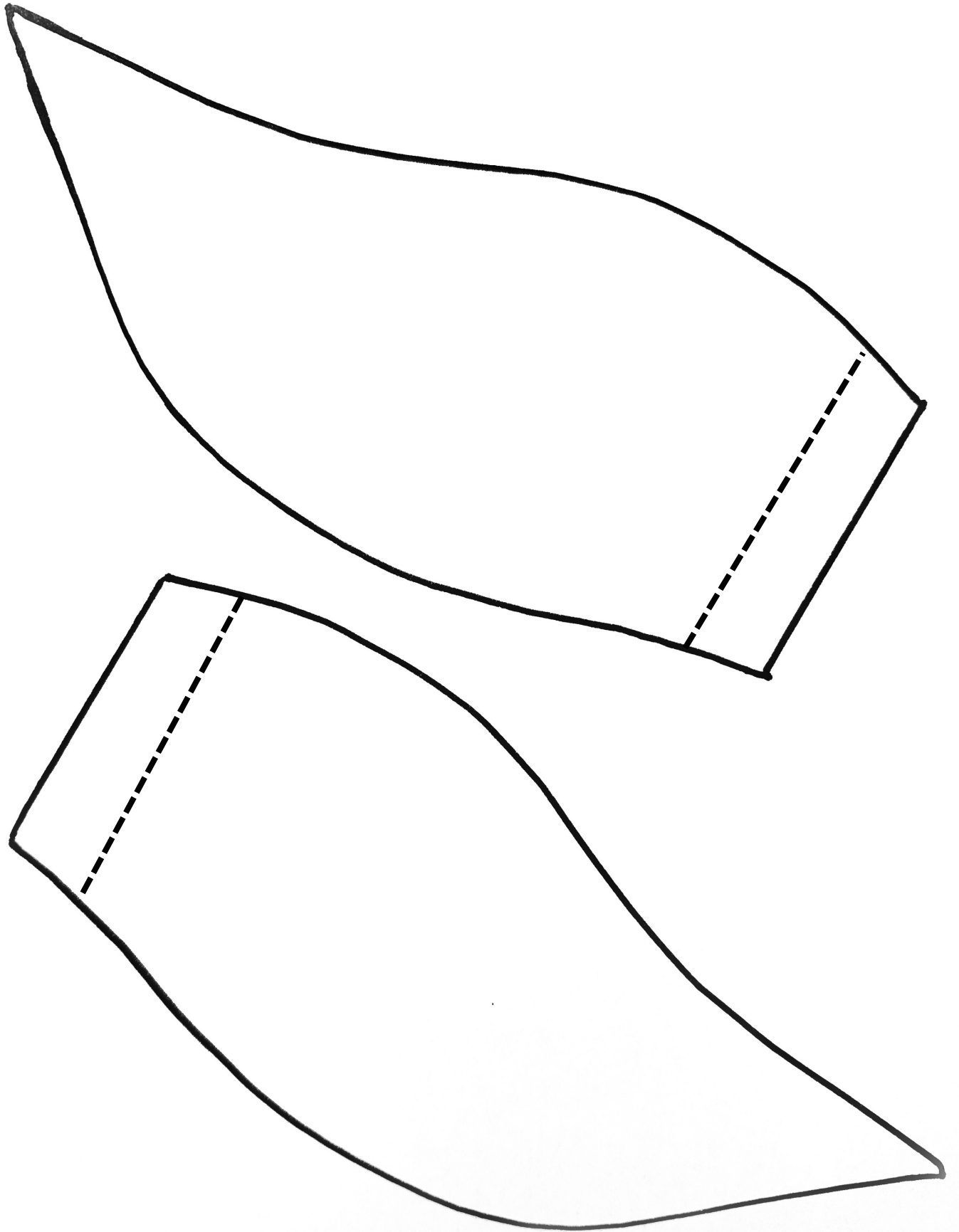
Put the wings in the upright position and apply glue at the top of the paper strip to attach to the underside of each wing.

Now it's time to test it out! When you press to open the clothespin, the paper strip should pull on the underside of the wings to fold the wings down.

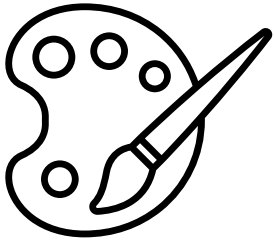


clothespin automaton templates

Cut out bird body, side strip and two wings along black lines.



clothespin automaton templates



Charley Harper inspired collage

materials

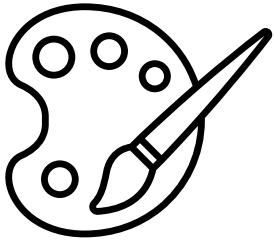
bird templates, printed on cardstock
scissors
glue
assorted pattern papers

directions

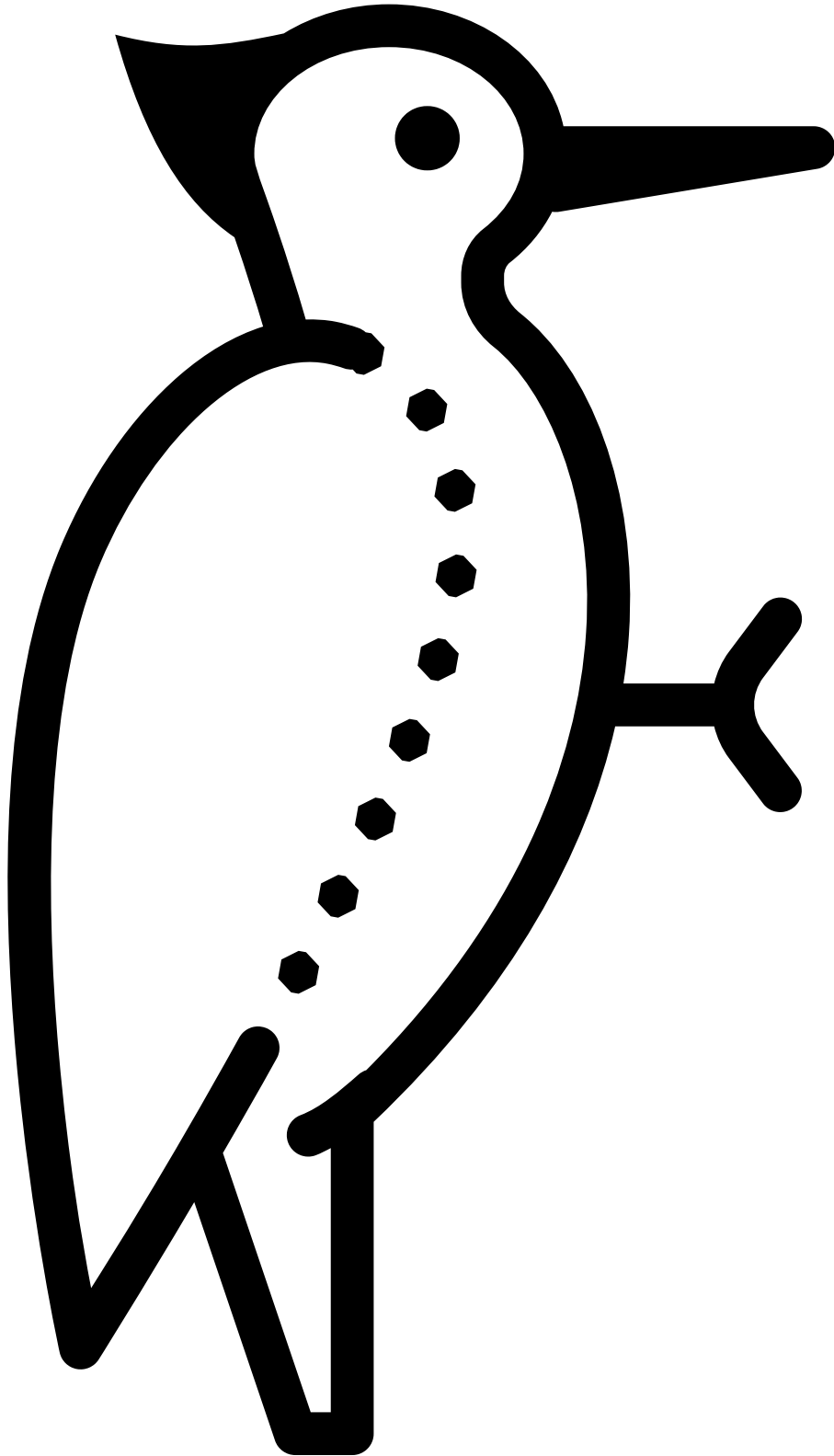
Cut and glue assorted patterned papers onto the bird templates to create bird collages.

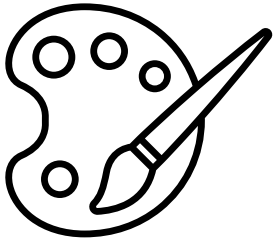


Charley Harper was a designer and illustrator with a unique and playful style. Some of his best known works depicted wildlife using minimal, colorful shapes mixed with patterns. For more about Harper's life and work, visit www.charleyharperartstudio.com

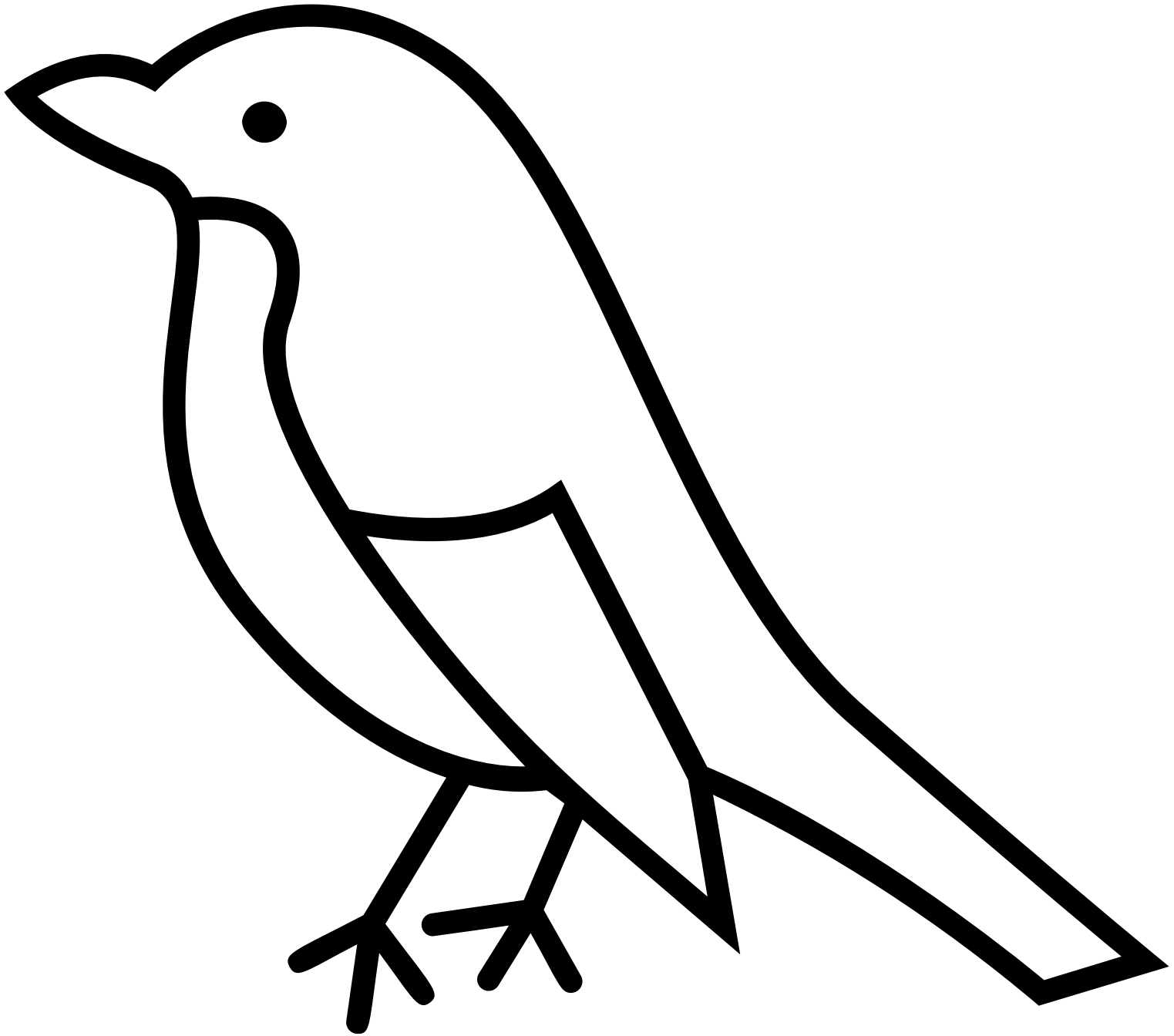


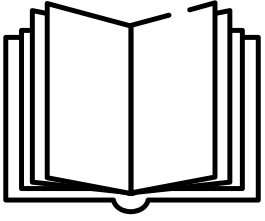
Charley Harper inspired collage





Charley Harper inspired collage





book list

Count the Birds by Charley Harper

Birds and Words by Charley Harper

Soaring with the Wind: The Bald Eagle by Gail Gibbons

Fantastic Press-Out Flying Birds by Richard Merrill

Why Should I Walk? I Can Fly! by Ann Ingalls and Rebecca Evans

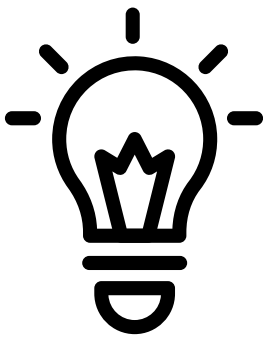
Bird Watch: What Will You Find? by Oana Befort

Birdy, How Do You Fly? by Robin Pan

Goggles: The Bear Who Dreamed of Flying by Jonathan Gunson

Aerospace Engineering and the Principles of Flight by Anne Rooney

How Do Birds Fly? by Melissa Stewart



learn & participate

Did you know there are special days and national programs set aside for learning about and caring for birds?

Lights Out

Many bird species require migration to survive and often, these long flights take place at night. Birds can quickly become disoriented, however, if they see bright lights (like from a city building, for example). Sadly, this has led to many bird deaths. The Audubon society has spearheaded a national campaign called 'Lights Out' - calling on business owners, city officials and even neighborhood residents to help minimize excess light, particularly during migratory months.

Read more about the program here and consider what you can do as a family, at your house and in your neighborhood, to participate and help spread the word.

www.audubon.org/lights-out-program

Backyard Bird Count

Calling all citizen scientists! Each year, for a few days in February, people all over the world participate in the "Great Backyard Bird Count" to spot and track bird sightings. This collected data helps scientists gauge how bird species are doing all around the world. Read more about the February event and how to keep track of your sightings:

www.birdcount.org

birds

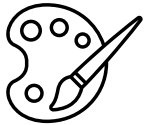
Flying Far



Watch the video **Flying Far**



Build a Chimney Swifts marble run



Create an Audobon inspired sketchbook



Choose a book about bird migration to read together



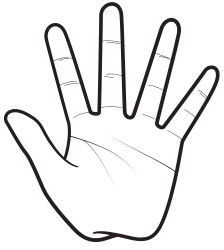
Read about and participate in World Migratory Bird Day



Watch the video **Flying Far**

What birds fly 
nearly 11,000 
miles to migrate?

notes



Chimney Swifts marble run

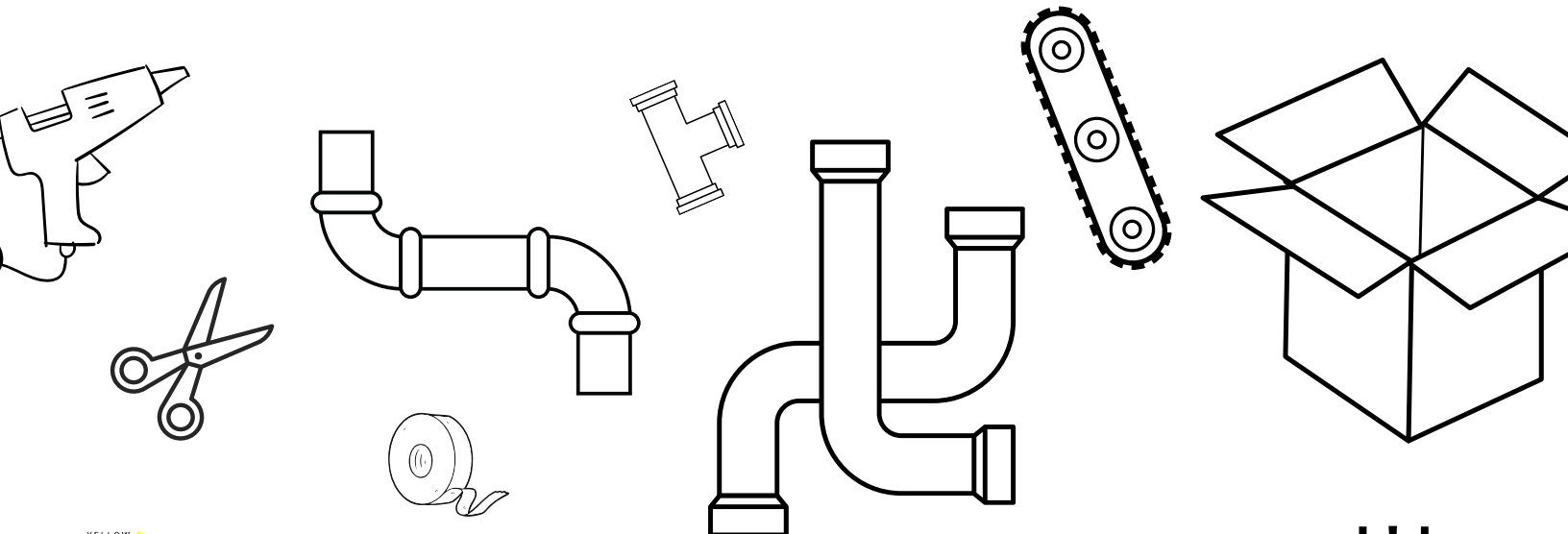
Breeding season is over for the Chimney Swifts in North America. Can you help the swifts migrate to South America and find a cozy, warm chimney for the winter months ahead?

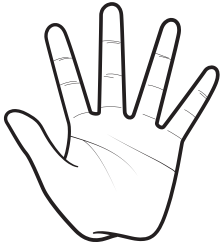
CHALLENGE

Build a successful marble run to illustrate the migratory flight path that Chimney Swifts take from North America to South America.

Your marble run must include:

- 8 or more magnet-backed pieces
- include 4 twists or turns
- have clear starting and finishing points
- creatively showcase some facts you've learned about Chimney Swifts





Chimney Swifts marble run

materials

XL magnetic board (or a \$13 oil drip pan from Auto Zone works well)*

pencils

scissors

low-temp glue gun with glue sticks

assorted cardboard scraps, heavy cardstock paper, craft foam, paper tubes, pool noodles, etc (gather recycled materials whenever possible)

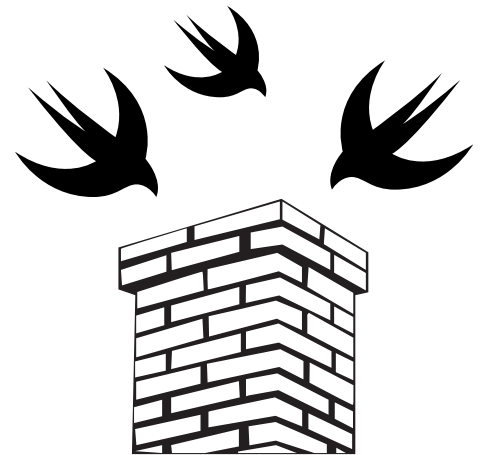
small to medium strength magnets (inexpensive packs from the Dollar Store or Walmart)

marbles, ping pong balls or small wiffle balls

printed handouts

directions

- sketch ideas
- build pieces
- test them!
- keep designing and redesigning pieces as needed
- create a start and finishing point and any details



LEARNING EXTENSION IDEAS

Art

Explore the work of naturalist and artist James John Audubon. If time allows, create a natural journal and create pencil drawings of Chimney Swifts.

Conservation science

Research how chimney swift populations are declining. What can we do to help?

Physics

Marble runs illustrate two key principles in physics: kinetic energy and potential energy. What do these principles mean and how do they apply to this project?

Geography

Identify these points on a map: North America, South America, Gulf of Mexico. Print the map and color the long migration route Chimney Swifts have to take.



CHIMNEY SWIFTS FACTS

Source: https://www.allaboutbirds.org/guide/Chimney_Swift/

"A bird best identified by silhouette, the smudge-gray Chimney Swift nimbly maneuvers over rooftops, fields, and rivers to catch insects. Its tiny body, curving wings, and stiff, shallow wingbeats give it a flight style as distinctive as its fluid, chattering call. This enigmatic little bird spends almost its entire life airborne. When it lands, it can't perch—it clings to vertical walls inside chimneys or in hollow trees or caves. This species has suffered sharp declines as chimneys fall into disuse across the continent."

Do they migrate?

"Chimney Swifts are among the most aerial of birds, flying almost constantly except when roosting overnight and nesting. When they do come to rest, they never sit on perches like most birds. Their long claws are suited only for clinging to the walls of chimneys and other vertical surfaces. During migration, thousands of swifts roost together in chimneys, funneling into them at dusk in spectacular tornado-like flocks.

Chimney Swifts migrate [from North America] to South America each winter flying across the Gulf of Mexico or skirting it along the Texas coast (a route they're more likely to take in spring than fall). Many swifts use one of three distinct flyways: the Atlantic coast, the east side of the Appalachians, and the Mississippi River. They fly high in the sky during the day and roost in chimneys at night."

Recommended sites for further research:


www.allaboutbirds.org
www.audobon.org
www.chimneyswifts.org

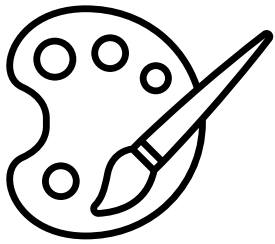


ideas





 Color the migratory path that Chimney Swifts take.
Label North America, South America and the Gulf of Mexico.



Audubon nature journal

materials

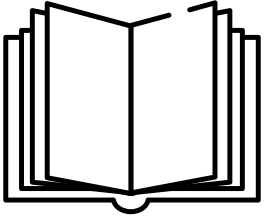
heavy cardstock paper or construction paper 9x12"
white copy paper, sized 8.5 x 11"
stapler
colored pencils
birds field guide



directions

Fold a sheet of cardstock or construction paper in half. Decorate your front and back covers if desired.
Fold several sheets of 8.5 x 11" white papers and staple everything together along the center fold. Take your journal along on nature walks or for your backyard adventures and record observations and drawings of birds you see.

John James Audubon was a French-American naturalist and artist, known for his studies and detailed illustrations of North American birds. He ambitiously set out to document as many birds as he could and was a forerunner in proving that birds migrate. During his field studies, he spent hours observing birds, making meticulous notes and drawings.



book list

Ruby's Birds by Mya Thompson

The Boy Who Drew Birds by Jacqueline Davies and Melissa Sweet

Why do Birds Cross the Oceans? by Baby Professor

How Do Birds Find Their Way? by Roma Gans and Paul Mirocha

The Peregrine's Journey by Madeleine Dunphy and Kristin Rest

Migration by Gail Gibbons

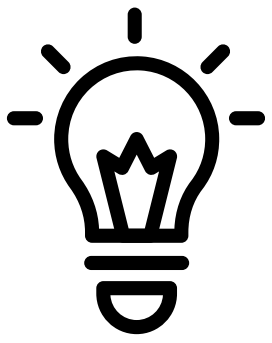
Tiny Bird: A Hummingbird's Amazing Journey by Robert Burleigh

Winter Survival: Animal Hibernation, Migration and Adaptation by L.R. Hanson

As the Crow Flies: A First Book of Maps by Gail Hartman

Counting Birds: The Idea That Helped Save Our Feathered Friends

by Heidi E.Y. Stemple



learn & participate

Did you know there are special days and national programs set aside for learning about and caring for birds?

World Migratory Bird Day

Every year, a day is set aside for conservation efforts of migratory birds during World Migratory Bird Day. Each year the theme changes, but it's always centered around how to protect bird habitats and many cities participate by offering educational programs. Read more about here:

www.migratorybirdday.org

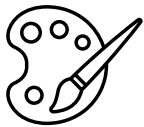
birds
OWLS



Watch the video **Owls**



Build an Owl cranky automaton



Air dry clay owls



Choose a book about owls to read together



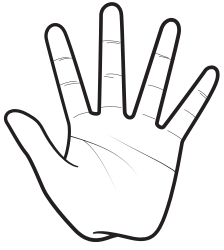
Research and build a nest box



Watch the video **Owls**

What makes
owls unique ?

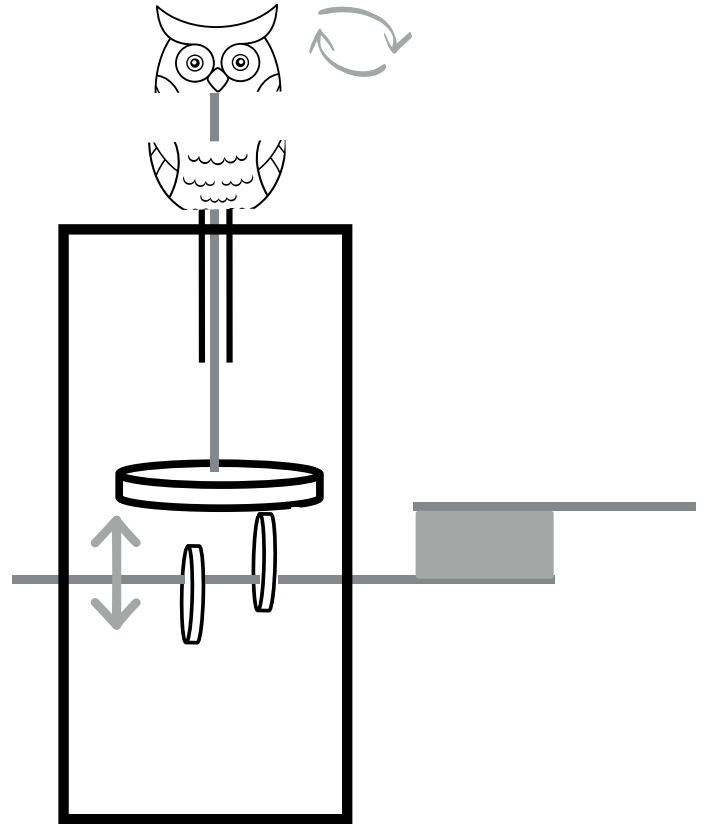
notes



build a cranky automaton

materials

shoebox
scissors
pencil
white or colored paper
colored pencils or markers
glue gun and glue sticks
plastic straw
2 wooden skewers
push pin or screw to puncture holes
cardboard scraps
ruler



directions

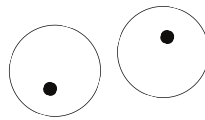
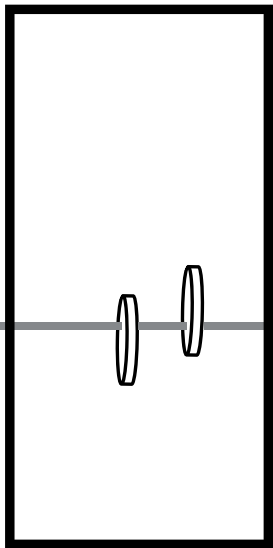
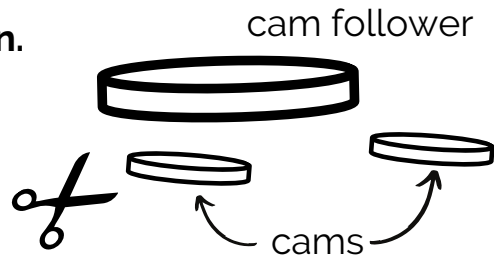
*Automata projects are fun engineering challenges for kids and adults alike! Project designs can range from simple to complex and the enjoyment and satisfaction comes from spending time tinkering and adjusting in order to get the desired results. Because of the complexity of the project, we recommend watching the second part of the accompanying video **OWLS** to see this tutorial.*

*For more detailed instructions and variations to build, we recommend visiting:
www.exploratorium.edu/tinkering/projects/cardboard-automata*

Gather your materials before you begin.

1

Draw a cam follower (a circle) about 2.5" in diameter on your cardboard and cut out. Next, draw 2 cams (small circles) about 1.5" in diameter each and cut out.

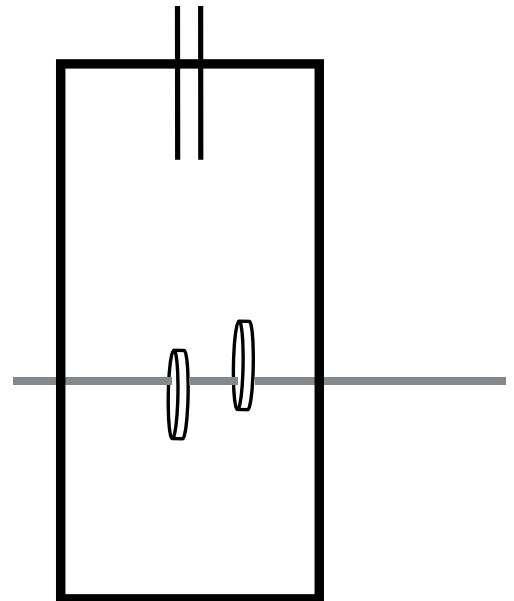


Draw a dot, slightly off-center on each of your cams and poke holes in each using a thumb tack or a screw. Next, poke a skewer stick through them and thread inside your shoebox, like shown.

2

3

Poke a hole in the top of the shoebox where you want the cam follower to be. Insert a piece of drinking straw. (The straw will extend above and below the shoebox edge to help stabilize the skewer stick.). Hot glue the drinking straw in place.

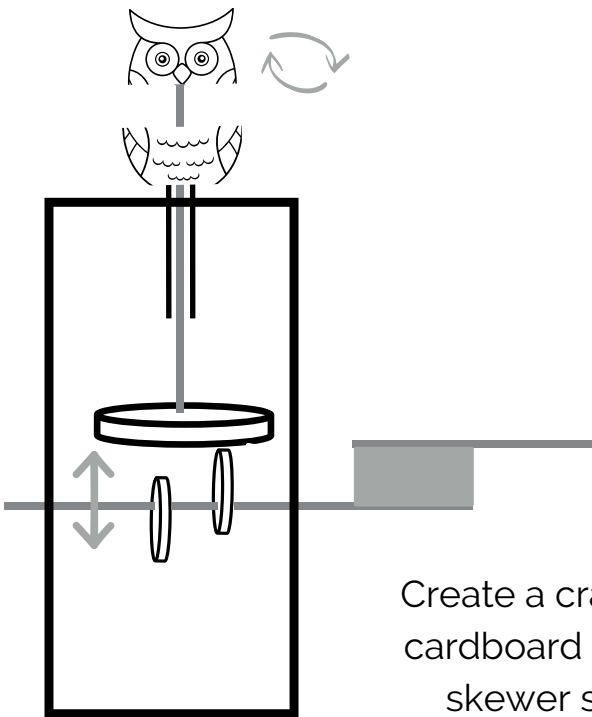
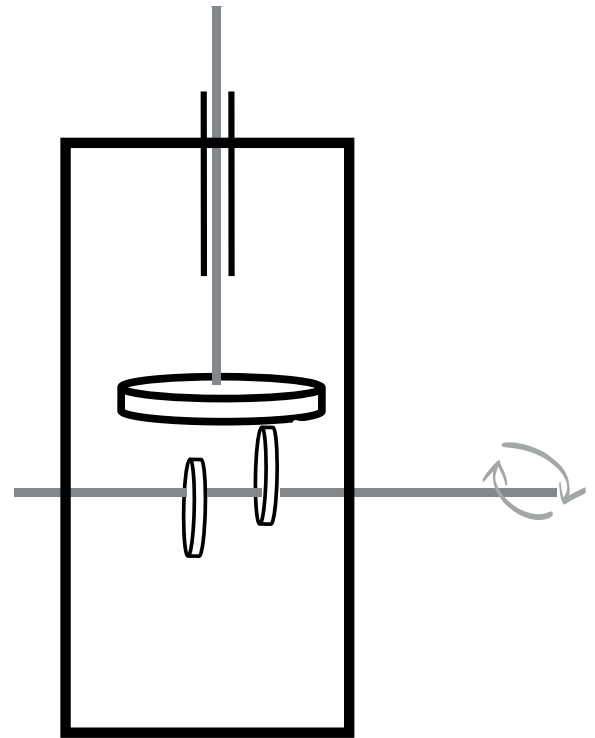


4

Insert a skewer stick through the straw, being sure the skewer is sticking out above and below the straw piece. Then glue the cam follower onto the end of the skewer.

5

Adjust the cams or cam follower however needed until the motion you're desiring is achieved when you turn the bottom skewer.

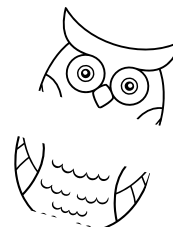


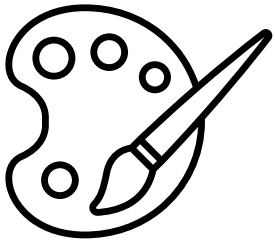
Create a cranky handle by glueing a small cardboard rectangle and another piece of skewer stick onto the skewer stick axle.

6

7

Continue to test the range of motion achieved on the top of the shoebox and tweak as necessary. Looking at the remaining materials you have on hand, design an owl whose head can move but whose body remains stationary. (Hint: try attaching a paper owl head to the skewer and an owl body to the straw)

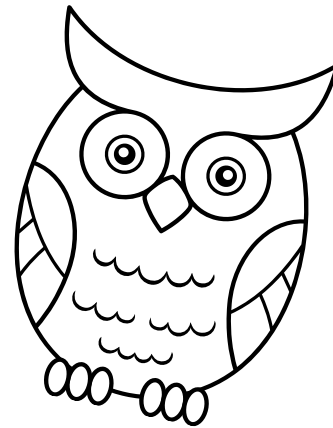
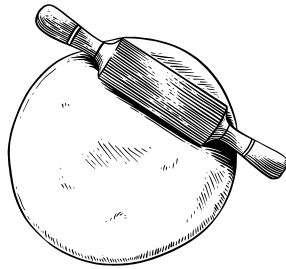




air dry clay owls

materials

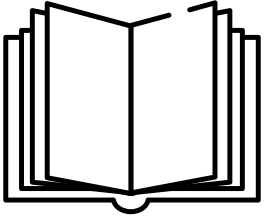
1 C cornstarch
1 C baking soda
1.5 C water
pot
paint + brushes



directions

Mix cornstarch and baking soda together. Put 1.5 C water in a pot on the stovetop over medium heat. When the water has warmed, stir in the cornstarch and baking soda mix, stirring constantly until there are no more lumps (about 5-7 minutes). Let cool.

Roll out the dough into ball shapes and begin designing your own owls. Allow to dry overnight before painting.



book list

All Things Owls for Kids by Animal Reads

National Geographic Readers: Owls by Laura Marsh

Owling: Enter the World of the Mysterious Birds of the Night by Mark Wilson

Owls by Gail Gibbons

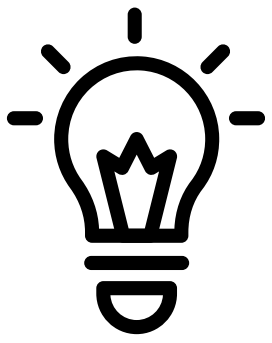
Exploring the World of Owls by Tracy C. Read

The Fantastic World of Birds of Prey by Paul Sweet

Ollie the Owl by Matel

Moonlight Animals by Elizabeth Golding

Who's There? A Bedtime Shadow Book by Heather Zschock

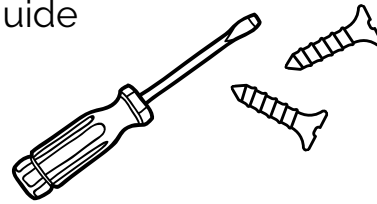


build a nest box

Encourage birds to nest in your yard with a wooden nest box

materials

printed nest box template
pencil
cedar, pine or other soft wood
corrosion resistant screws
miter saw
screwdriver
other hardware as outlined in the building guide



directions

Research which species of bird in your area would benefit from a nesting box using the website below. Print a template and gather the necessary building materials. Build the nest box and install at the proper height, as outlined in the specific guide.

Detailed information, including free templates and guides can be found at www.70birds.com