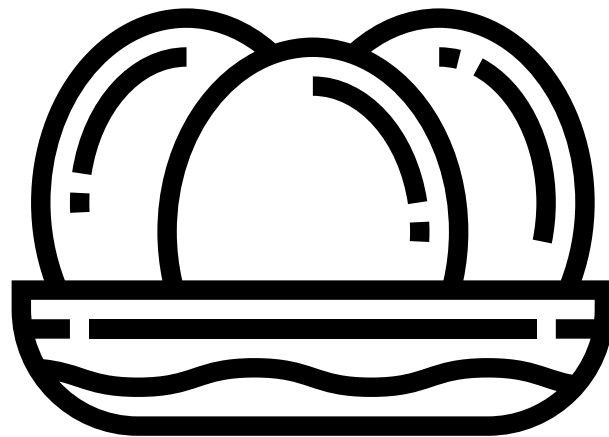


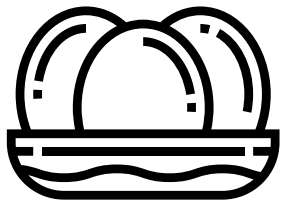


Presents

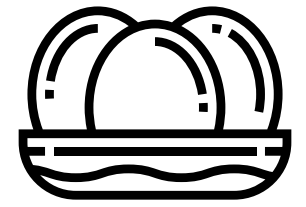
Habitat Engineering:

Nest Design!





Habitat Engineering

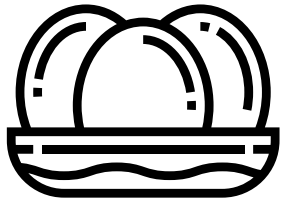


Animals across all walks of life build their homes using nothing more than discovered materials. From webs and hives, to dams and burrows, animal architects are busy at work all around us. Our backyard besties, such as birds, bees and spiders, have a huge impact on human life from the food we eat to the air we breathe!

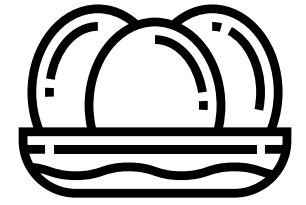
Unfortunately, many of our backyard best friends are disappearing! That's because they are losing their homes! In this lesson, we are going to explore habitat engineering!

In this lesson, we will learn about:

1. How to scavenge for natural building materials just like birds
2. How to build a bird's nest
3. Test our nest for baby bird safety
4. Test our nest against wind and rain
5. Explore how beak shapes impact nest design



Habitat Engineering



Activity #1: Nature Scavenger Hunt!

Unlike humans who can go to the store to buy materials, birds have to scavenge for nest-building supplies! In this activity, you are going to search the great outdoors for materials to build your nest.

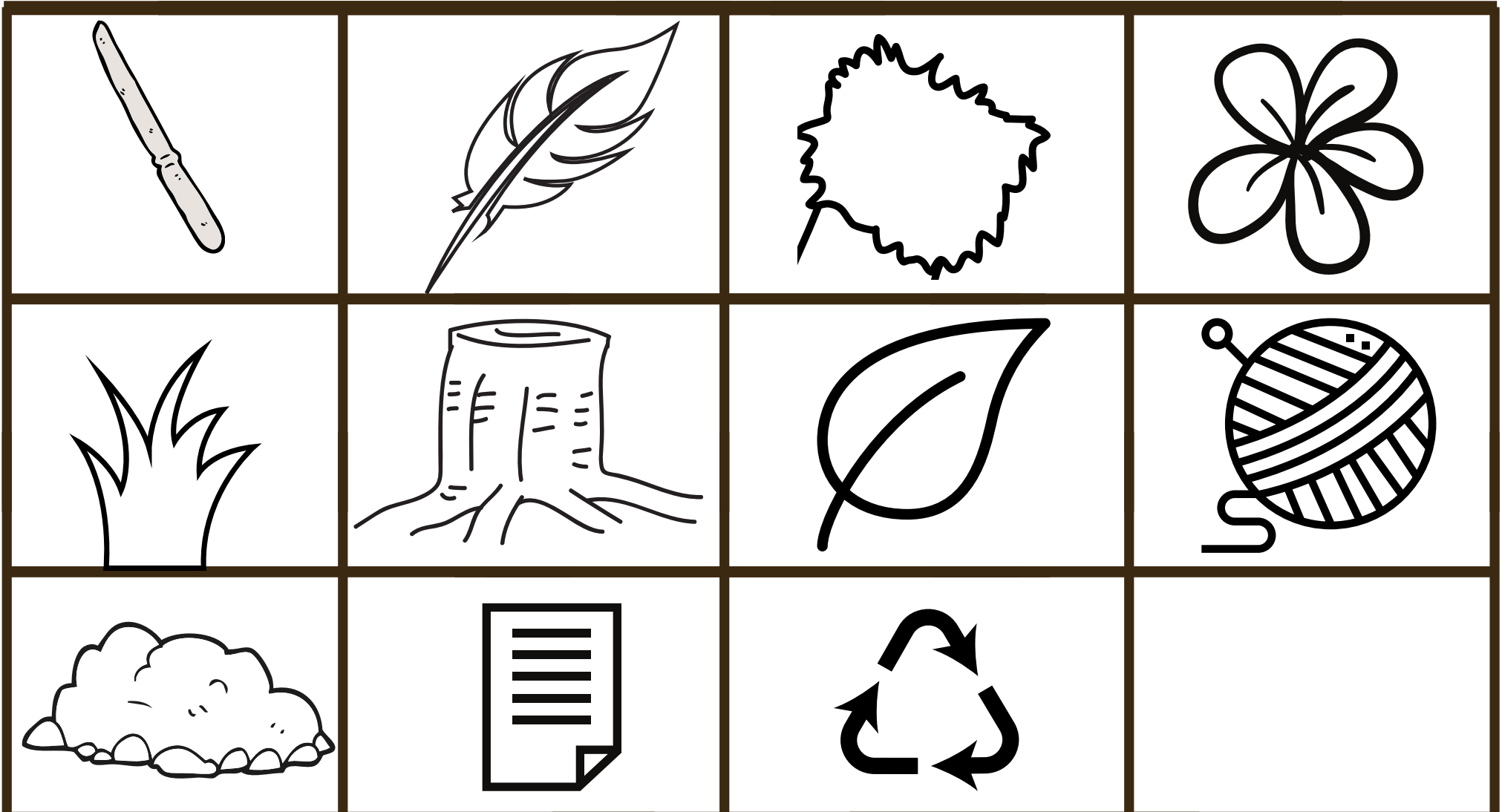
Scavenger Hunt List

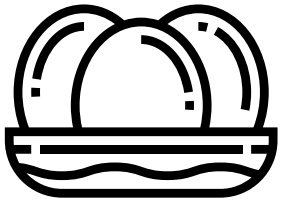
- Sticks
- Grass or straw
- Flowers
- Feathers
- Dirt
- Fur
- String
- Bark
- Paper
- Recycled Materials (things left behind by humans)

Nature Scavenger Hunt

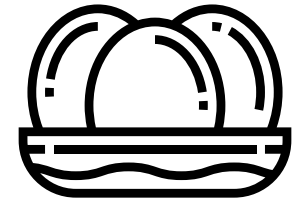
When you find an item, color in the box.

Fill in the empty box with your own unique discovery!





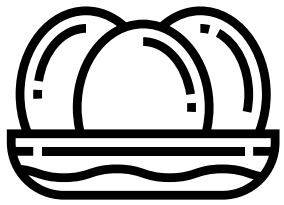
Habitat Engineering



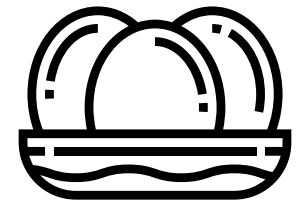
Activity #1: Nature Scavenger Hunt Wrap-Up

In this activity, we learned how to scavenge for nest materials like a bird. You may have noticed that some of these items were really hard to find, and some may have been really easy.

In your explorations, did you notice many items left behind by humans like plastic water bottles, receipts, and trash? Some times these items can be recycled by animals, but often this litter is bad for their habitats so be mindful of your own trash when you're in nature!



Habitat Engineering

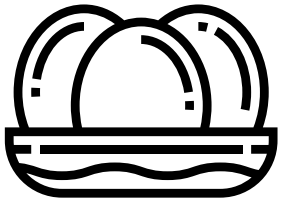


Activity #2: Nest Building

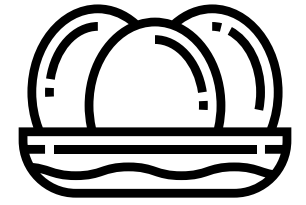
Building a nest is a really important part of a bird's life. It is the home where they sleep, where they raise babies and how they find their mate!

When birds build nests they make sure it is big enough for them to sit and lay eggs, and soft enough to be comfortable to sleep.

In this activity, you are going to build a bird's nest using only the materials you found in your scavenger hunt in Activity #1. Be sure to only use found materials, that is part of the challenge!



Habitat Engineering



Activity #2: Nest Building

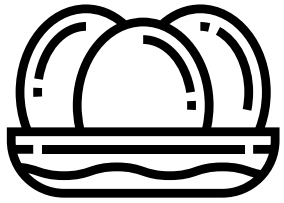
In this activity, you are going to build a bird's nest using only the materials you found in your scavenger hunt.

Materials

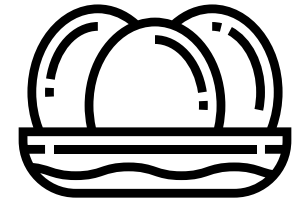
- Sticks
- Grass or straw
- Flowers
- Feathers
- Dirt + water
- Fur
- String
- Bark
- Paper
- Recycled Materials (things left behind by humans)

Directions:

1. Mix the dirt with water to make mud to help your nest stay together
2. Build the nest frame. Lay twigs around in a circle.
3. Using grass or string, tie these twigs together
4. Use twigs and mud to build up the walls, weaving the twigs into the base
5. Use additional materials like bark and grass to make a comfortable nest



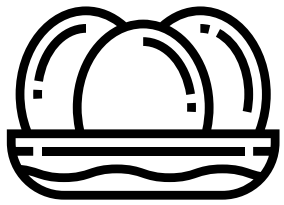
Habitat Engineering



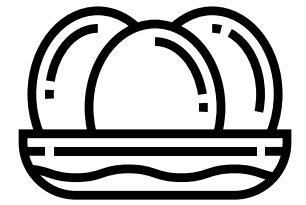
Activity #2: Nest Building

Draw a picture of your nest!

A large, empty rectangular box with a thin gray border, intended for drawing a picture of a nest.



Habitat Engineering

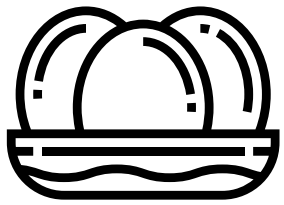


Activity #2: Nest Building Wrap-Up

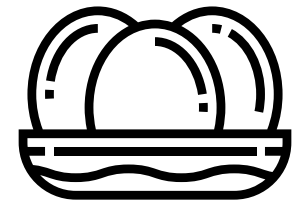
In this activity, we learned that build a nest is hard work! Without materials like glue, building is really tricky. It requires patience and hard-work.

Unlike humans, birds don't even have hands. They use their beaks to place and arrange the materials for their nests. They also don't have tools like hammers, saws, and nails like we do to build our houses.

Birds and other habitat builders are really good engineers!



Habitat Engineering



Activity #3: Nest Test: Egg Safety!

Birds use nests to lay their eggs. These eggs eventually hatch into baby birds, so keeping their eggs safe is really important.

How many eggs a bird lays depends on lots of things like their species, how old the bird is, and how much food the bird has.

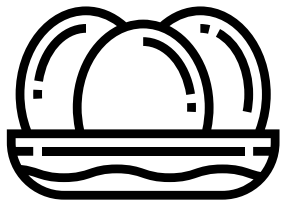
For this activity, we are going to use the Cardinal as our model. A Cardinal is a beautiful red bird that lays about 4 eggs.

In this activity, we are going to see if our nest can safely hold the weight for 4 eggs without falling apart or having eggs falling out.

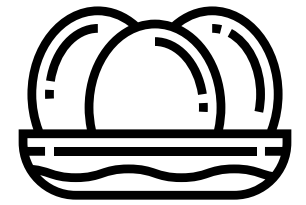
Do you think your nest is up to the egg test?

My hypothesis:

I think my nest can handle **1** **2** **3** **4** **more** eggs!



Habitat Engineering



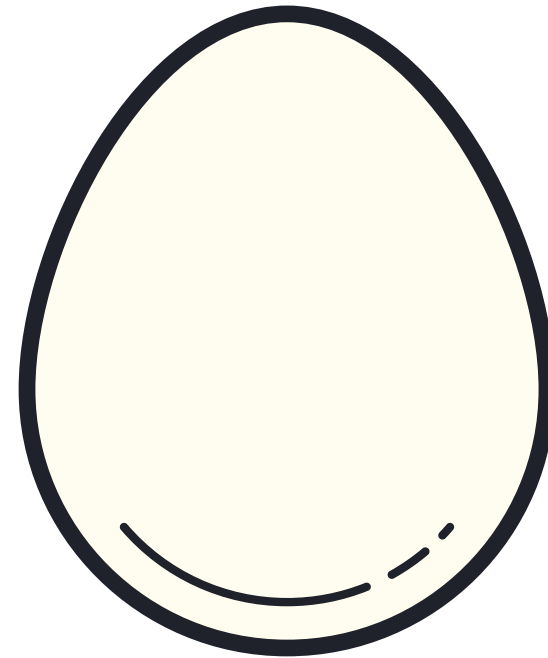
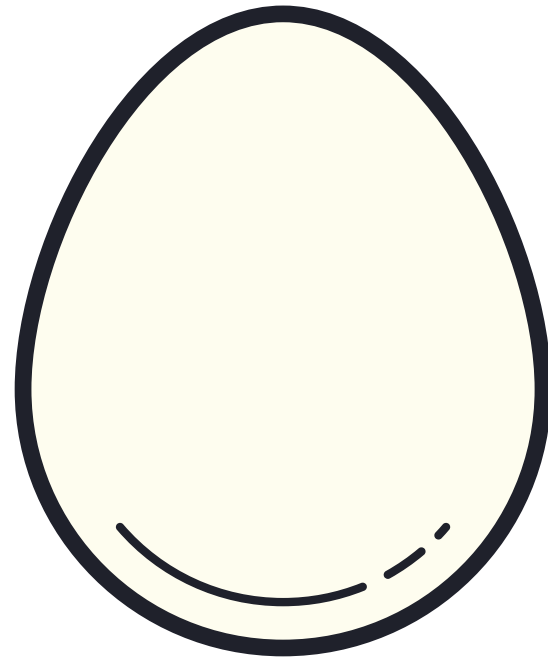
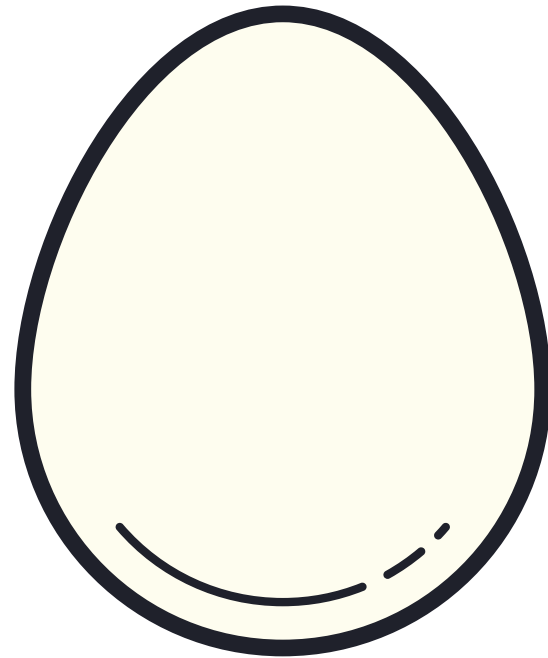
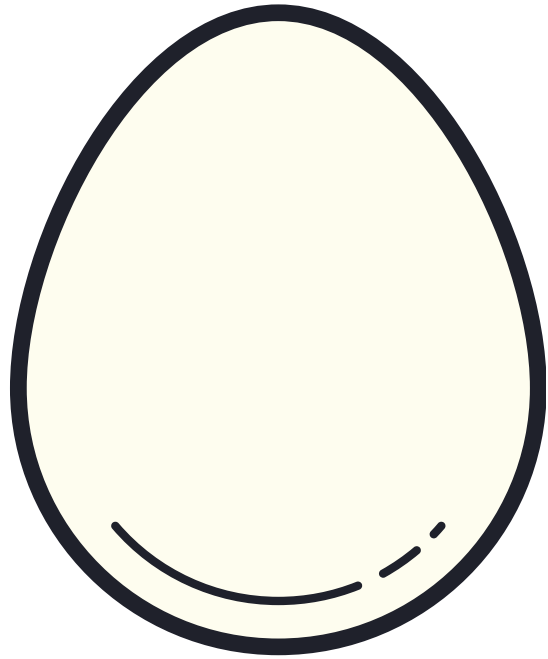
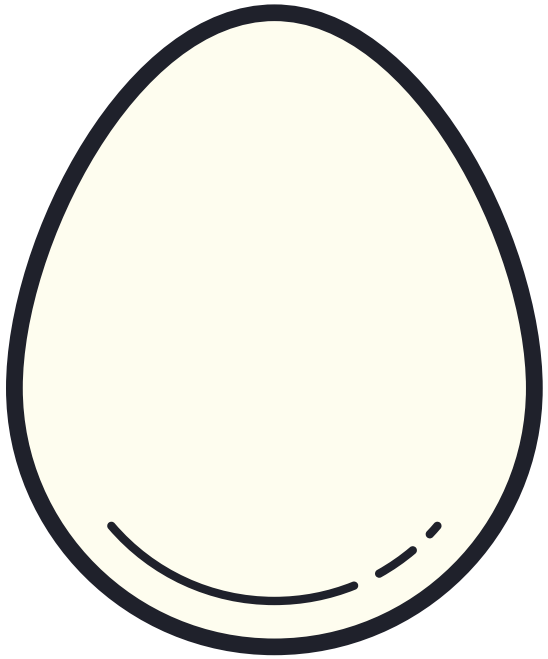
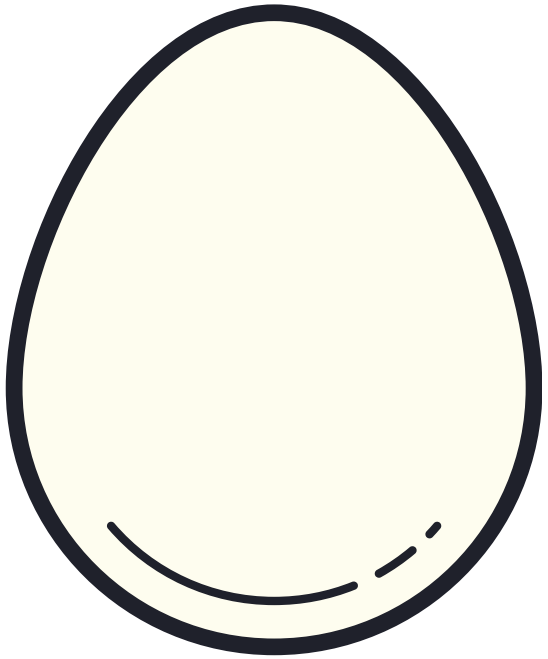
Activity #3: Nest Test: Egg Safety!

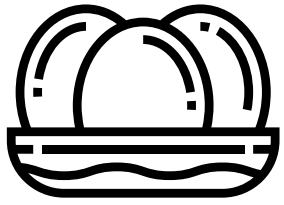
Materials

- Books
- Nest from Activity # 2
- Hard-boiled eggs (4 or more)

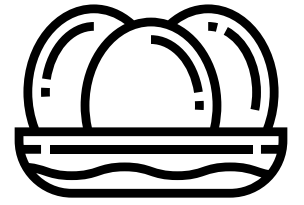
Directions:

1. Stack two piles of books of about equal height
2. Place your nest so just the outer edges of the nest are supported by the books and the middle is unsupported.
3. Slowly, place hard-boiled eggs into the center of the nest
4. Count how many eggs the nest can hold



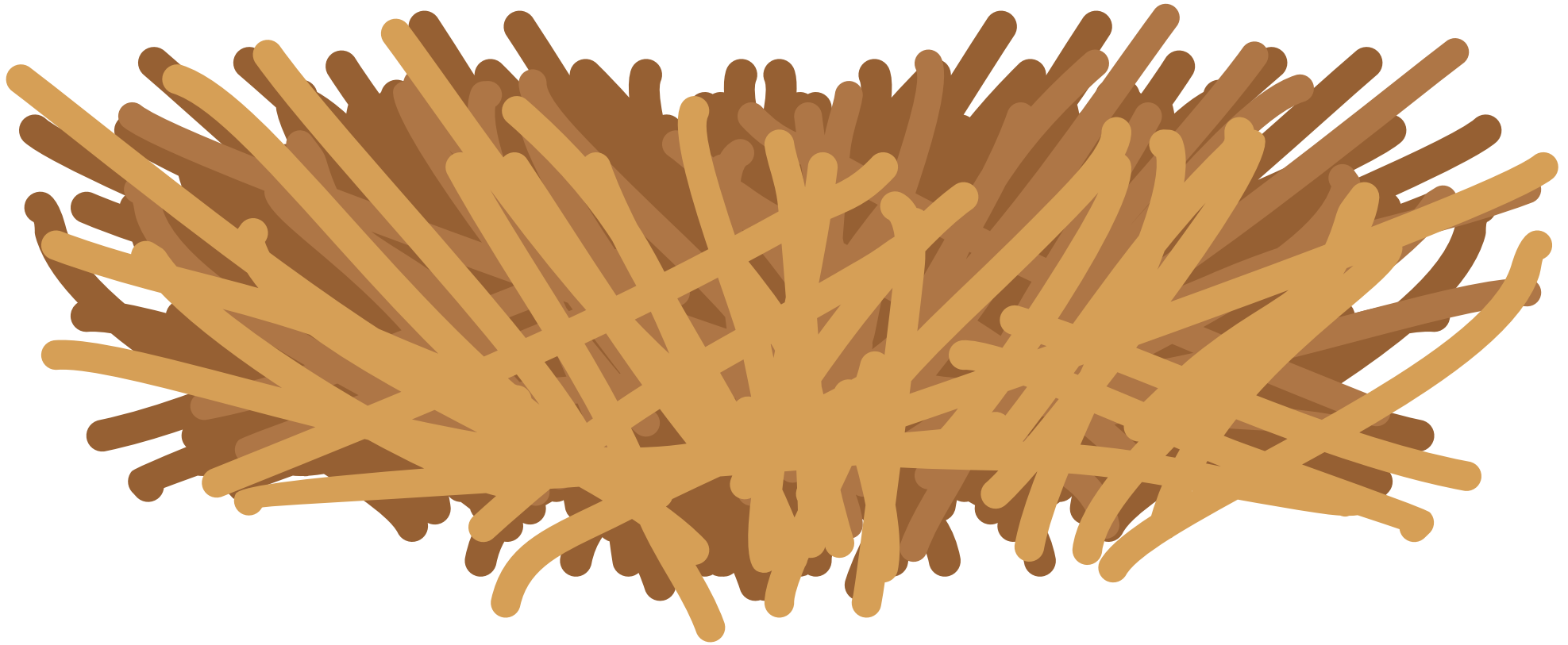


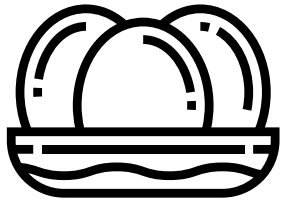
Habitat Engineering



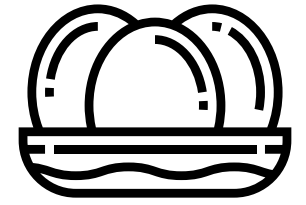
Activity #3: Nest Test: Egg Safety!

Cut out the eggs and nest. For every egg your nest could hold, place a paper egg in your paper nest.





Habitat Engineering

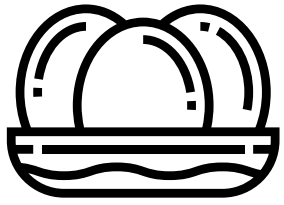


Activity #3: Nest Test: Egg Safety! Wrap-Up

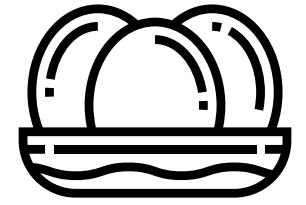
In this experiment, we learned that birds use nests to hold their eggs. The eggs hatch become baby birds, so keeping the eggs safe is really important to mommy birds.

Mommy birds make sure to build their nest so that they can support the weight of many eggs without falling through or out.

Because humans don't have the instincts that birds have for nest safety, we have to test our nests to make sure it is sturdy enough for a mommy and her babies before we leave it outside to be a new home.



Habitat Engineering

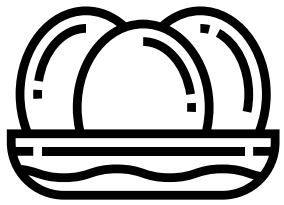


Activity #4: Nest Test: Mother Nature

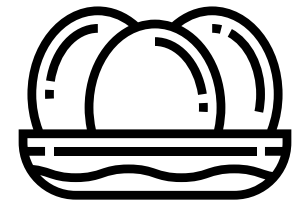
In this activity, we will learn about the types of weather like rain and wind that birds' nests need to be able to survive.

Weather can have a big impact on a bird's home. They have to build a nest that is safe enough to hold their babies and eggs but also allows water to drain out and wind to pass through it without breaking it.

Weather is just one of the many challenges that habitat engineers face when they build their homes!



Habitat Engineering



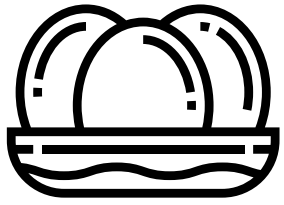
Activity #4: Nest Test: Mother Nature

Materials

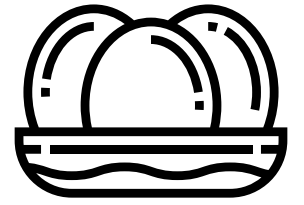
- Nest from Experiment #3 with hard-boiled eggs
- Hair Dryer
- Hose

Directions:

1. Find a bush, shrub or tree with low branches.
2. Carefully place your nest with the eggs on a branch so that it does not tip over or fall out
3. First, test your nest against wind. Turn the hair dryer on a low-setting and move the hair dryer back and forth over the nest.
4. If the nest survives without falling, turn the hair dryer up on high. If the nest falls out of the tree or falls apart, fix and try again.
5. Repeat Steps 3 and 4 until your nest can hold up to 60 seconds of a hair dryer on high
6. Now, test for rain. If your hose has a nozzle, turn to shower. Start with just light pressure, but gradually build. If the nest falls out of the tree or falls apart, fix and repeat until the nest holds up for 60 seconds of "rain"



Habitat Engineering



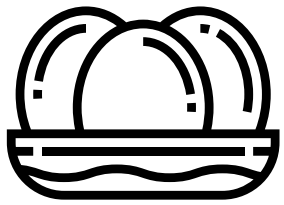
Activity #4: Nest Test: Mother Nature

Every 30 seconds, check your nest to see if it is still okay. If it is, put a check mark in the box. If not, fix your nest and try again!

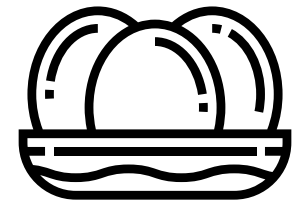
30 seconds

60 seconds





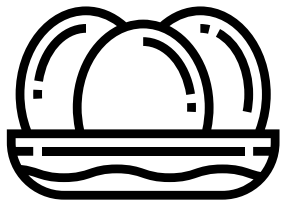
Habitat Engineering



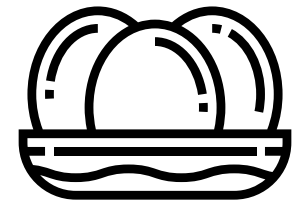
Activity #5: STEMSpark Stumper Building with Beaks

In this lesson, we have been building a bird's nest. We use our hands to build the nest, but birds use their beaks.

Beaks come in lots of shapes and sizes. A bird's beak changes what kind of nest they build and how they build it. In this activity, you are going to use common household objects like tweezers and tongs to serve as our beak so we can investigate how to build a nest like a bird



Habitat Engineering



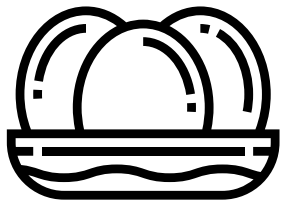
Activity #5: STEMSpark Stumper Building with Beaks

Materials

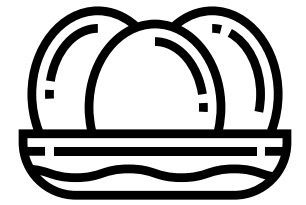
- Tweezers or tongs
- Sticks
- Grass or straw
- Flowers
- Feathers
- Dirt/mud
- Fur
- String
- Bark
- Paper
- Recycled Materials (things left behind by humans)

Directions:

1. Using only your tweezers or tongs, build the base of the nest and place twigs around in a circle.
2. Use grass or string to tie the twigs together.
3. Build up the nest walls by weaving twigs into the base and sticking it together with mud.
4. Use additional materials like straw or grass to make a comfortable nest.



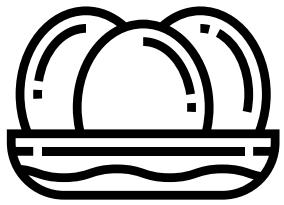
Habitat Engineering



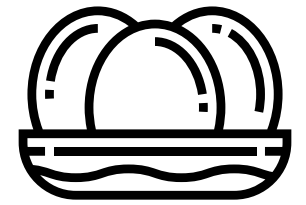
Activity #5: STEMSpark Stumper Building with Beaks

In this lesson, we explored building a nest the bird way, with a beak! This engineering challenge highlights how lucky we are as humans to have thumbs that help us hold things!

Birds don't have thumbs, so they need to use their beaks. Bird beaks come in all different shapes and sizes which changes the types of nests birds build and how they build their nest.



Habitat Engineering



Lesson Exit Ticket

1. Birds use **natural / store-bought** materials to build their nest
2. **Sticks/ Glue** is a big part of a bird's nest
3. Mommy birds lay **eggs / feathers** in their nests.
4. Nests need to be able to stay together even in wind and **sunlight rain.**
5. Bird use their **beaks / thumbs** to build nests