



Spring brings a wave of change to the natural world. The weather shifts, plants return to active growth, and animals adjust their behavior as the season unfolds.

In this packet, you'll explore the science behind these springtime changes. You'll ask questions, test ideas, and model real-world systems as you investigate plant processes, animal behavior, and motion. These activities invite you to think like a scientist by observing patterns, experimenting, and drawing conclusions about the spring season.

This packet includes...

- Exploring Bird Nests
- Build a Bug Hotel
- Discovering Photosynthesis
- Garden Design Challenge
- Launch Into Spring
- Frog Jump Origami
- Spring Crossword



Explore More

Looking for more ways to celebrate spring? Try one of these extensions!



Spring Cleaning: Organize a neighborhood or park clean-up with friends or family. Pay attention to the types of litter you find and consider how seasonal changes affect waste and the environment.



Pollinator Project: Visit a local plant nursery to learn which native plants attract pollinators. Design and start a small garden to help support bees, butterflies, and other pollinators in your area.



Composting in Action: Explore how composting works and why it matters. Use a reliable source (try searching “EPA compost at home”) to learn best practices, then start or contribute to a compost system at home or in your community.



Directions: In this activity, you will design and build a model bird nest. As you read, pay attention to how different nest types help birds' eggs survive. You will use this information to guide your own design.



Cup Nest

Birds do not all build the same kind of nest. The shape, size, and location of a nest depend on where the bird lives and what challenges it faces. A nest must protect eggs from weather, predators, and falling. Over time, birds have developed different nest designs that help their young survive.



Platform Nest

One common nest type is the **cup nest**. These nests are round and shaped like a bowl. Small birds often build them in tree branches using grass, twigs, mud, and soft materials. The raised sides help keep eggs from rolling out.



Hanging Nest

Larger birds, such as hawks and eagles, build **platform nests**. These nests are wide and flat, made from thick sticks. Platform nests must support more weight, since large birds and their chicks are heavier.

Some birds build nests that hang below branches. These **hanging nests** are woven tightly and are difficult for predators to reach.



Ground Nest

Other birds build nests on the ground. Instead of building tall walls, **ground-nesting** birds rely on **camouflage**. Their eggs are often speckled so they blend in with soil or rocks.

Some birds, such as woodpeckers, use **cavity nests** inside tree trunks. The solid walls of the tree provide strong protection from wind and rain.



Cavity Nest

Each nest type solves a different problem. Birds choose designs that match their habitat, body size, and safety needs. When we study bird nests, we can see how structure and environment work together. Birds are not just building homes; they are building for survival.



Build a Nest Challenge

Step 1: Design and Gather Materials

Choose one type of nest to build:

- Cup
- Hanging
- Platform



Now, gather the materials you will use.

You may use household materials (such as recyclables, paper, string, fabric, or craft supplies) or safe natural materials (such as twigs, grass, or leaves).



List the materials you collected:

Why are these materials a good choice for your nest type?

Draw a diagram of your nest design before you build it. Label important parts.



Step 2: Build and Test

Build your nest using the materials you collected.

When your nest is complete, you will test it to see if it can survive real-world challenges. Bird nests must withstand **movement**, **wind**, and **weight**. All nests must pass the Shake Test and Wind Test. Platform nests must also pass the Load Test.

Place three small “eggs” (rocks, pom-poms, or paper balls) inside your nest before testing.

Test 1: The Shake Test - Movement

Nests built in trees move when branches sway.

- If you built a cup or platform nest, place it on a table.
If you built a hanging nest, hang it from a safe support.
- Gently shake the table or support for five seconds.

Did the nest stay together?

Yes No

Did the eggs stay in the nest?

Yes No

Test 2: The Wind Test - Weather

Bird nests must survive wind and storms.

- Blow air toward the nest or use a fan on low speed for five seconds.
For hanging nests, allow it to swing naturally.

Did the nest stay together?

Yes No

Did the eggs stay in the nest?

Yes No

Test 3: The Load Test (platform nests only)

Large birds build nests that must support heavy weight.

- Add extra weight, such as small rocks.
- Hold for 10 seconds.

Did the nest support the weight without collapsing?

Yes No

Step 3: Reflect

Which test was most challenging for your nest? Why?

If you were to rebuild your nest, what would you do differently?



Instructions:

1. Start with the base of the bug hotel. You can build a simple wooden box or use a premade wooden crate. Make sure whatever you choose will hold up to the elements without risking harm to the environment.
2. Gather your materials and start working them into the base. Make sure to give your bug friends lots of little hiding places inside your hotel!
3. Get creative to fill your bug hotel! You may have to rearrange things a few times to get it to look the way you want. Take a look at the pictures below for some inspiration!
4. Figure out where you're going to put your bug hotel. Find a nice, dark place with a bit of shelter. If you don't have space near your home, ask an adult about talking to the park service. Maybe you can set your bug hotel up at a local park!



Now that your hotel is set up, you'll start getting some visitors! With an adult's permission, use the internet to research what bugs are visiting, or check out a bug guide from your local library!



In this investigation, you will follow the scientific method to gather observable evidence and determine whether photosynthesis is occurring in plant leaves.

Step 1: Research Question

What observable evidence indicates that photosynthesis is occurring in plant leaves?

Step 2: Background Information

During photosynthesis, plants take in carbon dioxide (CO_2) and water (H_2O). Using energy from sunlight, a series of chemical reactions rearranges these molecules. The water is transformed into oxygen, and the carbon dioxide is converted into glucose.



Glucose is the plant's food. It stores chemical energy that the plant uses for growth and other life processes. The oxygen is released into the atmosphere as a byproduct of this process.

Step 3: Construct a Hypothesis

In this investigation, you will submerge plant leaves in water and place them in sunlight. Based on the background information, write a hypothesis predicting what you expect to observe if photosynthesis is occurring. Think: What might happen on the surface of the leaves if oxygen is produced?

Use an **if-then-because** format. **Example structure:** If submerged leaves are exposed to sunlight, then _____, because _____.

My hypothesis:

Step 4: Experiment

Supplies:

- Fresh leaves from a tree or plant
- Room temperature water
- Clear bowl or container
- Small, heavy objects to weigh leaves down

Setting Up:

1. Fill the clear bowl or container with room temperature water.
2. Gently place the leaves in the water in a single layer. Make sure they are fully submerged. If the leaves float, place a small, heavy object on them to help hold the leaves under the water.
3. Put the bowl in a sunny spot. Wait for two to three hours.





Step 5: Analyze Data

After two to three hours, carefully **observe** the leaves and record detailed observations. Be specific.

Include...

- What you see on the surface of the leaves
- Any changes in the water
- Where any changes appear
- A labeled sketch, if helpful

Then, answer the following questions:

What observable evidence suggests that photosynthesis occurred in this experiment?

How does your observation connect to the background information?

Step 6: Draw a Conclusion

Claim: State whether your hypothesis was supported or not supported.

Evidence: Describe specific observations from your investigation. (What did you see? Where? How much?)

Reasoning: Explain how your evidence connects to photosynthesis. Why does your observation support or not support your hypothesis?



You've been asked to design a spring garden to create space for planting and relaxing. The yard has limited space, and materials cost money, so your design must be both creative and practical. You will choose garden elements, place them on a scale drawing, and calculate the materials needed.

Element	Shape	Size
Raised vegetable bed	Rectangle	Area: 80 ft ²
Raised vegetable bed	Rectangle	Perimeter: 18 ft
Flower bed	Rectangle	Area: 18 ft ²
Flower bed	Rectangle	Perimeter: 20 ft
Patio	Rectangle	Area: 80 ft ²
Compost area	Square	Perimeter: 20 ft
Fire pit area with seating	Circle	Radius: 6 ft
Water feature	Circle	Radius: 3 ft



Step 1: Design Your Garden Layout

You must include every element listed in the menu above in your design.

- Draw each element on the grid using the correct dimensions. One item is already placed as an example.
- Make sure all elements fit completely within the yard.
- Leave at least 3 feet of open space between every element.

You may decide where to place each item, but all items must be included.

Step 2: Calculate Materials

Answer the following questions:

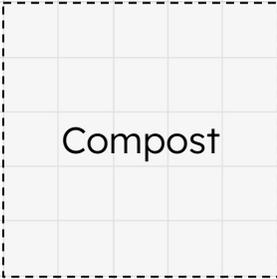
1. What is the total planting area in your design (flowers and vegetables)?
2. How many linear feet of border material would be needed to surround all planting beds?
3. If mulch costs \$0.50 per square foot, what is the total cost to cover your planting beds?



Activity
Garden Design Challenge

Science of Spring
9-12 Activities

1 square = 1 ft²





In this activity, you will design and build a cotton ball launcher. Act like an engineer as you build, test, and improve your design to make a cotton ball travel as far as possible.

Read through all instructions and get permission from a guardian before you begin!

Materials:

- 10 craft sticks
- 5-10 rubber bands
- Spoon
- Cotton balls
- Ruler or measuring tape (optional)



Instructions:

1. Stack five craft sticks. Wrap a rubber band around each end to make your base.
2. Stack two craft sticks and wrap a rubber band around **one end only**. This is your throwing arm.
3. Slide the large stack of sticks in between the two stacked sticks of the throwing arm until it almost reaches the rubber band. This will create a lever.
4. Attach the spoon to the top stick with one to two rubber bands. The bowl of the spoon should stick out past the base.
5. Place a cotton ball in the bowl of the spoon. Hold the base down on a flat surface. Press down on the bowl of the spoon and release to launch.
6. Test your launcher.
 - a. Which direction did the cotton ball go?
 - b. How far did it travel? Measure, if you can.
7. Improve your design by changing one thing at a time before testing again. Try to get your ball to go as far as possible. Some changes you could test:
 - a. Make the stack of craft sticks bigger or smaller
 - b. Move the large stack of craft sticks closer or further from the rubber band holding your throwing arm together
 - c. Use a lighter or heavier spoon

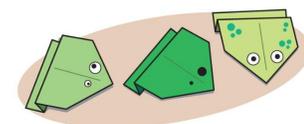
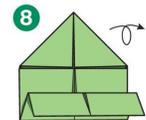
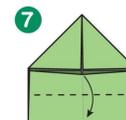
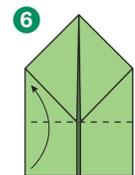
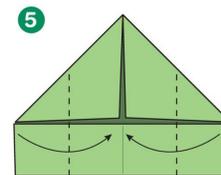
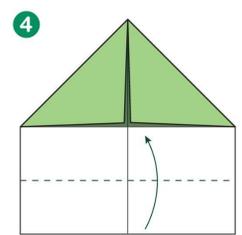
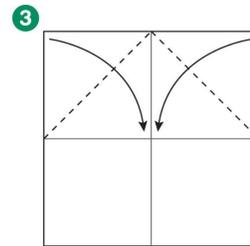
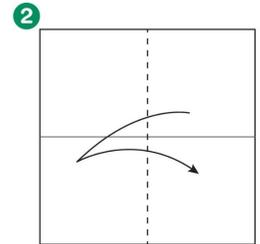
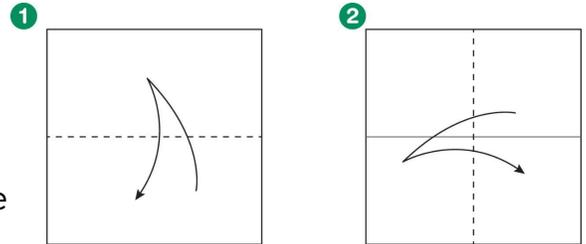
Challenge Yourself! Engineers design for accuracy. Set up a target. Adjust the angle and force of your launcher until you can consistently hit the target.



Origami is the Japanese art of folding paper to create objects such as flowers or animals. Follow the directions below to turn a piece of paper into a jumping frog! Make sure to firmly press each fold to form the creases.

Begin with a square piece of paper. The type and color of paper are your choice.

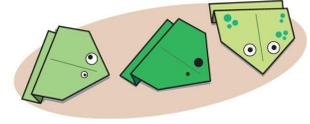
1. Fold the paper in half by making the top and bottom edges of the paper meet. Then, unfold the paper back into the square.
2. Fold the paper in half again by making the right and left edges of the paper meet. Then, unfold the paper back into the square. You should now see a plus sign crease in the middle of the paper.
3. Fold the top left and right corners of the paper in so they meet the center of the plus sign. This will create two diagonal lines.
4. Fold the bottom edge of the paper up to meet the bottom of the two corners you folded in Step 3.
5. Fold in the right and left edges to meet in the middle of the paper.
6. Fold the bottom edge of the paper about halfway up to meet the ends of the diagonal lines created in Step 3.
7. Fold the same section from Step 6 back down, splitting it in half.
8. Flip your paper over and press down on the back to see your frog jump.
9. Add eyes and decorations to make your frog unique.





Materials

- 3-5 different types/sizes of paper
- Pencil
- Ruler or measuring tape
- Markers or colored pencils to decorate the frogs (optional)



Directions

1. Follow the “Frog Jump Origami” steps to create three to five frogs made out of different types OR different sizes of paper.
2. Number each frog and record the size or type of paper used in the table.
3. Test how far each frog jumps in three trials.
 - Use your ruler or measuring tape to measure the jump distance in centimeters for each trial, and record each jump distance in the table below.
4. Calculate the average (mean) of the jump distances for each frog. (Add up the three trials and then divide by three.) Record your results in the table.
5. Complete the bar graph by drawing a bar to represent the average jump distance for each frog.

Frog #	1	2	3	4	5
Jump 1 Distance					
Jump 2 Distance					
Jump 3 Distance					
Average					

