



PINECONE ADAPTATION EXPERIMENT

Grade Level

2-6

Length of Lesson

50 minutes

Objective

By the end of this lesson, students will have a better understanding of why adaptation is important for survival.

Materials Needed

- Pinecones (2 per group)
- Clear cup or jar (1 per group)
- Water
- Copies of student worksheet

Standards

NGSS

K-2-ETS1-1; 3-LS3-2; 3-LS4-2; 4-LS1-1; 4-EES2-2; MS-PS3-4; MS-LS2-4; MS-LS2-2

Lesson Summary

This lesson is a fun, hands-on activity designed to help students understand how pine tree seeds, pinecones, have adapted to their environments.

Suggested Sequence of Events:

1. Set Up: Collect enough pinecones for each group to have at least one pinecone. Two pinecones would be best so that students can use one of the pinecones as their control and the other as the tester. Leave the pinecones in a dry place for a couple of days so that the pinecones are dried and all the scales are 'opened.'
2. Read "[The Pinecone Walk](#)" by Barbara Springfield to snag student interest.
3. Read through the AITC Tree Ag Mag to learn more about trees! Interactive online versions can be found on our website.
4. Complete the activity following the procedures:
 - Hold up a pinecone and ask students why pine trees have pinecones.
 - Put students into small groups of two to three and give them each a student worksheet.
 - Give each group two pinecones and have them discuss and record their observations on their worksheet. Explain that one pinecone will be the control and the other pinecone is the tester.
 - Next, hand out the rest of the materials.
 - Use the student worksheet and have students hypothesize what the reaction of the pinecone will be when it is placed in the water.
 - Share your hypotheses as a class and have them explain *why* they made that hypothesis.
 - Have them add their pinecones to the water and observe.
 - After 20 minutes, have students record their observations and complete the rest of the student worksheet.
4. Whole class discussion and reflection of activity. Have students share what happened to the pinecones and why they think that happened. How does this adaptation increase chances of the pine trees' survival?

TEACHER RESOURCES

Background Information:

An organism's existence is based on survival for itself and its offspring. Adaptations occur when characteristics have evolved over time to increase the chances of survival! The opening and closing of the pinecones is an adaptation to protect the seeds and provide the best time for release.

Pinecones react to moisture as a way to protect the seeds under the scales of the cone. When the weather is wet, the woodier part at the base of the scales absorbs the moisture in the air and causes swelling. The swelling causes the scales to curve inward and close! When the weather is dry, the scales dry out and begin to bend back outward, causing them to open back up. When the seeds are dry, they are lighter and can be carried further distances by the wind.

Extension Ideas:

- Have students measure the circumference and weight of their tester pinecones before and after they soak in the water.
- Have students lay out their tester pinecones on a paper towel overnight. Make observations the next day.
- Have students draw diagrams of their observations to help strengthen observation skills.
- Have students dissect a pinecone and find the seed. What does the seed actually look like? Why is the seed shaped like this? Why is there a tough scale around the seed?
- Read "[From Cone to Pine Tree](#)" by Emma Carlson-Berne to learn more about how pinecones turn into pine trees!
- Compare and contrast pinecones to other plant seeds. What about the plant's environments may have caused them to adapt that way? What environmental factors help trees spread their seeds around?
- Compare and contrast pine trees to other coniferous trees. Dig deeper and compare and contrast coniferous trees to deciduous trees. In what geographical locations do these trees grow?
- Turn this into an inquiry experiment: Is it temperature or moisture that causes the cones to open and close? Make hypotheses and use a control pinecone to test. Get inquiry ideas from students' incorrect hypotheses.
- Did you know pinecones stay on trees for up to 10 years before falling off? Research pinecones and have students write three new facts they learned during their research.
- Invite a tree farmer or nursery owner into your classroom to talk about what it takes to grow trees and what they're grown for.
- Go to agintheclassroom.org to contact your County Literacy Coordinator for free classroom sets of our Ag Mags!



Science

PINECONE ADAPTATION EXPERIMENT

STUDENT WORKSHEET

Observations are a very important step when doing experiments! Observe your pinecones and **record** your observations in the space below. Hint: Use some of your senses to guide your observations. Make sure you're specific!

What will happen when you put the pinecone in the water? Write your **hypothesis** in this box!

Your 20 minutes is up! Now, observe the pinecone in the water and record your observations in the space below.

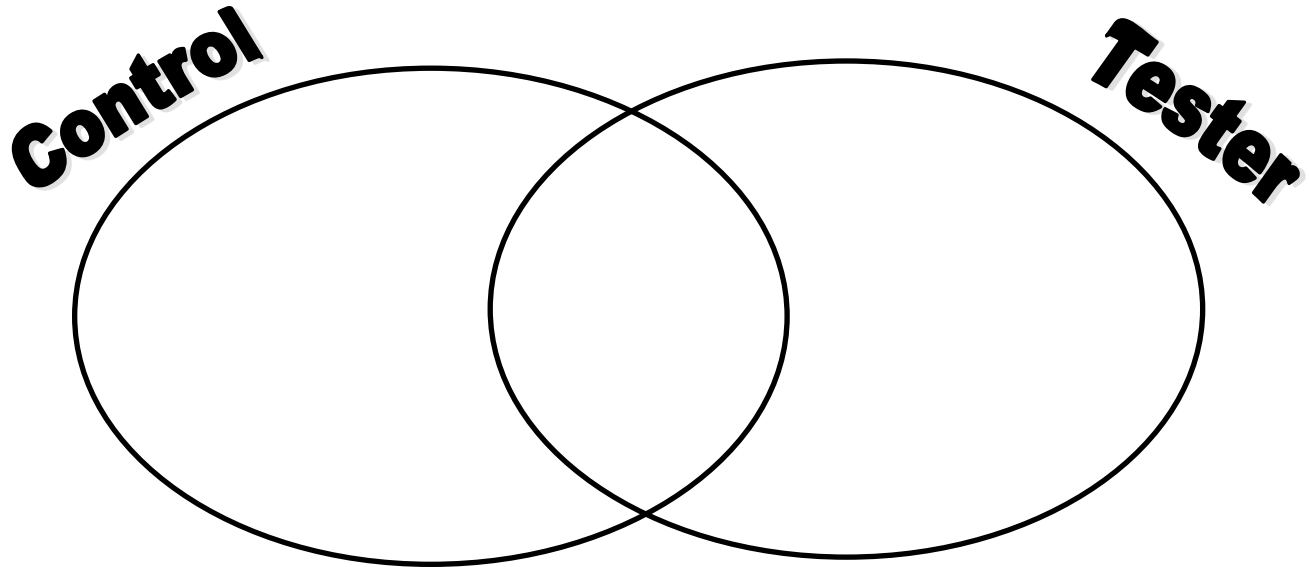


Science

THE PINECONE EXPERIMENT

STUDENT WORKSHEET

Use the Venn Diagram below to compare and contrast the control pinecone to the tester pinecone.



Was your hypothesis correct?

Yes

No

If no, how could we change the experiment to be able to test your original hypothesis? Are there other variables we could test?

Explain what happened to the tester pinecone.

Why do you think the pinecone reacted like this? How would this be beneficial for the seed's survival?