



Nature

educator guide

WELCOME TO THE NATURE Educator Guide!

In this Educator Guide, you'll find Grade Banded Learning Standards aligning to each of the activities. You will also find a QR Code linking you to COSI Connects, an online universe of science through videos, activities and so much more! COSI Connects also includes a section called Community Connects, a digital hub for online and in-person resources from museums, cultural institutions, and other nonprofits.

For additional resources, including book recommendations, and video instructions for completing each of the activities inside your box be sure to check out cosi.org/connects/kits/.

For questions regarding the content inside this educator guide, please email ScienceQuestions@cosi.org.

COSI Connects



Enjoy your
educator
guide!



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Facilitating STEAM Learning with Kits

Kits Overview

COSI Connects Kits contain carefully designed hands-on STEAM activities that support fun, engaging learning about a topic or theme. Each box comes with:

- **Supplies:** Materials for activities are in the box
- **Activity book:** This guide provides directions for setting up and completing activities, explains relevant STEAM content knowledge and skills, and offers discussion prompts to deepen the learning experience
- **Instructional videos:** Each kit has a QR code linking you to short videos demonstrating how to complete different steps of the activities. If you cannot scan the QR code, you can find the videos online at cosi.org/connects/kits. Click on your kit, then click the “Parent/Educator Resources” tab.

Goals for Using Kits

At COSI, we know science is everywhere and for everyone. To reinforce this message, we’ve designed our kits to do so much more than just teach STEAM content knowledge. Every kit, regardless of the content or topic, also provides important non-content learning opportunities such as:

- Engaging with STEAM in fun, inspiring, and creative ways
- Making sense of scientific observations
- Seeing oneself as a capable, welcome, and valued STEAM community member
- Practicing a growth mindset by valuing effort and learning over ease and knowing
- Bonding with peers, family, and educators over shared experiences and excitement

Techniques for Facilitating COSI Connects Kits

Decades of research show that learning is rarely as straightforward as receiving information. This is especially true when the goal is to *understand* and *apply* information, not simply recognize and repeat it. Learning and understanding requires the student to make sense of the information for themselves: Have they heard anything like that before? Does it make sense? Does it support or contradict something they already know? Is it useful or interesting enough to warrant the effort to learn and remember it?

When helping your learners accomplish the goals of using a COSI Connects kit, you'll want to ask more questions than you answer (unless they're practical or logistical questions about the directions).

Why? For a few reasons:

- 1) If learners have a question in mind before doing an activity, or before doing a step of the activity, they'll be primed to notice information that is useful for sense-making or question-asking.
- 2) This technique helps you model the process of science for your learners. Instead of assuming what they do or don't know and thus what you need to tell them, you are being curious, collecting data (their knowledge and ideas) and interpreting those data to decide how to most effectively help them.
- 3) This invites critical thinking: you can follow most questions with things like, "Why do you think that?" or "What did you observe during your activity that makes you think that?"
- 4) It shows your learners that you are interested in their experiences, and that you find them valuable and interesting to know.
- 5) If something isn't working, it can help you troubleshoot the issue: Did they skip a step? Use a different material? Was the reaction really fast or really subtle and they missed it?

Make sure you ask your questions with curiosity and openness: you are asking the question because you want to learn your learners' answers, not because you will try to change their minds (even if you do want to!). This will help them feel more comfortable sharing, which will deepen and sustain their conversations and learning.

Technique	Examples of Effective Questions
<p>Model the scientific method before, during & after Model the scientific method before, during & after Scientists work together to collect information (evidence) they can use to answer questions about how things work, why things happen, or even if/when things <i>will</i> happen! They collect this evidence by learning from their peers, making observations, and conducting experiments. Additionally, scientists are never "done" learning: experiments often leave scientists with more questions than answers, which is exciting!</p>	<ul style="list-style-type: none"> • What questions could we answer by doing this activity? • What information could we collect to answer that question? What changes or results could we look for? • What do you think will happen? Why? • What information or knowledge did you use to come up with your answer? • What new questions do you have? What about those questions is interesting to you? How would you collect evidence to answer your questions?
<p>Focus on ideas rather than terminology If a learner is having a hard time with a particular word or phrase (pronouncing, understanding – anything!), help them find other words to use instead. It's more important for learners to learn by making sense of ideas and practicing skills than it is for them to use terminology correctly.</p>	<ul style="list-style-type: none"> • What are other words that mean the same thing? • How would you explain it to a younger sibling? • Can you act out the word, or draw the word? • Is there a similar word that means something different, and that's making this feel confusing? • How can you remember the information/skill even if you forget the specific word(s)?

<p>Help learners see themselves as scientists by challenging negative misconceptions</p> <p>Importantly, “science” is a <i>process</i>, not a product - science is not simply a collection of information or facts. Science is a process of asking questions, making observations to collect information, and thinking carefully to make sense of the information.</p> <p>The goal of science is not to “prove” that a certain idea is “right,” or to get “the correct result” from doing an experiment. If an experiment produces an outcome that suggests a scientist’s idea was wrong, that’s great because there is something new to be learned!</p> <p>A “good” scientist is not somebody who is already very smart, works all by themselves without any help, and never makes mistakes. A “good” scientist is curious, collaborative, and learns from their mistakes.</p>	<ul style="list-style-type: none"> • What does the word “science” mean to you? • Do you think science is interesting? Fun? Exciting? Scary? Boring? Why? • How do we use science to learn about things? • How does science help us understand things? • How do you use science to understand things? • What does the word “scientist” mean to you? • What does a scientist do? • What makes somebody a “good scientist” or “good at science”? • Do you think you can be a scientist? • How are you like a scientist every day? • What attributes make you a good scientist? • Why do you think it’s more important for a scientist to learn from mistakes than to never make mistakes? • Have you ever made a mistake that helped you learn something really useful?
<p>Invite sense-making and peer discussion</p> <p>It’s great for learners to have questions because that means they’re curious, and they have the opportunity to learn something new! Ask your learners to share what kit activity information and experiences they’re curious or confused about and want to understand better. Ask other learners in your group to share how they figured something out.</p> <p>This is especially helpful when you have learners who want to work more quickly than others: capitalize on their energy and help them engage more deeply!</p>	<ul style="list-style-type: none"> • Was any part of the kit activity surprising, strange, or even counterintuitive to what you expected? • Why do you think that was surprising/strange/counterintuitive – what made you think that something else would happen? • Did any part of the kit activity not make sense? • Did you see or try anything in the kit activity that helped something make sense? • Do you have any other information or experiences from before the kit activity that helped something make sense?
<p>Explore real-world connections</p> <p>Learners are more likely to value the effort required to learn or complete a task if they believe the results will provide something useful and relevant. Personal connections can also help learners see themselves as capable STEAM community members and practitioners.</p>	<ul style="list-style-type: none"> • Is this something you’ve ever wondered about? • Would a friend or family member find this interesting? • How could you use something you learned from this activity in your own life? • How could you use something you learned from this activity to help someone else?
<p>Reflect on progress and experiences</p> <p>At the end of each activity, or even after a step within an activity, ask your learners questions that help them see things like:</p> <ul style="list-style-type: none"> • They learned a new fact or skill • They had a fun/cool/interesting experience • They overcame an obstacle and achieved success • They are scientists and they’re doing science • They changed their mind with new information • They turned a “mistake” into a learning opportunity • They wondered new and interesting questions 	<ul style="list-style-type: none"> • What is the most interesting thing you learned? • Was anything confusing at first, but now you understand it better? • Was anything frustrating at first, but it helped you learn something? • Why was it confusing at first? How did you get to understand it better? • What is something you learned that you want to tell a friend or family member? • What is something you learned that you want to use in your everyday life?

Kit Accessibility Tips

This is an additional resource to support the success of learners. Below are tips and tools from COSI's accessibility experts that can be used when adapting for learners.

Fine Motor Adaptations

- Get creative! When completing a movement required activity, think of different ways to accomplish it, like moving an object by attaching it to a wheelchair.
- If an object is too small to handle, swap for similar but larger objects, like switching a bouncy ball for a basketball. You can also attach the smaller object to a larger one to make it easier to hold.
- Use hand over hand to support students when completing fine motor tasks.
- For the writing portions, provide notepaper to give extra space for writing.

Blind and Low Vision Adaptations

- Use puffy paint on the activity book images to create additional tactile images.
- Use manipulatives (objects) for students to touch when explaining how something works to help students process what is happening.
- Use the camera on a phone or tablet to magnify the words and images in the activity book.

Deaf Adaptations

- Utilize COSI's demonstration videos with closed captioning when completing an activity.
- Visually demonstrate the activity steps.

Cognitive Adaptations

- Break the activity into smaller steps to make processing easier.
- For harder to understand concepts use manipulatives (objects) to explain or relate to a practical process.
- Model the steps for the child to follow and complete at the same time.
- Ask leading questions to help students problem solve. For example: "How could you change the shape of the wings to make it fly better?"

Speech Adaptations

- Have students present in alternate ways, like with drawings or by demonstrating what they did.

Standards Alignment and Extension Questions

The following pages will include Ohio Learning Standards and Next Generation Science Standards that are aligned with each activity in the kit. In addition to these standards, you will find extension questions to scale up or scale down the content of each activity according to your students' abilities or grade level. These extension questions are arranged in grade level bands of Kindergarten – Second Grade, Third – Fifth Grade, and Sixth – Eighth Grade. Each set of these questions are also aligned with both Ohio Learning Standards and Next Generation Science Standards.

Throughout the kit activities, your students will find opportunities to write down their scientific findings and connect to digital learning resources through COSI Connects. This will allow them to fulfill the Ohio English Language Arts, Technology, and Digital Literacy Learning standards listed below.

Kindergarten – 2nd Grade

- K-2.ICT.3.b.: Use visuals found in digital learning tools and resources to clarify and add to knowledge.
- W.K.2: Use a combination of drawing, dictating, and writing to compose informative/explanatory texts that name what is being written about and supply some information about the topic.
- W.1.8: With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.
- W.2.8: Recall information from experiences or gather information from provided sources to answer a question.
- K-2.ST.2.a.: Communicate and collaborate using several digital methods.

Third Grade – Fifth Grade

- 3-5.ICT.1.a.: With guidance, identify and use digital learning tools or resources to support planning, implementing and reflecting upon a defined task.
- W.3-5.10: Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
- 3-5.ICT.4.d.: Produce and publish information appropriate for a target audience using digital learning tools and resources.

Sixth Grade – Eighth Grade

- 6-8.ICT.4.b.: Select and use a variety of media formats to communicate information to a target audience.



Nature

ACTIVITY 1: Animal Hide and Seek

How do animals hide from predators or sneak up on prey in nature? Create an animal that can successfully hide in the room using clever camouflage. Kit includes activity instructions, animal cutout sheet, scissors, and crayons.

Ohio Learning Standards

Kindergarten Science K.LS.1: Living things have specific characteristics and traits.

Kindergarten Science K.LS.2: Living things have physical traits and behaviors, which influence their survival.

1st Grade Science 1.LS.2: Living things survive only in environments that meet their needs.

3rd Grade Science 3.LS.2: Individuals of the same kind of organism differ in their inherited traits. These differences give some individuals an advantage in surviving and/or reproducing.

Next Generation Science Standards

Kindergarten Science K-LS1-1: Use observations to describe patterns of what plants and animals (including humans) need to survive.

3rd Grade Science 3-LS4-2: Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates and reproducing.

3rd Grade Science 3-LS4-3: Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

GRADES
K-2

Extended Learning Questions:

- 1) Can you camouflage your animal based on texture? Feel a spot where you might want your animal to hide. Try to make the same texture on your animal. You can use craft supplies or natural materials.*
- 2) What kind of weather would your animal like best? Why?
- 3) Think about where you live. If your animal lived near where you live, how would it find everything it needs? How would it find the food and water it needs? What other animals would it meet?
- 4) Create a story about your animal and how it used camouflage to stay safe and healthy.

***This modified version of the activity is particularly good for blind and low vision learners.**

Ohio Learning Standards:

Kindergarten Science K.ESS.1: Weather changes are long-term and short-term.

Kindergarten Science K.PS.1: Objects and materials can be sorted and described by their properties.

Kindergarten Technology K-2.DT.2.a: Observe and describe details of an object's design.

1st Grade Science 1.LS.1: Living things have basic needs, which are met by obtaining materials from the physical environment.

Next Generation Science Standards:

2nd Grade Science 2-PS1-2: Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.



Nature

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How do animals hide from predators or sneak up on prey in nature? Create an animal that can successfully hide in the room using clever camouflage. Kit includes activity instructions, animal cutout sheet, scissors, and crayons.

GRADES
3-5

Extended Learning Questions:

- 1) Camouflage your animal based on texture rather than looks. First, find a texture where you would like your animal to hide. Then, use craft supplies or natural materials to add texture. Then, perform a test. Without looking, how can you tell the difference between the texture of the hiding spot and the animal? Have others try it out too! *
- 2) Some animals change color as they grow up. Pick a type of bird. With a guardian's permission you can use the internet to find pictures of that bird. Find a picture of that bird as a hatchling, and a picture of that bird as an adult. Find a picture of a male adult and a female adult. Compare the pictures. Describe how the bird changes as it grows. Describe any differences you see between the male and female bird.
- 3) What reasons, besides camouflage, make an animal very colorful? Why are peacocks colorful? If you're not sure, use a reliable resource to find the answer.
- 4) Choose an animal to research. Answer the following questions about that animal:
 - a) What is the animal's diet? How does it use camouflage to help it find food?
 - b) What predators does the animal have? How does it use camouflage to help it stay safe?
 - c) What other adaptations might your animal have developed to survive in its environment?

***This modified version of the activity is particularly good for blind and low vision learners.**

Ohio Learning Standards:

3rd Grade Science 3.LS.1:

Offspring resemble their parents and each other.

3rd Grade Science 3.LS.3: Plants and animals have life cycles that are part of their adaptations for survival in their natural environments.

4th Grade Science 4.LS.1:

Changes in an organism's environment are sometimes beneficial to its survival and sometimes harmful.

3rd-5th Grade Technology

3-5.ICT.2.b: Use appropriate search techniques to locate needed information using digital learning tools and resources.

Next Generation Science Standards:

3rd Grade Science 3-LS3-1:

Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.

3rd-5th Grade Engineering 3-5-ETS1-2:

Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.



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GRADES
6-8

Extended Learning Questions:

- 1) Try camouflaging your animal based on texture instead of looks. Use craft or natural materials to change the texture. Based on the camouflage you developed, what is the area of the space in which your animal can remain safely camouflaged? Use shapes and measuring tools to estimate the area.*
- 2) Some animals like chameleons have cells that can change color. How does this give them an advantage? What are other animals that can change their colors?
- 3) Consider each of the body parts of your animal: wings, head, thorax, abdomen, tail, etc. In what ways do the shape, color, or pattern of those body parts affect the function it was intended to do?
- 4) If your animal's camouflage failed, would it have another way to defend itself against predators? How would it do this?
- 5) Compare your organism to that of another classmate. What are the similarities between the two? What are the differences? Do they live in similar habitats or different habitats? What environmental factors do you think caused those differences to adapt and evolve differently?

***This modified version of the activity is particularly good for blind and low vision learners.**

Ohio Learning Standards:

6th Grade Mathematics 6.G.1:

Through composition into rectangles or decomposition into triangles, find the area of right triangles, other triangles, special quadrilaterals, and polygons; apply these techniques in the context of solving real-world and mathematical problems.

6th Grade Science 6.LS.3: Cells carry on specific functions that sustain life.

6th Grade Science 6.LS.4:

Living systems at all levels of organization demonstrate the complementary nature of structure and function.

7th Grade Science 7.LS.2:

In any particular biome, the number, growth and survival of organisms and populations depend on biotic and abiotic factors.

Next Generation Science Standards:

Middle School Science MS-LS2-4:

Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.



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The Community Connects section of this digital hub brings together educational resources from museums, cultural institutions, and other nonprofits in your community to extend your learning

cosi.org/connects





Nature

ACTIVITY 2: What's for Dinner?

How do organisms in nature get energy? Learn about producers, consumers, and decomposers as you discuss the flow of energy through a food chain. Then, create your own food web. Kit includes activity instructions, worksheet, yarn, crayons, and paper organism squares.

Ohio Learning Standards

Kindergarten Science K.LS.1: Living things have specific characteristics and traits.

1st Grade Science 1.LS.1: Living things have basic needs, which are met by obtaining materials from the physical environment.

4th Grade Science 4.LS.1: Changes in an organism's environment are sometimes beneficial to its survival and sometimes harmful.

5th Grade Science 5.LS.1: Organisms perform a variety of roles in an ecosystem.

7th Grade Science 7.LS.1: Energy flows and matter is transferred continuously from one organism to another and between organisms and their physical environments.

Next Generation Science Standards

Kindergarten Science K-LS1-1: Use observations to describe patterns of what plants and animals (including humans) need to survive.

Middle School Science MS-LS1-6: Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.

Middle School Science MS-LS2-3: Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.

GRADES
K-2

Extended Learning Questions:

- 1) Gather physical representations of plants and animals, such as plastic toys or cutouts. Have each student hold one plant or animal. Use the yarn to create a food web together as a group by connecting the string between the students.*
- 2) Some animals, like squirrels, save or store their food. Why might they do this?
- 3) Can some of your animals eat more than what you have them connected to? What else can your animals eat?

***This modified version of the activity is particularly good for blind and low vision learners.**

Ohio Learning Standards:

Kindergarten Science K.LS.2: Living things have physical traits and behaviors, which influence their survival.

Kindergarten-2nd Grade Technology K-2.ICT.3.b: Use visuals found in digital learning tools and resources to clarify and add to knowledge.

Next Generation Science Standards:

Kindergarten Science K-ESS3-1: Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.

2nd Grade Science 2-LS4-1: Make observations of plants and animals to compare the diversity of life in different habitats.



Nature

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GRADES
3-5

Extended Learning Questions:

- 1) Cut out the drawing of the images on the cards to provide students, or let students pick animals or plants. Give the students the yarn and encourage them to create a food web by connecting the string between themselves. Can they think of something else their choice eats or is eaten by?*
- 2) Look at some pictures of carnivores and some pictures of herbivores. What similarities and differences do you notice? Now, introduce the group to some animals they may have never seen before. One by one, guess whether the animal is a carnivore, herbivore, or something else based on its characteristics.
- 3) Baby humans eat milk or formula when they are babies but change what they eat as they grow. What is another animal that eats something different as a young animal than it does as an adult? Butterflies, cows, frogs and fish might be good places to start. Use a reliable website to learn more information about one of these animals.
- 4) Choose one of the organisms on your food web cards. Imagine the environment where that organism lives and draw it on paper. How does that organism's environment help it to survive? What does it eat? Where does it get water from? What else can you think of that it needs to survive?

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Ohio Learning Standards:

3rd Grade Science 3.LS.2:

Individuals of the same kind of organism differ in their inherited traits. These differences give some individuals an advantage in surviving and/or reproducing.

3rd Grade Science 3.LS.3:

Plants and animals have life cycles that are part of their adaptations for survival in their natural environments.

5th Grade Science 5.LS.2:

All of the processes that take place within organisms require energy.

Next Generation Science Standards:

3rd Grade Science 3-LS3-2: Use evidence to support the explanation that traits can be influenced by the environment.

3rd Grade Science 3-LS4-2:

Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates and reproducing.



Nature

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GRADES
6-8

Extended Learning Questions:

- 1) Imagine a new habitat in another part of the world. Draw, purchase, or create representations of several organisms in this location. You might use plastic or clay models, or cutouts. Use the yarn to create a food web for this new habitat by connecting the string between the different organisms. In what countries of the world might these animals and plants live? Find those countries on a globe or map.*
- 2) What animals might be in a prehistoric food web? Which of them are still here today? Which of them are no longer on Earth?
- 3) How do an organism's body systems use food they eat to create energy? Investigate the digestive system of an animal.
- 4) Think about what would happen if one organism was removed from the food web. How would it impact the other organisms in the food web? Write a persuasive essay to explain how important it is to protect a particular organism in your food web.

***This modified version of the activity is particularly good for blind and low vision learners.**

Ohio Learning Standards:

6.LS.4: Living systems at all levels of organization demonstrate the complementary nature of structure and function.

7.LS.2: In any particular biome, the number, growth and survival of organisms and populations depend on biotic and abiotic factors.

8.LS.1: Diversity of species, a result of variation of traits, occurs through the process of evolution and extinction over many generations. The fossil records provide evidence that changes have occurred in number and types of species.

Next Generation Science Standards:

Middle School Science MS-LS2-1: Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

Middle School Science MS-LS2-2: Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

Middle School Science MS-LS2-4: Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.



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Nature

ACTIVITY 3: Birdwatching

Can you name any of the birds you see outside? Grab some binoculars and see how many different kinds of birds you can spot! Kit includes activity instructions, backyard birder checklist, pen, and child's pair of binoculars.

Ohio Learning Standards

Kindergarten Science K.LS.1: Living things have specific characteristics and traits.

Kindergarten Science K.LS.2: Living things have physical traits and behaviors, which influence their survival.

1st Grade Science 1.LS.2: Living things survive only in environments that meet their needs.

2nd Grade Science 2.LS.2: All organisms alive today result from their ancestors, some of which may be extinct. Not all kinds of organisms that lived in the past are represented by living organisms today.

Next Generation Science Standards

2nd Grade Science 2-LS4-1: Make observations of plants and animals to compare the diversity of life in different habitats.

GRADES
K-2

Extended Learning Questions:

- 1) Go outside to a place where there are birds. Listen carefully to hear the bird calls. How many different types of birds do you hear?*
- 2) Find a bird and watch it for 60 seconds. What is it doing? Is it flying? Eating? Looking around? Singing a song? Describe in words what it is doing.
- 3) Can you find a bird eating? What does it eat? Do all birds eat the same thing?
- 4) Are there any birds you wouldn't expect to see during the day? Why?
- 5) Design a bird feeder that would attract birds in your area. Consider what type of food you will use. How does the type of food influence what type of birds will come to the feeder?

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Ohio Learning Standards:

Kindergarten Math K.CC.4: Understand the relationship between numbers and quantities.

1st Grade Science 1.LS.1: Living things have basic needs, which are met by obtaining materials from the physical environment.

2nd Grade Science 2.LS.1: Living things cause changes on Earth.

Next Generation Science Standards:

Kindergarten Science K-LS1-1: Use observations to describe patterns of what plants and animals (including humans) need to survive.

Kindergarten Science K-ESS3-1: Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.



Nature

ACTIVITY 3: Birdwatching

Can you name any of the birds you see outside? Grab some binoculars and see how many different kinds of birds you can spot! Kit includes activity instructions, backyard birder checklist, pen, and child's pair of binoculars.

GRADES
3-5

Extended Learning Questions:

- 1) Go outside to a place where there are birds. Listen carefully to hear the bird calls. How many different types of birds do you hear? Optional: Download the Merlin bird ID App from the Cornell Ornithology lab (<https://merlin.allaboutbirds.org/>) onto a phone or tablet. Use it to record and identify bird calls. What birds can you find in your area by their call?*
- 2) While you are birdwatching, observe and write down what the birds are doing. What behaviors do birds have that help the bird get food? Attract a mate? Protect its territory? Provide a home?
- 3) How can the appearance of birds be different? Do some birds look different as they grow up? Do some female and male birds look different? If you're not sure, find some pictures of birds online to answer the question. If you notice differences, why do you think they exist?
- 4) Go online to www.allaboutbirds.org/cams/ Click "See All Cams." Pick one of the bird cams from a place where you do not live. What differences do you notice among the birds there and birds near where you live? What similarities do you notice?
- 5) Why are birds important in our ecosystem? Think about what they eat, and what eats them. Think about how they interact with plants and other organisms in the area. List three different ways that birds play a role in the ecosystem.

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Ohio Learning Standards:

3rd Grade Science 3.LS.2:

Individuals of the same kind of organism differ in their inherited traits. These differences give some individuals an advantage in surviving and/or reproducing.

3rd Grade Science 3.LS.3: Plants and animals have life cycles that are part of their adaptations for survival in their natural environments.

3rd-5th Grade Technology

3-5.ICT.2.b: Use appropriate search techniques to locate needed information using digital learning tools and resources.

4th Grade Science 4.LS.1:

Changes in an organism's environment are sometimes beneficial to its survival and sometimes harmful.

5th Grade Science 5.LS.1:

Organisms perform a variety of roles in an ecosystem.

5th Grade Science 5.LS.2:

All of the processes that take place within organisms require energy.

Next Generation Science Standards:

3rd Grade Science 3-LS4-2:

Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates and reproducing.

5th Grade Science 5-LS2-1: Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.



Nature

ACTIVITY 3: Birdwatching

Can you name any of the birds you see outside? Grab some binoculars and see how many different kinds of birds you can spot! Kit includes activity instructions, backyard birder checklist, pen, and child's pair of binoculars.

GRADES
6-8

Extended Learning Questions:

- 1) Go outside to a place where there are birds. Listen carefully to hear the bird calls. Based on the call alone, do you think each bird is calm or alert? Why? Optional: Download the Merlin bird ID App from the Cornell Ornithology lab (<https://merlin.allaboutbirds.org/>) onto a phone or tablet. Use it to record and identify bird calls. Based on the call, try to identify at least 3 different types of birds. Why might some bird vocalizations be complex "songs" while others are much simpler calls?*
- 2) Once you have seen birds and/or heard their calls, identify what the birds are doing. Can you find any birds that are eating? What are they eating? How do they get their food? How might the shape of the bird's beak help it to obtain and eat its food?
- 3) Choose two different biomes. For each biome, research two birds that live in that biome. Describe the biome and the birds that live in it. How are the birds in the two biomes similar? How are they different?*
- 4) Are there different birds in your area at different times of the year? What factors in nature might make a bird migratory? Choose one migratory bird and research the places that it goes during different seasons. Create a map to chart the migration pattern, labeling the locations where the bird commonly visits.

***This modified version of the activity is particularly good for blind and low vision learners.**

Ohio Learning Standards:

6th Grade Science 6.LS.4:

Living systems at all levels of organization demonstrate the complementary nature of structure and function.

7th Grade Science 7.LS.2:

In any particular biome, the number, growth and survival of organisms and populations depend on biotic and abiotic factors.

7th Grade Science 7.ESS.5:

The relative positions of Earth and the sun cause patterns we call seasons.

8th Grade Science 8.LS.1:

Diversity of species, a result of variation of traits, occurs through the process of evolution and extinction over many generations. The fossil records provide evidence that changes have occurred in number and types of species.

Next Generation Science Standards:

Middle School Science MS-LS2-4:

Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

Middle School Science MS-

LS4-4: Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.



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Nature

ACTIVITY 4 : What's a Watershed?

How do we impact nature? Learn all about watersheds as you build your own watershed model. Kit includes activity instructions, two markers, spray bottle, and glue dots. You will also use your empty box!

Ohio Learning Standards

2nd Grade Science 2.LS.1: Living things cause changes on Earth.

4th Grade Science 4.ESS.1: Earth's surface has specific characteristics and landforms that can be identified.

4th Grade Science 4.ESS.3: The surface of Earth changes due to erosion and deposition.

Next Generation Science Standards

2nd Grade Science 2-ESS2-2: Develop a model to represent the shapes and kinds of land and bodies of water in an area.

4th Grade Science 4-ESS2-1: Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind or vegetation.

GRADES
K-2

Extended Learning Questions:

- 1) Before spraying water on the watershed, place stickers on the paper to show where you think there will be puddles of water. Now, spray your watershed. Did you guess correctly?*
- 2) Take a piece of cardstock or watercolor paper. Draw on it with watercolor paints or watercolor pencils. Let it dry. Then, hang it up on an easel and spray it with water. How does your painting change?
- 3) Look at or feel your landscape from different angles – from the top, from different sides. How many rivers and lakes are there? Where do you think plants and animals might live on your landscape? Draw or describe the animals. *
- 4) What might happen to your rivers if it didn't rain for a long time? What if it rained really hard for a long time?
- 5) What do you think will happen if you place your wet landscape into the freezer? Make a prediction, then try it out!

***This modified version of the activity is particularly good for blind and low vision learners.**

Ohio Learning Standards:

Kindergarten Science K.ESS.1: Weather changes are long-term and short-term.

1st Grade Science 1.ESS.2: Water on Earth is present in many forms.

1st Grade Science 1.LS.2: Living things survive only in environments that meet their needs.

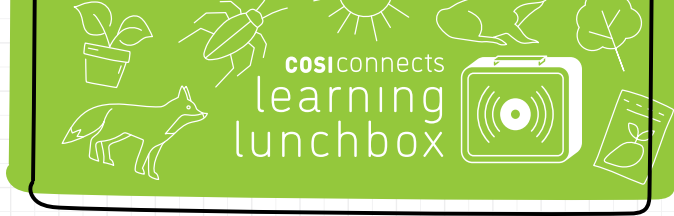
2nd Grade Science 2.ESS.2: Water is present in the atmosphere.

Next Generation Science Standards:

Kindergarten Science K-ESS3-2: Ask questions to obtain information about the purpose of weather forecasting to prepare for and respond to severe weather.

Kindergarten Science K-ESS3-1: Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.

2nd Grade Science 2-ESS2-3: Obtain information to identify where water is found on Earth and that it can be a solid or liquid.



Nature

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GRADES
3-5

Extended Learning Questions:

- 1) Before spraying water on the watershed, place stickers on the paper to show where you think the water will pool. Were you correct after spraying water on your watershed? If it rained really hard in your watershed, some of the soil on your mountains and riverbank could be eroded away (wash into the rivers and lakes). What could be the consequences of that?*
- 2) Think about the pollution that might get into lakes and rivers in a watershed. Who else uses the water in lakes and rivers? How would the pollution affect them?
- 3) Based on what you learned, what are three things people can do to help protect the waterways in their area? Discuss in groups. How would these things help? Can you do any of them yourself? Why is that important?
- 4) You created mountains and lakes when you crinkled the paper. What kinds of events on Earth change the shape of the surface?
- 5) Research the watershed you live in using the internet or other sources. Find it on a map. Now, find your house or school on the same map. What lakes or rivers are in your watershed?

***This modified version of the activity is particularly good for blind and low vision learners.**

Ohio Learning Standards:

3rd Grade Science 3.ESS.1:
Earth's nonliving resources have specific properties.

3rd Grade Science 3.ESS.3:
Some of Earth's resources are limited.

3rd-5th Grade Technology 3-5.ICT.3.a: Gather, organize and summarize information from multiple digital learning tools and resources to build knowledge of a topic.

4th Grade Science 4.ESS.2:
The surface of Earth changes due to weathering.

4th Grade Science 4.LS.1:
Changes in an organism's environment are sometimes beneficial to its survival and sometimes harmful.

Next Generation Science Standards:

3rd Grade Science 3-LS4-4: Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.

5th Grade Science 5-ESS3-1: Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.



Nature

ACTIVITY 4 : What's a Watershed?

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GRADES
6-8

Extended Learning Questions:

- 1) Before spraying water on the watershed, place stickers on the paper indicating where you think the water will pool. Were you correct after spraying water on your watershed?*
- 2) If the water can remove soil and collect pollution as it rolls down hills and mountains, what might the environmental consequences of heavy prolonged rain be? What are some ways to mitigate, or reduce the effects, of that?
- 3) Make a new watershed model. This time, using waxed paper. This represents an impermeable surface, like a parking lot. Tape the corners down and spray with water just like you did with your original watershed. What do you notice? How does the water behave the same? How does it behave differently?
- 4) Write a letter to a friend or leader in your community explaining the importance of protecting your watershed and what your community can do to help.
- 5) You created mountains and lakes when you crinkled the paper. On Earth, what processes might have created mountains and lakes?

***This modified version of the activity is particularly good for blind and low vision learners.**

Ohio Learning Standards:

6th Grade Science 6.ESS.4: Soil is unconsolidated material that contains nutrient matter and weathered rock.

7th Grade Science 7.ESS.1: The hydrologic cycle illustrates the changing states of water as it moves through the lithosphere, biosphere, hydrosphere and atmosphere.

7th Grade Science 7.LS.2: In any particular biome, the number, growth and survival of organisms and populations depend on biotic and abiotic factors.

8th Grade Science 8.ESS.3: A combination of constructive and destructive geologic processes formed Earth's surface.

Next Generation Science Standards:

Middle School Science MS-LS2-4: Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

Middle School Science MS-ESS2-2: Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.



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Energy

ACTIVITY 5: Biomimicry

How can we learn from nature? Explore biomimicry as you learn about inventions that were inspired by nature! Then, observe nature to find out what you can learn from it! Includes activity instructions, space to take notes, eight color activity cards, and child's pair of binoculars for making observations.

Ohio Learning Standards

K – 2nd Grade Technology K-2.DT.1.a.: Identify and discuss differences between the human-designed world and the natural world.

3rd – 5th Grade Technology 3-5.DT.1.d.: Identify and describe examples of technology products and processes.

6th – 8th Grade Technology 6-8.DT.1.b.: Analyze how tools, materials and processes are used to alter the natural and human-designed worlds.

Next Generation Science Standards

Kindergarten-2nd Grade Engineering K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

GRADES
K-2

Extended Learning Questions:

- 1) Walk outside and find a place to stand or sit. Pick a sense: smell, touch, hearing, or sight. Set a timer for two minutes. During those two minutes, take in everything you notice about the environment using the sense you chose. After two minutes, share what you noticed with the group. Did anyone notice the same things?*
- 2) Think of a fish, a bird, and a cat. How do each of those animals get around? What body parts do they use to get around? Humans cannot fly with just their body parts – we don't have wings. How have humans made their own versions of wings?
- 3) Go outside. Bring paper and crayons or colored pencils. What kinds of flowers can you find? Draw one of the flowers. How do you know that it's a flower instead of just a plant?
- 4) Go outside twice: once in the morning and once in the afternoon. Each time, write down what animals you see, and what they are doing. What differences do you notice from morning to afternoon? Are there different animals? Are they doing different things?

***This modified version of the activity is particularly good for blind and low vision learners.**

Ohio Learning Standards:

Kindergarten Science K.LS.1: Living things have specific characteristics and traits.

Kindergarten Science K.LS.2: Living things have physical traits and behaviors, which influence their survival.

1st Grade Science 1.LS.2: Living things survive only in environments that meet their needs.

1st Grade Math 1.MD.4: Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.

Kindergarten-2nd Grade Technology K-2.DT.2.b: Demonstrate the ability to follow a simple design process: identify a problem, think about ways to solve the problem, develop possible solutions, and share and evaluate solutions with others.

Kindergarten-2nd Grade Technology K-2.DT.1.b: Describe technology as something someone made to meet a want or need.

Next Generation Science Standards:

Kindergarten Science K-LS1-1: Use observations to describe patterns of what plants and animals (including humans) need to survive.

1st Grade Science 1-LS1-1: Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.

Kindergarten-2nd Grade Science K-2-ETS1-2 Engineering Design: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.



Energy

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GRADES
3-5

Extended Learning Questions:

- 1) Walk outside and find a place to stand or sit. Have each person pick a sense: smell, touch, hearing, or sight. It's okay to choose the same sense. Set a timer for three minutes. During those three minutes, take in everything you notice about the environment using the sense you chose. Share with the group. What was different about what people noticed? What was the same about what people noticed? What did you notice that came from a non-living part of the environment (if anything)?*
- 2) Pick an animal that lives near you and is easy to observe. Animals like squirrels, ants, bees and birds are good examples. Brainstorm a list of the different tasks and challenges that the animal needs to do each day. Look on the internet or in a book if you aren't sure. Then, if possible, observe that animal outside (without disturbing it). How does it complete the tasks on your list? How does it overcome the obstacles? What can we learn from that animal?
- 3) What kinds of plants can you observe in the world around you? Go outside and count how many different plants you can find in 5 minutes. Optional: Download the free app called Seek by iNaturalist. Identify one of the plants you found by focusing the camera on it in the Seek app. Optional: See how many plants you can find on the Ohio Native Plant Search on cosi.org/connects/ohio-native-plant-quest.

***This modified version of the activity is particularly good for blind and low vision learners.**

Ohio Learning Standards:

3rd Grade Science 3.ESS.1:
Earth's nonliving resources have specific properties.

3rd Grade Science 3.LS.2:
Individuals of the same kind of organism differ in their inherited traits. These differences give some individuals an advantage in surviving and/or reproducing.

3rd-5th Grade Technology 3-5.DT.2.b: Plan and implement a design process: identify a problem, think about ways to solve the problem, develop possible solutions, test and evaluate solution(s), present a possible solution, and redesign to improve the solution."

4th Grade Science 4.LS.1:
Changes in an organism's environment are sometimes beneficial to its survival and sometimes harmful.

Next Generation Science Standards:

3rd Grade Science 3-LS4-2:
Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates and reproducing.

3rd-5th Grade Engineering 3-5-ETS1-2:
Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.



Energy

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GRADES
6-8

Extended Learning Questions:

- 1) Go outside with a group of people. Set a timer for 5 minutes. During the 5 minutes, take in everything you notice about the environment. Share with the group, taking notes on what people observed. What was different about what people noticed? What senses did people use to observe? Optional: Create a diorama of the place you observed. How might you add the sights, smells, sounds, and feelings to the diorama?*
- 2) Brainstorm a list of challenges you face every day. Spend some time outside observing plants and animals. What challenges do those plants and animals face? How are they similar to the challenges you face? Create a new device to solve a problem based on what you observed. Draw your invention and explain how the animal or plant world inspired your creative process and problem solving. How would you go about building and testing it?
- 3) Download the free app called Seek by iNaturalist. Go outside to a place with flowers. Complete the flower exploration found on cosi.org/connects/flower-dissection. If you see something you cannot identify, open the Seek app and focus the camera on the plant you want to identify. Use art supplies to create a picture of the plant you found. Label the picture with the name of the plant and where you found it. Lastly, identify any parts of the flower that you can.
- 4) Plants are able to take in carbon dioxide and create oxygen. Research some inventions inspired by plants that capture carbon dioxide. How might these inventions help the environment?

***This modified version of the activity is particularly good for blind and low vision learners.**

Ohio Learning Standards:

6th Grade Science 6.LS.4:

Living systems at all levels of organization demonstrate the complementary nature of structure and function.

6th-8th Grade Technology

6-8.ST.1.d: Analyze an environmental concern and investigate technology solutions to that problem.

6th-8th Grade Technology

6-8.DT.4.c: Apply the design principle "form follows function" to develop a product.

7th Grade Science 7.LS.2:

In any particular biome, the number, growth and survival of organisms and populations depend on biotic and abiotic factors.

Next Generation Science Standards:

Middle School Science MS-LS2-2:

Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

Middle School Engineering MS-

ETS1-4: Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.



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Glossary:

Adaptation- a body part or behavior that helps a living thing survive in its environment.

Biomimicry- anything that people make that mimics or copies something in nature.

Camouflage- an animal's covering or form that allows it to hide in its surroundings.

Carnivore- an organism that eats animals.

Conservation- efforts to protect and preserve natural environments and the organisms that live there.

Consumer- an organism that cannot make its own food and must feed to get energy.

Decomposer- an organism that breaks down other organisms and creates nutrients in the process.

Ecosystem- all interactions between a natural environment and all the organisms that live there.

Food Chain- the flow of energy from the Sun to producers, consumers, and decomposers.

Food Web- the connection of many food chains in an ecosystem.

Herbivore- an organism that only eats plants.

Omnivore- an organism that eats both plants and animals.

Ornithologist- a scientist who studies birds.

Producer- an organism that makes its own food and also serves as an energy source for other organisms.

Watershed- the land around a body of water.