



NATURE'S PROBLEM SOLVERS

GRADE: 4-8

TIME: 60 minutes

THEME: Environmental Learning

CURRICULUM CONNECTIONS:

Science, Math, Language, Design & Technology

MATERIALS:

- Journals or observation sheets
 - Pencils
 - Optional clipboards
 - Optional field guides
 - Optional tablets or cameras
 - Optional magnifying glasses
 - Optional measuring tools
- No special equipment is required.

LEARNING GOALS:

- make detailed observations of an organism and its surroundings
- distinguish between observation and inference
- investigate structures, behaviours and relationships that may help organisms survive
- identify adaptations or cooperative relationships
- use evidence to develop explanations
- recognize that organisms respond to environmental and seasonal conditions in different ways
- explore the concept of biomimicry by connecting strategies found in nature to human problem-solving
- consider how understanding natural systems can help us imagine possibilities

ACTIVITY OVERVIEW

After listening to elin kelsey's presentation, Hope Grows Outside: Finding Hope in a Changing World, students head outside to investigate how living things survive and respond within their environments.

Every organism experiences changing conditions and challenges, from finding food and shelter to conserving water, avoiding predators and preparing for seasonal change.

Students choose an organism or evidence of one to investigate closely. They look for structures, behaviours and relationships that might help it survive, while distinguishing between what they can observe directly and what they think might be happening.

The activity asks:

What can living things teach us about responding to challenges?

Students then consider how ideas found in nature might inspire human problem-solving and new possibilities.



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BEFORE GOING OUTSIDE:

After elin kelsey's presentation, ask:

What did you hear about the ways living things respond to change?

Return to the idea that hope doesn't require pretending challenges don't exist.

Sometimes hope comes from understanding how living things respond to challenges and what those responses make possible.

Introduce the investigation question:

What can living things teach us about responding to challenges?

Ask students to brainstorm some of the challenges organisms experience.

These might include:

- finding food
- finding water
- staying warm or cool
- avoiding predators
- finding shelter
- reproducing
- competing for resources
- moving from place to place
- surviving drought or heavy rain
- responding to human disturbance
- preparing for seasonal change

Then introduce an important distinction.

- **Observation vs. Inference**

Write two statements:

- I see a squirrel carrying an acorn.
- The squirrel is storing food for winter.

Ask:

- **Which one can we actually observe?**
- **Which one is an explanation for what might be happening?**

Explain:

- **Observation:** What we can directly see, hear, measure or document.
- **Inference:** An explanation we develop using observations and what we already know.

Scientists use both, but they don't treat them as the same thing.

Tell students that outside, their first job is to observe carefully before explaining what they think is happening.

TAKE IT OUTSIDE:

Take students to a schoolyard, garden, nearby park, neighbourhood or another accessible outdoor space.

Students choose an organism, evidence of an organism, or small natural feature to investigate.

They might choose:

- a tree
- another plant
- a bird
- an insect or spider
- fungi
- moss or lichens
- seeds or cones
- evidence of an animal
- a small habitat

Students should observe living things without capturing, handling or disturbing them.



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TAKE IT OUTSIDE:

1. Meet Your Problem Solver

Spend several minutes simply observing.

Record:

- What do you see?
- What do you hear?
- What is happening?
- What is the organism doing?
- What is happening around it?

Encourage students to include specific details rather than immediately explaining what those details mean.

For example:

- Instead of: "This tree is adapted to the cold."
- record: "The tree has needles instead of broad leaves."

The explanation can come later.

2. Investigate Its Structure

Look closely at the organism's physical features.

Students might notice:

- | | | |
|--------------|-------------------|------------------------|
| • leaf shape | • fur or feathers | • seeds |
| • bark | • colour | • cones |
| • roots | • body shape | • protective coverings |
| • stems | • wings | |
| • thorns | • feet | |

Ask:

- **What structures do you notice?**
- **What might these features help the organism do?**
- **What evidence supports your idea?**

Students should identify when an explanation is something they think rather than something they directly observed.

3. Investigate Behaviour

If students can observe an animal or other active organism, ask: What is it doing?

They might observe:

- | | |
|------------------|-------------------------------------|
| • gathering food | • resting |
| • moving | • communicating |
| • feeding | • seeking shelter |
| • hiding | • interacting with another organism |

In October, students may also see evidence of seasonal behaviours.

If no animal behaviour is visible, students can investigate evidence such as tracks, chewed seeds, nests or other signs and develop questions about what might have happened.

4. Investigate the Habitat

Ask students to look beyond the organism itself. What's around it?

Consider:

- | | | |
|------------|----------------|-------------------|
| • sunlight | • temperature | • human activity |
| • shade | • wind | • other organisms |
| • water | • shelter | |
| • soil | • food sources | |

Ask: **How might these surroundings influence how this organism lives?**



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TAKE IT OUTSIDE:

5. Investigate Relationships

Look for connections between the organism and other parts of the environment.

Students might notice:

- a plant providing food
- a tree providing shelter
- insects interacting with plants
- organisms sharing habitat
- fungi interacting with dead wood
- birds or other animals feeding in the same area
- people maintaining or protecting habitat

Ask:

- **Does this organism survive entirely on its own?**
- **What does it depend on?**
- **What might depend on it?**

This helps move the investigation beyond individual “survival strategies” toward understanding ecological relationships.

6. Challenge → Response → Result

Students now organize their thinking.

- **Challenge:** What challenge might this organism experience?
- **Response:** What structure, behaviour or relationship might help it respond?
- **Result:** What could that response make possible?

For example:

- **Challenge:** Colder temperatures and changing seasons
- **Response:** A tree loses its leaves
- **Result:** The tree conserves resources during winter

Or:

- **Challenge:** Finding food
- **Response:** An animal gathers or stores seeds
- **Result:** Food may be available later

Remind students that some explanations may need to be researched and verified back inside.

Before Going Inside

Ask students to choose their strongest observation.

Complete:

- I observed...
- I think this might help because...
- I would need to find out...

This reinforces the difference between evidence and explanation.

BACK INSIDE:

Students use field guides, books or reliable digital sources to investigate their organism.

Ask them to verify or revise the explanation they developed outside.

- Did their observations support an actual adaptation?
- Was the behaviour they observed typical?
- Was their original inference correct?
- Did their research reveal a relationship they hadn't noticed?

Students then prepare a short Nature's Problem Solver profile.



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BACK INSIDE:

Include:

- **The organism:** What did you investigate?
- **The challenge:** What environmental condition or challenge does it experience?
- **The response:** What adaptation, behaviour or relationship helps?
- **The evidence:** What did you actually observe outside?
- **What you discovered:** What did additional research help you understand?
- **The possibility:** What does this response make possible for the organism?

From Nature to Human Problem-Solving: Biomimicry

Now shift the question: **Could anything we discovered inspire the way people solve problems?**

Introduce the term **biomimicry**: Biomimicry is an approach to design and problem-solving that looks to nature for ideas and inspiration.

Scientists, engineers and designers can study how living things and natural systems respond to challenges and use what they learn to inspire human designs.

Students don't need to create a literal copy of an organism. Instead, ask them to identify the idea or principle behind what they observed.

For example:

- **Nature observation:** Seeds can be carried by wind.
- **Principle:** A lightweight structure can use moving air for transportation.

Or:

- **Nature observation:** Some plant surfaces direct or collect water.
- **Principle:** Shape and surface can influence where water travels.

Then ask: **Where could that idea be useful to people?**

QUESTIONS TO PROMPT THINKING:

Observation

- What exactly did you observe?
- What details stand out?
- What could you measure or document?
- What do you know from evidence and what are you inferring?

Relationships

- What does this organism depend on?
- What might depend on it?
- Where do you see cooperation or interaction?
- How does its habitat influence its survival?

Response

- What structures might help?
- What behaviours did you observe?
- How might this organism respond to seasonal change?
- What evidence supports your explanation?

Connecting Back to the Presentation

- What does this investigation add to your understanding of elin kelsey's presentation?
- How can noticing responses to challenges affect the way we think about environmental change?
- Where did you find resilience, cooperation or possibility?
- Can understanding how living systems respond to change help us imagine new possibilities?

Challenge

- What conditions does this organism experience?
- What resources does it need?
- What changes throughout the year?
- What might make survival difficult?

Possibility

- What does this response allow the organism to do?
- What might happen if conditions change?
- What can this example teach us about responding to challenges?
- What possibilities do you see?



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OPTIONAL EXTENSIONS

Biomimicry Design Challenge

Challenge students to design something inspired by a structure, process, behaviour or relationship they investigated.

- **Begin with:** What idea from nature are you borrowing?
- **Then:** What human challenge could this idea help address?

Students can:

- sketch a design
- build a model
- create a labelled diagram
- write a design brief
- create a digital prototype

Their design should explain: **Nature's strategy → Human challenge → Biomimicry Design idea**

Encourage students to explain the connection rather than simply making an object that looks like the organism.

Test the Idea

Add Math, Science and Design & Technology by having students develop a simple test of their nature-inspired design.

Students could compare:

- shapes
- surface areas
- materials
- structures
- water movement
- wind resistance
- insulation
- strength

Ask: **What evidence would tell you whether your idea works?**

Nature's Problem Solver Gallery

Create a class gallery featuring the different organisms students investigated.

Each profile includes: **Challenge → Response → Result → Possibility**

Look across the gallery and ask:

- **Do different organisms respond to similar challenges in different ways?**
- **Are there patterns across our examples?**
- **How important are relationships and cooperation compared with individual adaptations?**

ADAPTATIONS & ACCESSIBILITY:

Students don't need to travel through a large outdoor area or find a moving animal to participate.

Consider:

- choosing an accessible outdoor observation area
- allowing students to investigate from one location
- providing seated observation options
- assigning partners or small groups
- offering a selection of organisms or natural features within the observation area
- allowing students to investigate evidence of an organism rather than the organism itself
- using photography to enlarge small details
- providing field guides with images
- allowing drawing, photography, audio recording or verbal responses instead of extensive writing
- assigning collaborative roles such as observer, recorder, photographer, researcher or illustrator
- providing additional observation and processing time
- offering a quieter observation area where possible

Where possible, adapt the outdoor experience so all learners can participate outside rather than replacing it with an indoor alternative.



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TEACHER NOTE: NATURE DOESN'T "SOLVE PROBLEMS" LIKE PEOPLE DO

The title Nature's Problem Solvers is an engaging way to invite students into the investigation, but it's useful to distinguish the metaphor from the science.

Organisms generally aren't consciously identifying environmental problems and designing solutions to them.

Adaptations develop across generations through evolutionary processes. Individual organisms may also use behaviours or physiological responses that help them survive particular conditions.

For Grades 4–8, you can adjust the scientific depth to suit your students.

The important distinction is:

We observed this.

versus

We think this means...

versus

Research provides evidence that...

That distinction turns the activity from a nature scavenger hunt into a genuine outdoor scientific investigation.

It also strengthens the connection to hope.

Students aren't being asked to see every natural process as a positive story. Instead, they investigate real challenges, real responses and what those responses make possible.

That leads back to a central question from the activity:

When we understand how living systems respond to challenges, what new possibilities can we imagine?