SCIENCE WEEK 2025

Decoding the Universe – Exploring the unknown with nature's hidden language

Stage: 2, 3 and 4

This resource will guide students on an exciting journey through the 2025 National Science Week theme, "Decoding the Universe" – Exploring the unknown with nature's hidden language, helping them uncover the mysteries of the natural world through hands-on activities, inquiry, and discovery.

Through this resource, students will discover how humans decode the natural world by observing patterns and tracks while also exploring how animals interpret their environments using extraordinary senses.

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SUGGESTED ACTIVITIES - TEACHER RESOURCE

LEARNING INTENTIONS

1. I understand how patterns help animals survive
2. I can identify different types of natural patterns and explain how they help animals adapt to their environments

SUCCESS CRITERIA

1. I can identify two ways patterns help animals survive
2. I can describe two examples of animal patterns and explain how each helps the animal adapt to its environment

EXPLORING PATTERNS

Animals have evolved patterns that serve important biological functions—such as camouflage to avoid predators, warning coloration to signal danger, mimicry to deceive other species, and visual cues for communication and mating—each acting as a form of natural code that helps them survive and adapt to their environment.

- Display examples of animal patterns from a range of species (mammals, birds, fish, reptiles, amphibians) and ask students to discuss why animals have these patterns. Encourage them to spot similarities and difference between the patterns.
- Play the game "Who Am I?" where students wear an animal pattern on their forehead and ask yes or no questions to guess the animal.
- Students design their own imaginary animal with a pattern that helps it survive in a chosen habitat, then explain how the pattern provides camouflage, warning, or mimicry. Students could create their imaginary animal through hands-on models (clay, plasticine) or mixed-media collages (recycled materials, various craft materials) digital drawings (Adobe Illustrator, Procreate, or free tools like Canva or Google Drawings), or 3D modelling tools.
- Explore aposematism - how animals like poison dart frogs and blue tongue lizard use bright colours and patterns to signal danger. Students design a brightly patterned “dangerous” animal to warn predators using fabric or craft materials. Students embody and act out the animal to demonstrate how it warns predators, reinforcing the concept of aposematism.
- Extension ideas – guide students in researching and presenting how patterns in insects, fish, octopuses, and birds contribute to survival through camouflage, warning, communication and attraction.

GOING DEEPER FOR HPGE STUDENTS- TEACHER RESOURCE

LEARNING INTENTIONS

1. I understand how patterns help animals survive
2. I can identify different types of natural patterns and explain how they help animals adapt to their environments

SUCCESS CRITERIA

1. I can identify three ways patterns help animals survive
2. I can describe three examples of animal patterns and explain how each helps the animal adapt to its environment

MIMICRY

Animal mimicry is a fascinating survival strategy where one species evolves to resemble another in appearance, behaviour, or sound. There are several types of pattern-based mimicry in animals, each serving a different purpose. Explore the different examples with your students.

- Batesian mimicry occurs when a harmless animal copies the warning patterns of a harmful or toxic species to avoid predators. For example, the scarlet kingsnake mimics the venomous coral snake, or the hoverfly mimics the wasp, tricking predators into thinking it's dangerous.

  Other examples: Clearwing moths, Viceroy butterfly, Mimic octopus

- Automimicry occurs when one part of an animal's body mimics another part or a different species to confuse or deter predators. For example, the owl butterfly has large eye spots on its wings that resemble owl eyes, eye-like markings on the back of a tiger's ears helping to scare off potential threats.

  Other examples: Bush Viper, Foureye butterflyfish, Woma python

- Cryptic mimicry is when an animal mimics parts of its environment—like leaves, twigs, or bark—to avoid being seen by predators or prey. For example, stick insects look like twigs, and leaf-tailed geckos resemble dead leaves, leafy sea dragons mimic seaweed, making them nearly invisible in their natural habitats.

  Other examples: Leafwing butterfly, Looper caterpillars, Tawny Frogmouth

DESIGN WORKSHEET

DESIGN A PATTERN TO HELP AN ANIMAL SURVIVE

Use the bow below to plan your ideas. Think about:

- What habitat does your animal live in?
- What kind of pattern will it be? (Stripes, spots, bright colours)
- What type of predators your animal will need to hide from?
- What is the purpose of the pattern? (camouflage, warning, mimicry)

Draw your pattern design in the box below

Explain how your pattern will help your animal survive in its habitat.

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DIFFERENT TYPES OF PATTERNS

ANIMAL PATTERN EXPLORATION

Animals use patterns in many ways to help them survive. Some patterns help them blend into their surroundings, others confuse predators, and some send clear messages like "stay away!" or "I'm ready to mate." In this activity, you'll explore six types of patterns—blending, disruptive, disguise, mimicry, communication, and mating—and think about how different animals use these patterns. You'll list examples for each type and then choose one animal to draw, showing how its pattern helps it survive in its environment.

Pattern Type	Animal Examples	Example of pattern (draw)
Blending		
Disruptive		
Disguise		
Mimicry		
Communication		
Mating		

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EXTENSION - MIMICRY RESEARCH

THE FASCINATING WORLD OF ANIMAL MIMICRY

Objective:
To explore the different types of animal mimicry, understand their purposes, and examine specific examples. Students will present their findings and reflect on the significance of mimicry in survival strategies.

Task Overview:
Students will conduct research on the three main types of mimicry: Batesian mimicry, automimicry, and cryptic mimicry. They will select one example for each type of mimicry and create a presentation that highlights their findings.

1. Research Phase:
    - Divide into small groups and assign each group one type of mimicry (Batesian, automimicry, or cryptic)
    - Each group will research their assigned type of mimicry, focusing on:
        - Definition and characteristics
        - Purpose of the mimicry in survival
        - At least two specific examples of animals that exhibit this type of mimicry, including their habitat and any interesting behavioural traits

2. Presentation Preparation:
    - Create a visual presentation (e.g., PowerPoint, poster, or digital infographic) that includes:
        - A brief introduction to the type of mimicry.
        - Detailed information on the examples chosen (images, diagrams, or videos if possible)
        - Explanation of how the mimicry works to aid in survival (e.g., avoiding predators)
        - Any relevant adaptations or features that help the animal mimic

3. Class Presentation:
    - Each group will present their findings to the class, allowing time for questions and discussion
    - Focus on engaging the audience with visuals and clear explanations

4.Reflection:
    - After all presentations, each student will write a short reflection (1-2 paragraphs) on what they learned about animal mimicry and its importance in nature

SUGGESTED ACTIVITIES- TEACHER RESOURCE

LEARNING INTENTIONS

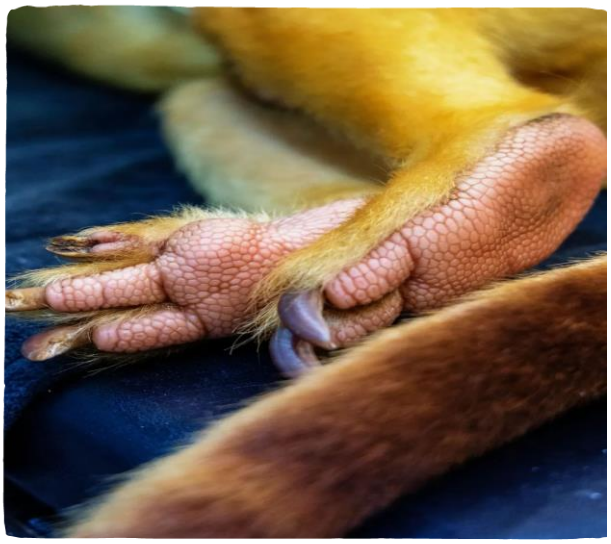
1. I understand how Indigenous Australians use animal footprints to track and understand animal movement
2. I can explain why Indigenous knowledge about animal tracks is important for living sustainably and caring for the environment

SUCCESS CRITERIA

1. I can identify examples of how Indigenous Australians use animal tracks
2. I can explain how tracking skills help understand changes in the environment and how this was useful for survival

FOOTPRINTS

Animal footprints are like secret stamps—clues left behind that help us decode nature's hidden language. For thousands of years, Indigenous peoples have read these signs to track animals, understand their behaviour and movements. By studying these patterns, we learn how animals live, travel, and interact with their environment—like reading a hidden language written in the ground.



INDIGENOUS TRACKING

- Show students a variety of animal tracks and ask them to identify which animal they belong to.
- Use a sand box and allow students try create different animal footprints.
- Explore the different ways Indigenous people used animal tracks:
- hunting
- reading behaviour and movement
- monitoring environmental change
- navigation
- cultural knowledge and storytelling

GOING DEEPER FOR HPGE STUDENTS- TEACHER RESOURCE

LEARNING INTENTIONS

1. I understand how Indigenous people used environmental indicators to track animal movements and identify their presence in the area
2. I understand how Indigenous people used auditory and olfactory cues to enhance their tracking skills and predict animal behaviour

SUCCESS CRITERIA

1. I can identify and describe at least three different environmental indicators that Indigenous people used to track animal movements
2. I can explain how each indicator helps in identifying animal presence

OTHER WAYS OF TRACKING

Indigenous people have developed various methods for tracking that go beyond following animal tracks in sand. Students can explore the following examples:

1. Environmental Indicators: Indigenous trackers often observe changes in the environment, such as shifts in vegetation, broken branches, or disturbed soil, which can indicate the presence of animals.

2. Sound Cues: Listening for specific sounds can provide clues about animal movement. For instance, the calls of birds or the rustling of leaves can signal nearby wildlife.

3. Smell: Certain animals have distinct scents that can be detected. Indigenous trackers might recognise these smells to identify the presence of specific animals in the area.

4. Weather Patterns: Understanding how weather affects animal behaviour can aid in tracking. For example, animals may be more active during certain times of the day or after rain.

5. Water Sources: Animals often travel to water sources, so knowledge of local water bodies can help trackers predict animal movements.

6. Seasonal Changes: Indigenous knowledge of seasonal patterns in animal behaviour can guide tracking efforts, as animals may migrate or change their habits based on the time of year.

7. Animal scat: used as a tracking tool to identify species, understand their dietary habits, determine the age of the droppings, assess territorial behaviour, indicate health, and map movement patterns. By examining the size, shape, contents, and condition of the scat, trackers can gain valuable insights into wildlife presence and behaviour.

ANIMAL TRACKS

Match the following footprints to the animal they belong to.









Look at the animal foot/paw and draw what footprint they would leave behind.

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TRACKING THE LAND

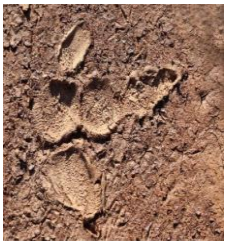
UNDERSTANDING ANIMAL TRACKS THROUGH INDIGENOUS KNOWLEDGE

Animal footprints are like secret stamps - clues left behind that help us decode nature's hidden language. For thousands of years, Indigenous peoples have read these signs to track animals, understand their behaviour and movements. By studying these patterns, we learn how animals live, travel, and interact with their environment - like reading a hidden language written in the ground.

Group Activity: Track Detective Challenge

Look at the following animal tracks and think about the following:

- What animal do they belong to?
- Where might you find this animal track?
- What might the animal be doing?





Cultural Connection: Storytelling

Create a short story or explanation based on your track scenario, incorporating Indigenous perspectives. Consider how the track might be part of a Dreaming story or used in seasonal knowledge.

Individual Reflection

Write a short paragraph explaining:

- The different ways Indigenous Peoples used animal tracks and why this was import for survival
- Why Indigenous knowledge of animal tracks is important for sustainability.
- How this knowledge helps care for the environment.

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SUGGESTED ACTIVITIES- TEACHER RESOURCE

LEARNING INTENTION

1. I can identify and describe how different animals use their senses to enhance their survival
2. I understand how animals use electroreceptors

SUCCESS CRITERIA

1. I can describe how each sense helps an animal survive in an environment
2. I can describe how electroreception helps animals to find food, avoid danger, or navigate

SUPER SENSES

From the keen eyesight of the sugar glider to the powerful hearing of the greater bilby, and the sensitive touch of the koala — Australia's wildlife uses its super senses to decode the hidden language of nature every day.

- Set up sensory stations to help students explore how different animal senses—such as sight, hearing, touch, smell, and taste
- Assign each student or group an Australian animal to research how its senses contribute to survival, focusing on specific senses and their roles in finding food and avoiding predators, culminating in a presentation to share their findings with the class
- Take students on a nature walk to observe sensory experiences using a senses checklist, encouraging them to connect their observations to how local wildlife uses these senses for survival

ELECTRORECEPTORS

From the electric-sensing bill of the platypus to the signal-detecting snout of the echidna, some of Australia's most curious creatures are tuned into nature's electric whispers. These monotremes use electroreceptors to decode the unseen world around them.

- Assign students to research Australian animals that utilise electroreception, focusing on its role in finding food, avoiding danger, and navigation, and have them create a presentation to share their findings, complete with diagrams and habitat examples
- Create a role-playing game where students act as Australian animals with electroreception abilities, designating some as "predators" and others as "prey" in a setup that simulates a feeding ground, allowing predator students (potentially use blindfolds) to experience the challenges of locating prey using sensory cues

LINKS:

Platypus Keeper Talk

Echidna Diet Talk

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GOING DEEPER FOR HPGE STUDENTS - TEACHER RESOURCE

LEARNING INTENTION

1. I can identify and describe how different animals use their senses to enhance their survival
2. I understand how animals use electroreceptors

SUCCESS CRITERIA

1. I can describe how each sense helps an animal survive in an environment.
2. I can describe how electroreception helps animals to find food, avoid danger, or navigate

OTHER CONCEPTS TO EXPLORE

These activities will enable HPGE students to delve into the remarkable adaptations of various animals, enhancing their understanding of how these senses contribute to survival in their environments.

- Investigate how elephants use low-frequency sounds transmitted through vibrations in the ground to communicate and detect distant threats or mates.
- Explore the exceptional eyesight of birds of prey, which allows them to see small movements from great distances, aiding in hunting and navigation.
- Examine how nocturnal animals rely on their heightened sense of smell and acute hearing to locate food and avoid dangers in the dark.
- Investigate how reptiles use their tongues to collect scent particles and how some can detect heat, allowing them to hunt warm-blooded prey.
- Explore how seals use their sensitive whiskers to detect vibrations in the water, helping them locate prey and navigate in murky environments.
- Investigate how dolphins use echolocation to navigate and hunt underwater by emitting sound waves and interpreting the returning echoes.
- Examine how bats use echolocation to emit high-frequency sounds that bounce off objects, helping them navigate and find food in complete darkness.
- Explore how sharks and rays utilise electroreception to detect the electrical signals produced by other animals, enabling them to locate prey hidden in sand or murky waters.
- Investigate how insects use antennae and sensory hairs to perceive their surroundings, employing chemoreception for smell and taste, photoreception for light detection, and how ants communicate through their antennae and detect chemical trails, while flies can taste with their feet.

DESIGN CHALLENGE: "NATURE'S SOLUTIONS FOR A SUSTAINABLE FUTURE"

OBJECTIVE:

Students will explore biomimicry by researching animal adaptations and natural systems to design a solution that addresses a global challenge, such as climate change, sustainable buildings, pollution, or resource scarcity.

Challenge Prompt:

Choose an animal or plant that has unique adaptations or capabilities and design a product or system that mimics these features to solve a specific world problem.

Steps to Complete the Challenge:

1. Research Phase:

- Select an Inspiration: Each student or team will select an animal or plant known for its remarkable adaptations or super senses and understand how that adaptations can be used to solve a real-life problem (e.g., bullet train design based on a kingfisher's beak, Eastgate Centre in Zimbabwe mimics the natural ventilation system of termite mounds, adhesive properties of gecko feet to create new types of adhesives, hexagonal structure of honeycombs has inspired architects and engineers to design lightweight and strong materials).
- Understand the Adaptation: Investigate how this organism survives or thrives in its environment, focusing on specific adaptations, behaviours, or structures that can provide insights for innovation.




2. Identify a World Problem:
Each team will choose a pressing global issue to address, such as plastic pollution in oceans, water scarcity, energy inefficiency in buildings, food waste.

DESIGN CHALLENGE: "NATURE'S SOLUTIONS FOR A SUSTAINABLE FUTURE"

3. Design Phase:

- Brainstorm Solutions: Using insights from their chosen organism, students will brainstorm potential products or systems that could help address the identified problem. They should consider:

❑ How the animal's features can be translated into a design.

❑ The sustainability of materials and processes involved.

- Create Prototypes: Develop a prototype or model of their design, incorporating elements of the inspiration from nature.

4. Presentation:

Each team will present their design to the class, explaining:

❑ The chosen organism and its relevant adaptations.

❑ The world problem they aimed to solve.

❑ How their solution mimics the natural adaptation.

❑ Potential impact and sustainability of their design.

5. Feedback and Reflection:

- After presentations, students will engage in a feedback session where they can discuss strengths and areas for improvement in each other's designs.
- Each student will write a reflection on what they learned about biomimicry and how nature can inspire innovative solutions to real-world challenges.

LINKS: Biomimicry Institute Wired Biomimicry Popular Science

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