Why are Iguanas Falling from the Sky?

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Target Grade: 6th Grade Science

Time Required: 3 days, 90 minute lessons

Standards

Next Generation Science Standards (NGSS):

- **MS-PS1-4.** Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.
- **MS-ETS1-1.** Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
- **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.
- **MS-LS2-5.** Evaluate competing design solutions for maintaining biodiversity and ecosystem services. [Clarification Statement: Examples of ecosystem services could include water purification, nutrient recycling, and prevention of soil erosion. Examples of design solution constraints could include scientific, economic, and social considerations.]

Lesson Objectives

Students will be able to:

- Research about the falling iguanas in Florida and make a direct connection to cold temperatures.
- Understand and analyze the characteristics of cold-blooded animals.
- Compare and contrast various cold-blooded animals.
- Compare and contrast common adaptations of cold-blooded animals.
- Understand the term invasive species and how species' bodies adapt differently.
- Research and analyze how humans have attempted to help animals "adapt."
- Synthesize a warming device for cold-blooded animals.

Central Focus

Students will investigate the phenomenon of iguanas freezing and falling from trees in Florida. To begin the investigation, students will research this phenomenon and cold blooded animals other than iguanas.

Based on their research, using the engineering design process, students will create a device that will regulate heat and protect iguanas.

Key words: invasive species, biology, thermal energy, cold blooded, warm blooded, lizards, reptiles

Background Information

In this lesson, students will investigate the phenomenon of iguanas falling out of trees. This has recently become a problem for many residence living in Florida. The following are news clips reported on the falling reptiles:

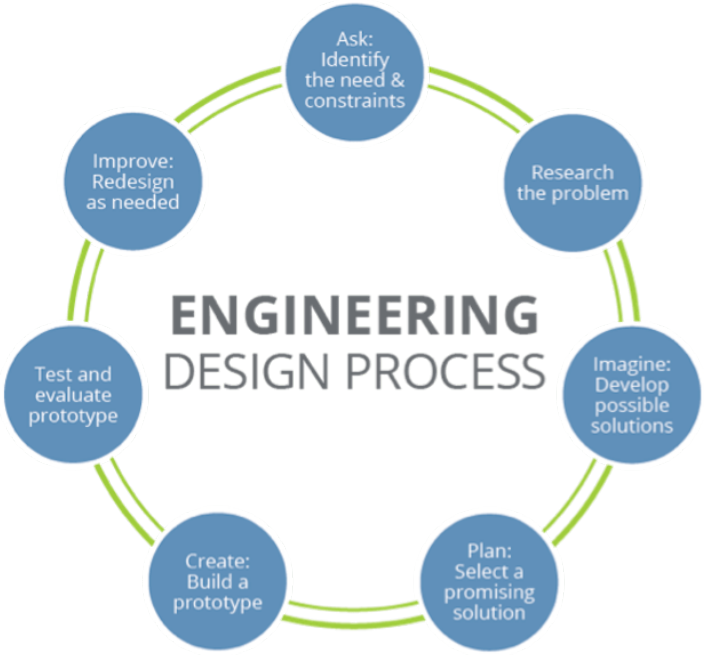
- https://www.youtube.com/watch?v=X0y2edIIn0A
- https://www.youtube.com/watch?v=CYuWjdGOBdo

This phenomenon is caused by the cold-blooded nature of the animals. Their body temperature is directly correlated to environmental temperatures. When the environment gets too cold their body becomes stiff leading them to lose their grip and fall. Iguanas are an invasive species in Florida, which helps explain their body's inability to adapt to the environment.

The following are terms students should be aware of prior to the lesson:

- Invasive species: a nonindigenous species that spreads from the point of introduction and becomes abundant
- Cold blooded animals: having a body temperature varying with that of the environment
- Warm blooded animals: maintain a constant body temperature, typically above that of the surroundings, by metabolic means

Students should be aware of the engineering design cycle prior to this lesson. These steps include the following; Define the Problem, Collect Information, Brainstorm Solutions, Develop a Solution, Build a Prototype, Present Your Ideas to Others for Feedback, Test and Redesign. The process is never really complete, as there can always be additional redesign. Students also need to be aware of the safety precautions in using some of the makerspace materials. It is advisable that the teacher does not introduce new tools in this lesson, but instead uses only the tools students are familiar with already, as a safety precaution.



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Materials

- Iguana falling video
- Laptop for each student
- Iguana Protection Program sheet
- Cold-Blood Sheet
- Iguanas are falling from the sky sheet
- STEM reflection sheet
- Possible STEM materials for designing the device:
    - Cardboard
    - String
    - Lightbulbs
    - Scissors
    - Rubber bands
    - Popsicle sticks
    - Recycled plastics and cans
    - Wood
    - Thermal playdough
    - Paper
    - Straws
    - Tape
    - Pipe cleaners
    - Toilet paper rolls

Instruction

Day 1

- Introduce the students to the question: Why are Iguanas falling from the sky?
- Show a short news clip of the phenomena.

    - Turn off video sound and hide heading to leave the phenomenon unknown.
    - Possible Videos:
        - https://www.youtube.com/watch?v=X0y2edIIn0A
        - https://www.youtube.com/watch?v=CYuWjdGOBdo
- After watching the video, the teacher will instruct students to research the phenomenon using the *Iguanas are Falling from the Sky* research guide.
- Their research should answer the following questions:
    - Why is this happening?
    - Where is this happening?
    - What is happening in their bodies?
    - When (time of year) is this happening?
    - Who is this happening to? Any other animals?
- Next, students will research other cold blooded animals.
- Their research will focus on the following:
    - Comparing and contrasting the animal to iguanas
    - How the animal experiences cold temperatures
    - How they adapted over time
    - How they can be protected
- To end the class, lead short discussion on interesting things the students learned during their research.

Day 2

- Students will finish up any research they did not complete in the previous class.
- Once all research is completed, students will receive the Iguana Protection Program handout.
- The handout will explain each task the students must complete to create a device to warm and protect iguanas.
- The tasks are the following:
    - Task one: Brainstorm ideas to engineer a protection device for iguanas in Florida. Discuss with a partner your ideas and provide feedback to each other.
    - Task two: Develop a blueprint of your device that is labeled and descriptive. It should discuss how it will warm and protect the iguanas.
    - Task three: Ask for feedback from peers on the blueprint. Make revisions when necessary.
    - Task four: Create a list of materials needed from the provided options. Check for material approval from teacher. Begin developing a prototype of your blueprint.
- To finish class, have students submit their blueprints and list of needed materials.

Day 3

- To begin class, the teacher will return all blueprints.
- Students will constructing their prototype using makerspace materials.

- Once constructed, students complete a STEM reflection form focusing on what worked, what needs revisions, and what they learned.
- Students will submit their prototype, research notes, blueprint, and STEM reflection sheet.

Differentiation

- Students can work in groups or on their own for this project.
- Google translate and speech to text is available online and may be utilized for ELL or special needs students.
- Students may choose to create their blueprint on websites like SmartDraw or the sketch option in Microsoft Word.
- Time (an extra day) may be extended for research and constructing the device and/or allow students to build the device at home**.**

Assessment

Formative Assessment:

- Throughout the lesson, teacher can use basic scaffolding questions like, “Can you explain to me your process and why your group is doing that?” or “What are ways your group can improve your design?”
- Teacher can have short discussions over the students’ notes to check for understanding.
- Teacher can have students fill out an exit ticket asking what they learned, what they want to learn more about, and what the student’s design plan is for the next day.

Summative Assessment:

- The focus of this lesson is problem solving with the engineering design process. Due to this, the students should be graded on things like problem solving, the quality of their notes, participation, and ability to use their notes
- Example Rubric:

Project Rubric		
	Student's Points	**Max. Points**
Problem Solving		5
Notes quality		5
Participation		5
Usage of Notes		2
Total Points:		17

Iguanas are Falling from the sky!!

Name: Date:

Teacher: Score:

Grab a computer and begin identifying the five major W's.

Why is this happening?

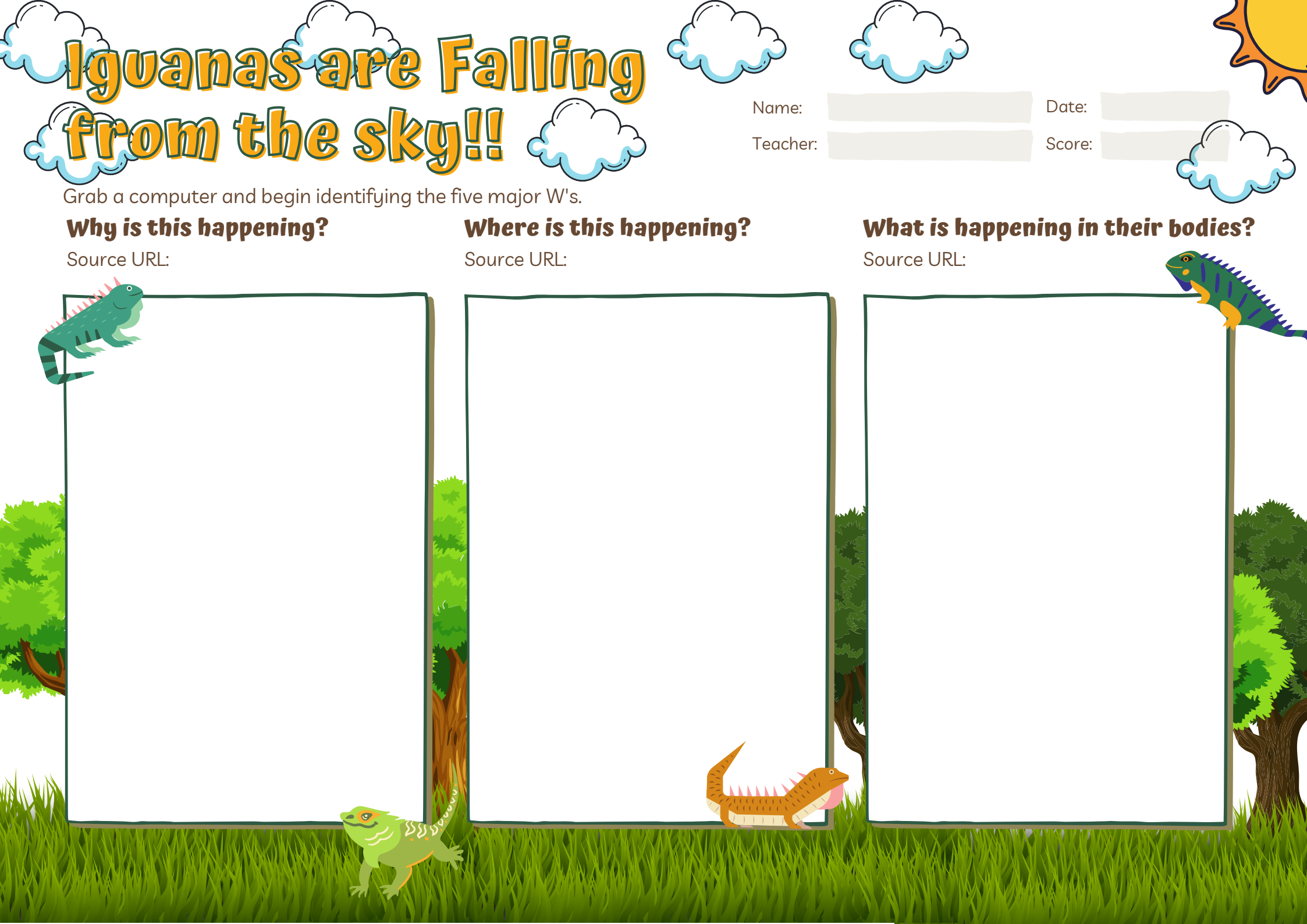
Source URL:

Where is this happening?

Source URL:

What is happening in their bodies?

Source URL:

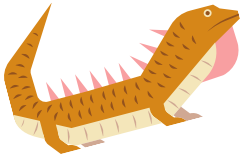


When is this happening?

Source URL:

Who is this happening to (any other animals)?

Source URL:



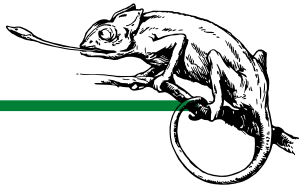
COLD-BLOODED

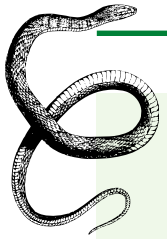
NAME:

GRADE:

TEACHER:

Research other cold-blooded animals. Compare and contrast them to Iguanas in Florida. Answer the following about each animal: How does this animal experience cold temperatures? How have they adapted over time? How can we protect them?





Animal	Animal Answers

IPP

IGUANA PROTECTION PROGRAM

You have been enlisted

YOUR INSTRUCTIONS ARE THE FOLLOWING

TASK ONE

On your own, brainstorm ideas to engineer a protection device for Iguanas in Florida. Discuss with a partner your ideas and provide feedback to each other.

TASK TWO

Develop a blueprint of your device that is labeled and descriptive. It should discuss how it will help warm and protect the Iguanas.

TASK THREE

Ask for feedback of blueprint from peers. Make necessary revisions.

TASK FOUR

Create a list of materials needed from the provided options. Check for material approval from teacher. Begin developing a prototype of your blueprint.

STEM REFLECTION

Name:
Date:

WHAT DID I LEARN?

WHAT PARTS WORKED WELL?

WHAT PARTS OF THE DESIGN DID NOT WORK?

WHAT WOULD I DO DIFFERENTLY?