Copy Cats: Wild Engineering (1st Grade)
Distance Learning Lesson

SYNOPSIS
Students explore how inventions are inspired by adaptations in nature. Students will learn how adaptations that plants and animals have help them to survive by solving a problem. Students will solve a problem by designing an invention that mimics animal/plant adaptations.

NGSS STANDARDS SUPPORTED
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.*

PHENOMENA
Human engineering mimics the natural world.

MATERIALS
- Copy Cat Slideshow (includes the photos and animal/plant videos)
- Inside the Outdoors Animals Videos
- Great Park Videos
- Invention Worksheet and/or Patent Application
- Notebook/Journal
- Pencils
- Coloring supplies
- Construction paper
- Craft/repurposed supplies
- Scissors
- Glue
- Tape

ESSENTIAL QUESTIONS
- How can nature help us solve human problems?
- What problems do certain structures that plants and animals have help to solve?

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LESSON

Facilitator (Teacher/Parent) Does	Student Does	Questions to Move Thinking Forward
Engage Show students photos of nature-inspired inventions (photos are also available in the slideshow). Have students discuss with their partner what plant or animal they think inspired those inventions and explain their reasoning.	Observe and wonder about the photos of the inventions. Try to determine if a plant or animal inspired those inventions. Discuss ideas with a partner, recording reasonings, and wonderings behind guesses.	What plant or animal does this remind you of? Why? Why did humans need this invention? What problem did we need to solve? Is there anything a plant or animal can do that you wished you could do? Why? Is there anything a plant or animal has that you wish you had? Why?
Come back together and have students share their ideas and reasoning. The facilitator can record their findings as they are sharing.	Students present their observations and reasonings to the class and compare with the other students.	Did your classmates make similar or different observations? Can nature inspire invention?
Introduce adaptations, describing them as special "superpowers" can help connect the idea to students. If you could copy any plant or animal's "superpower" which one would you choose? Why? What problem does having that "superpower" help you solve?	Have students think of superpowers plants and animals have. Students should record ideas in their journals.	How do the different parts that plants and animals have help them survive?

LESSON (continued)

Facilitator (Teacher/Parent) Does	Student Does	Questions to Move Thinking Forward
Explore Students will watch videos about Inside the Outdoors animals and/or the Great Park, showing their adaptations. While watching videos students should record observations about specific adaptations they notice or wonder about. Students should record what "problem," they think the adaptation is solving.	**Explore** Students watch the video about the animals or the plants, recording observations and wonderings about adaptations.	What adaptations did you notice about the animals/plants in the video? Why does the plant/animal have that adaptation? How does it help them survive? What problem does it solve for the plant/animal?
Explain Have students share observations and wonderings with one another, record ideas from class discussion. Discuss problems that are being solved by the observed adaptation.	**Explain** Share notices and wonderings with class. Discuss your findings.	How did the adaptations help the plant/animal survive? What problem does it solve for the plant/animal?
Elaborate Have the students choose one adaptation they saw on the video to focus on. Have students identify the problem that adaptation is solving. (Why does it help the animal survive?) Do humans have the same problem? Can the students think of an example?	**Elaborate** Students choose an adaptation, identify the problem that is being solved, explore similar human problems, and design an invention to solve the problem using the adaptation as inspiration.	How do engineers use the natural world to solve human problems? Can we solve a problem by copying plants and animals?

LESSON (continued)

Facilitator (Teacher/Parent) Does	Student Does	Questions to Move Thinking Forward
Have students design their own invention based on that adaptation that humans could use to solve a similar problem. Students can draw, write, or build a model of their invention (Invention Worksheet or Patent Application).	Students will design a model of their invention, labeling special features that reference the adaptation.	Can you design a new invention to solve a problem? Do you have anything in your house that might have been inspired by nature? What problem would you like to solve?
Students should present their inventions "Shark Tank" style. The facilitator could have "imaginary" money to invest, or a "patent" to award the students for their inventions. Students could "pitch" their models, describe their inventions, and explain how humans could benefit from their invention. The facilitator could then ask follow up questions and "invest" or award the patent.	Students pitch their inventions using their models to show off the design, uses, and reasoning behind their inventions.	Why do humans need your invention? What problem is it solving? Would people buy it? If so, how much do you think people would be willing to pay for it?

MODIFICATIONS

Synchronous	Asynchronous	Independent Learning
Engage Students observe nature-inspired objects in the classroom or observe pictures for virtual learning. Examples: helmet (turtle shell), flippers (webbed feed), velcro (burrs), etc. Have students observe the inventions and work together to think of animals or plants that inspired them. Students could record group or individual findings in their journals. **Explore** Students can watch videos as a class and share observations and wonderings live. **Elaborate** Students can present their inventions in class or live on virtual class platform for classmates.	**Engage** Students observe photos on a slideshow, recording observations, and wonderings on the slide. **Explore & Explain** Students watch the videos linked on the slideshow and record observations and wonderings on the slide. The facilitator can compile student ideas and share them with classmates. Students can comment on other students' ideas in a discussion board with recordings, writings, and drawings. **Elaborate** Students can record presentations and post them on a shared space to share with classmates.	Students can look at pictures and videos, using YouTube videos for further understandings and discuss ideas, thoughts, wonderings, and their inventions with their families.

SUPPLEMENTAL SUPPORT

Adaptation	A behavior or characteristic that helps a plant or animal survive in the environment.
Biomimicry	The design and production of materials, structures, and systems that are modeled on biological entities and processes.

Invention Worksheet

Patent Application

Additional Videos:

- Janine Benyus: Biomimicry's Surprising Lessons From Nature's Engineers - TED Talk
- Inventing with Plants - SciShow Kids
- How a Dog Inspired Velcro and a Bat Inspired Radar | Think Like a Tree - Bats and radar (start 1:10)
- How Moth Eyes Inspired the Camera Lens | Think Like a Tree - Moth and Camera Lense
- Using Oak Trees to Help Us Survive A Hurricane - Oak trees and hurricanes
- How Sea Organisms Are Changing the Way We Make Glue | Think Like a Tree - Mussels and glue
- Can Namib Desert Beetles Help Us Solve Our Drought Problems? | Think Like a Tree - Desert Beetle saving water.
- Plagiarizing Nature | Biomimicry - Tinyverse
- How Birds Inspire Builders - The Brain Scoop
- 3 Cool Materials That Mimic Shark Skin - D News