

STEM AT HOME ACTIVITY GUIDE: Crea-ture Catcher



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STEM AT HOME GUIDE: Creat-ure Catcher Challenge

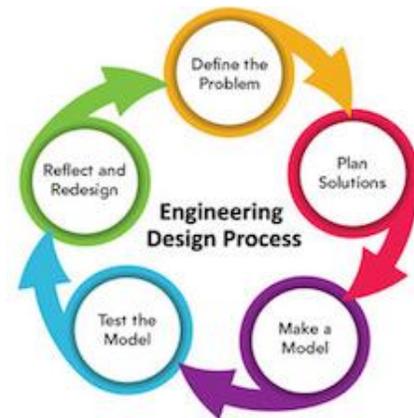
Background Knowledge

Aim: Design a device to safely catch as many endangered creatures as possible in a 12-inch by 12-inch area for release in a nature reserve.

Problem & Career Focus: Currently over 3,000 species of animals and insects are considered endangered. These creatures, if not protected, are at risk of going extinct like the dinosaurs! Some of these creatures have been found in your neighborhood by mistake. Using the engineering design process, your task is to work with your team of biologists, veterinarians, and aquarists to safely capture your endangered creatures for release into a nature reserve where they will be much safer.

Educational Standards Correlations: Life Science, Engineering, Earth's Systems, Ecosystems

Engineering Design Process: STEM professionals use the engineering design process as steps to help solve real-world problems. With your team: define the problem, discuss solutions, design, build, test, and improve a prototype of your solution. One of the most important steps of the engineering design process are reflect and redesign- if your team notices the capture device isn't working, improve the design. Use the engineering design process steps to guide your exploration during the Creat-ure Catcher Challenge.



Investigating Questions

- How could this challenge be used in real-life situations?
- How can the design of your device safely capture your creatures?
- What material combinations will you use to construct a device to fit the 12"x12" area?

Materials

- Yarn, string, or twine
- Pipe cleaners
- Scissors
- Creatures (plastic bugs, bats, spiders, horses or any toy animals you have at home!
- Ribbons
- Coffee filters, foil, and/or paper
- Tape
- Any other household items you desire!

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Background Knowledge

Vocabulary:

Species: a group of similar organisms that are able to reproduce.

Endangered: a species of animal that is seriously at risk of extinction in the wild.

Extinction: in biology, the dying out or extermination of a species.

Nature Reserve: an area where animals and plants are protected that has few buildings or homes.

STEM Career Connections:

Biologists

Are scientists that study humans, plants, animals, and the environments in which they live.

They: conduct studies, human-medical research, plant research and environmental research.

Veterinarians

Serve the healthcare needs of animals, including small animals, livestock, birds, zoo, and laboratory animals.

They: treat family pets, work in clinic settings, perform research and surgery to keep animals healthy.

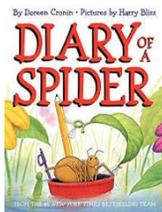
Aquarists

Specialize in keeping aquarium animals healthy, but also are caretakers for fish and other underwater animals.

They: monitor water quality, temperature, clean tanks, repair equipment, design museum exhibits and observe animal behavior.

Literacy Connections:

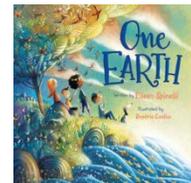
Diary of a Spider by Doreen Cronin



Red Alert! Endangered Animals Around the World by Catherine Barr



One Earth by Eileen Spinelli



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Background Knowledge

Real World Applications: Endangered species, if not protected, could eventually become extinct- and extinction has a long list of problems for our food, water, environment, and even health. A balanced and diverse ecosystem plays an important role for the survival of animals and plants in a habitat.

Habitats

From the depths of the ocean to the top of the highest mountain, habitats are places where plants and animals live. A species' habitat are places where they can find food, shelter, protection, and mates for reproduction! There are many habitats and



biomes on Earth that species call home: deserts, ocean, forests, tundra, rain forest, grassland, and more! Plants, animals, and bugs that live in those habitats have specific body adaptations to help them survive. You wouldn't see a polar bear living in the desert- it wouldn't survive.

Animal Adaptations

Adaptations are any behavior or physical characteristic of a living organism that helps it to survive. These include body coverings, body parts, and behaviors. **Design your device to take into account how to safely capture your creature to make sure no harm is done to their body parts.**

Body parts: wings, teeth, legs, fins, stingers, eye whiskers, feet, claws, tails, beaks, and more.

Body coverings: fur, hair, scales, blubber, shells, skin, and more!

Behaviors: camouflage, migration, hibernation, mimicry, instincts, and more

Everyday Science: You Are What You Eat!

Everyday food: Bugs can be found in everyday food that you consume. We might think that fruits and vegetables are washed properly before we buy them, but there can still be tons of bug parts: legs, heads, particles from bugs that we bring home. Even in canned food, bugs can still either be used or make their way onto our dinner plates. Happy eating!

Red candy: You know you shouldn't eat a lot of sweets.

But it always seems to be the red candied goodies have the best flavors. From red skittles, Swedish Fish, Twizzlers, Hot Tamales, and even red juice- your sweet treat contains more than just sugar. An ingredient called "carmine" used as a vibrant, bright red food coloring is actually made from the abdomen of a female beetle from Africa. The belly of this beetle is used to help make the red coloring in some of our favorite treats.



Check out these video links!

Wild Kratts: How to Protect Endangered Animal Species

<https://www.youtube.com/watch?v=Kq4-Vzk8XeY>

Exploring Habitats

<https://www.youtube.com/watch?v=FlsgHW11nOs>

25 Amazing Animal Facts You Might Not Know

<https://www.youtube.com/watch?v=qMdqPCnFh3s>

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Activity Directions

Aim: Design a device to safely catch as many endangered creatures as possible in a 12-inch by 12-inch area for release in a nature reserve.

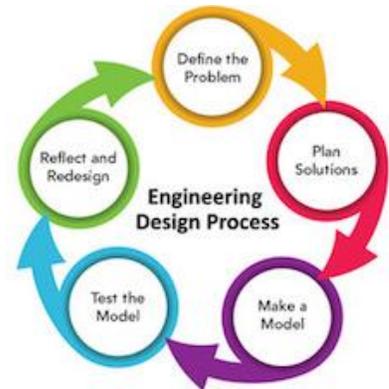
Instructional Video: <https://youtu.be/yidq6jEbYWI>

Investigating Questions

- How could this challenge be used in real-life situations?
- How can the design of your device safely capture your creatures?
- What material combinations will you use to construct a device to fit the 12"x12" area?

Materials

Yarn, string, or twine	Pipe cleaners
Scissors	Ribbons
Coffee filters, foil, and/or paper	Tape
Creatures (plastic bugs, bats, spiders, horses, any toy animals) you have at home	
Any other household items you desire	



Criteria & Constraints:

Engineering design challenges (EDCs) are great opportunities for open-ended activities to grow critical thinking and problem-solving skills. EDCs do not use a list of directions to build a specific design, rather suggest a framework of designing a solution based on the problem and goal. How your team chooses to address the problem and goal is entirely up to you.

- Lay out all materials and items available for the challenge. Plan to give time for your team to discuss the problem relating to your background knowledge. What creature will you focus your rescue on for the capture device (*Define the Problem*)?
- Discuss, sketch, and determine what materials your team will use to create the capture device, ensuring your creature will be safe! (*Plan Solutions*).
- Using your sketches and discussions, begin creating the device from your model from materials available. Family adults: allow your child(ren) to experiment with the materials and help them build problem-solving skills (*Make a Model*).
- As you are building your capture device, test out the model with the creatures you are using! Is the device large enough? Can it hold the weight of the creatures? (*Test the Model*)

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- With your team, continue to discuss and work through problems with your designed model along the way. What adjustments can your team make to keep the creature safe? If you were to make a new capture device, what materials would you use or how would your model be different? (*Reflect and Redesign*)

Ideas to Increase Difficulty:

- Increase the area which the creature catcher must perform.
- Pre-cut materials so that some are too short.
- Add constraints to the number of materials that can be used.

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Sample Ideas



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STEM AT HOME GUIDE: Creat-ure Catcher Challenge Extension Activity

Creat-ure Own Bug!

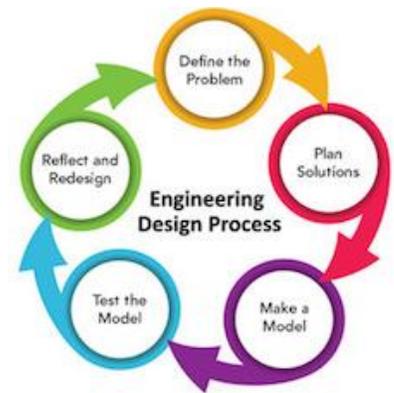
Materials:

Model Magic/Play Dough/Legos
 Tape, Hot Glue, or Tape
 Googly Eyes
 Macaroni Noodles
 Tissue Paper

Pipe Cleaners
 Feathers
 Empty Toilet Paper Rolls
 String
 *ANY household item

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-In this challenge you are designing 2 things: Your new habitat and creature!

-To increase the level of complexity- separate your family into 2 teams! One team will design the habitat and the other team will design the creature.

- Research and brainstorm Earth's different habitats. What materials can you use to create solutions to the problem (Define the Problem)?
- Sketch your prototype and design of key aspects within the habitat (weather, land, water, etc.). (Plan Solutions)
- Use research and the sketches from habitat to start brainstorming your bug prototype (What will the body look like? Will it have legs, wings, etc.) (Plan Solutions and Make a Model)
- Plan your creature prototype: draw or sketch the design. Go outside and observe insects and bugs in nature (Plan Solutions and Make a Model).

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- Use your household materials to make a model of your creature and habitat! (Make a Model).
- Test your design outside! Will your creature survive in the habitat you live in? Talk with your team about ways you could improve the design of your bug and/or habitat. (Reflect and Redesign)

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