Wild About Animals

Pages 1-4 Wild About Animals with Jordan Veasley

Watch the Video Here

Materials Required for This Lesson/Activity	
Quantity	**Description**
10-12 per group	Popsicle Sticks
1 sheet per group	Cardboard
1 per group -or- multiple to be shared by class	Hot Glue Gun with Glue
1 length per group	String
4-6 per group	Rubber Bands
2 per group	Paper or Styrofoam Cups
2-4 sheets per group	Construction Paper and/or Cardstock
1 length per group	Aluminum Foil
Class Set	Cutting Tools (such as scissors, box cutters, or craft knives)
Class Set	Masking/Duct Tape for students to access

Pages 5-7 Wild About Animals with Phil Torres

Watch the Video Here

Materials Required for This Lesson/Activity			
Quantity	**Description**	**Potential Supplier (item #)**	**Estimated Price**
	No Materials Needed for this Lesson		

Wild about Animals with Jordan Veasley: Engineering Animal Enrichments

Grade/ Grade Band: Middle and High School	**Topic:** Engineering Design

Brief Lesson Description: Students will develop a prototype of an enrichment to make the life of an animal at a zoo more engaging and present their idea to others.

Performance Expectation(s):

HS ETS 1-2: Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

MS ETS 1-4: 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.

Specific Learning Outcomes:

Students will be able to….

-Explain what animal enrichment is and how it enhances the lives of zoo animals.
-Design a prototype to explain animal enrichment using common classroom items.
-Develop a test to determine the effectiveness of the animal enrichment
-Predict how it would enhance the animal experience at the zoo.
-Present you solution to others for feedback.

Narrative / Background Information

Prior Student Knowledge:

Elementary students are often familiar with zoos and how they meet the needs (shelter, food, and health) of various animals. As they move into middle school and high school, students develop understanding of ecological roles of animals as well. This lesson will help students to consider the quality of life of zoo animals and how engineering can improve this.

Science & Engineering Practices:	**Disciplinary Core Ideas:**	**Crosscutting Concepts:**
Designing Solutions: Design a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria and trade-off considerations. (HS-ETS1-2) **Developing and Using Models:** Develop a model to generate data to test ideas about designed systems including those representing inputs and outputs. (MS-ETS1-4)	**ETS 1.B: Developing Possible Solutions** A solution needs to be tested, and then modified on the basis of the test results in order to improve it. (MS-ETS1-4) Models of all kinds are important for testing solutions. (MS-ETS1-4) **ETS 1.C: Optimizing the Design Solution** Criteria may need to be broken down into simpler ones that can be approached systemically and decisions about the priority of certain criteria over others (trade-offs) may be needed. (HS-ETS1-2) The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution. (MS-ETS1-4)	**N/A to selected standards**

Possible Preconceptions/Misconceptions:

Common misconceptions that students have about zoos may include:

-Animals are neglected
-Animals do not have enough space
-Animals are trained to do tricks like those in circuses
-Animals are taken from the wild
-Zoos are purely for human entertainment.

To learn more about these misconceptions visit this article!

LESSON PLAN – 5-E Model

ENGAGE: Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions:

Students will begin this lesson by answering the following prompts:

- *Have you ever been to a zoo?*
- *If so, what was your favorite part of visiting?*
- *If not, what do you think a visit to the zoo would be like?*

After students have a few minutes to consider these questions, have them share in groups and then discuss as a class. Explain that many of us visited zoos as children, but that zoos do important work to help us protect wildlife and biodiversity.

Show the XSTEM video "WIld about Animals with Jordan Veasley". His portion of the video ends at 21:58

After the video, ask students to share:

- *one thing that they learned*
- *one thing that they were surprised by*
- *one thing they are left wondering.*

EXPLORE: Lesson Description – Materials Needed / Probing or Clarifying Questions:

Explain to students that today we will be engineering animal enrichments for animals in the zoo. Place students in groups of 4. Assign each student a website below and ask them to spend ~10 minutes exploring the following websites to answer the question, "What is animal enrichment? Give 3 or more examples of animal enrichment" Tell them that they need to be prepared to share with their team.

Website 1: Smithsonian National Zoo and & Conservation Biology Institute Animal Enrichment
Website 2: Wild Welfare Enrichment & Animal Welfare
Website 3: Animal Behavior College The Importance of Enrichment in Zoo Wildlife Habitation Facilities
Website 4: Toronto Zoo Animal Enrichment

Have students share their findings with their teams. Then, as a class, discuss the following three questions:

- *What is animal enrichment?*
- *What problem(s) does animal enrichment solve for the animals living in the zoo?*
- *Do you think all animals are provided enrichment? Why or Why not?*

EXPLAIN: Concepts Explained and Vocabulary Defined:

Explain to students that today we will become engineers tasked with developing animal enrichment for animals at the zoo. Then, show the following video that explains the Engineering design process to the students.

Explain to students that today they will start by defining the problem, investigating the animal that they are going to create an enrichment for and brainstorm possible solutions.

Hand students the Activity Sheet and have them read/review the Problem statement and criteria and constraints. Ask students what clarifying questions they have. The most common one will be what materials are available to use for the enrichment. This is up to you as the instructor, but suggest materials include:

-Popsicle sticks	-Rubber Bands	-Masking Tape
-Card Board	-Paper/Styrofoam Cups	-Duct Tape
-Hot Glue	-Construction Paper	-Any other readily available materials you commonly use
-Masking Tape	-Aluminum Foil	
-String	-Card Stock	

Next, students need to read the passage about the ball python and complete the data table about their needs in the student activity sheet. In a group, students may be assigned roles based on the three categories: Habitat, Diet, and Health.

Finally have students work collaboratively to brainstorm 3 or more ideas for animal enrichments for the ball python. As they generate their ideas, they should be able to explain how they will enhance the life of the species. Have students show you their completed activity sheets (part 1-3) before allowing them to move on to the elaborate portion of the lesson.

ELABORATE: Applications and Extensions:

Students will construct a prototype of their animal enrichment. This is meant to be a rapid prototyping activity–the purpose of their prototype is to show an idea for feedback rather than be a working model. Set a clear time constraint for this activity–the suggested time frame is 30 minutes.

After students build their prototype, they should create a diagram of their idea that shows the important structures, functions, and dimensions of their design.

They will then consider how they would test the success of their design by creating a test for use with the Ball Python. Before students do this, make it clear that animal testing must undergo a rigorous process to ensure the safety of animals, so for this lesson we are only proposing how it would be conducted in a zoo under the supervision of a zookeeper.

EVALUATE:

Formative Monitoring (Questioning / Discussion):
Questions throughout lesson plan in italics, Student Hand Out

Summative Assessment (Quiz / Project / Report):
Students will present their design solutions to the class using a 2 minute elevator pitch. They will use their physical prototypes to show their idea and should address the following information:
-how your prototype would work
-how you anticipate it would improve the life of a ball python
-how you would test it with animals.

As students listen to others' presentations, they should provide one area of strength and one area for growth in their design. An easy way to do this is to provide students index cards or post notes to write on and hand to groups as they finish. This feedback will be used by students in the Elaborate further portion of the lesson. You may have all students listen to one another's presentations–OR–you can have groups pair up and present to each other to limit the class time needed.

Student presentations can be graded using the following rubric:

Exceeds Standard	Meets Standard	Does Not Meet Standard
Meets all required elements and extends to further research/evidence to prove the viability of the solution.	Student Presentation Includes: -Prototype that shows the concept of the animal enrichment -How the prototype would work -The anticipated impact on the life of a ball python -How the prototype would be tested with animals	Missing required elements -or- has errors in the presentation that show material is not understand

Elaborate Further / Reflect: Enrichment:
After receiving feedback from other students, groups should complete part 6 (redesign) of the activity sheet. This will allow them to consider their feedback and think about how their design can be improved. If time allows, they can represent their revised idea to the group that they originally presented to.

SOCIAL EMOTIONAL LEARNING ACTIVITY

Social Awareness: Demonstrating Empathy and Compassion or Understanding the influences of organizations and systems on behavior

In today's video, Jordan Veasley discussed the benefits of volunteering in preparing for his future. But what other benefits does volunteering have? Students today will explore the idea of volunteering and determine the benefits for themselves and others for these activities.

Start the lesson by asking students to define what it means to volunteer. Then, ask them to create a list of activities that they have volunteered in their lives.

Next, show the following video: Volunteering: The Beneficial Side Effect Ted X Talk
As they watch the video, have students create a list of the benefits of volunteering for both the volunteers and the organizations that they help. Discuss as a class following the video.

Provide students an opportunity to research local ways to volunteer. Possible starting points include volunteermatch.com, unitedway.org, or dosomething.org

Alternatively, after watching the video, you can provide students an opportunity to volunteer for local animal related organizations including humane societies, animal sanctuaries, or local zoos.

INTERDISCIPLINARY CONNECTIONS/IDEAS
ELA: Have students read this article and use the provided resources to have a debate on the question, "Are animal Zoos Good or Bad for Animals? CTE: With students in child care/teaching pathways, create a lesson to teach younger students about how zoos help promote biodiversity of species. Geography: Research and explore zoos around the world. How are they similar? different?

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Lesson Created by Jess Noffsinger
For questions please contact info@usasciencefestival.org

Wild About Animals with Discovery Channel Host Phil Torres: Evidence of Species over Time

Grade/ Grade Band: Middle - High School	**Topic:** Evidence of Species over Time	

Brief Lesson Description: Students will explore how data can be used to determine if species populations and types change over time.

Performance Expectation: HS-LS4-5**:** Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.

Specific Learning Outcomes:
Students will be able to:
-Explain what a species is and how it is different from another species
-Explore species data from citizen scientists in their own area
-Describe a variety of evidence that can be used to track and determine new species
-Support a claim about what type of evidence they think best to use to determine if an organism is a new species.

Narrative / Background Information

Prior Student Knowledge:
Students should be familiar with species and how they are classified. They should also have previous experience with what constitutes scientific evidence.

Science & Engineering Practices:	**Disciplinary Core Ideas:**	**Crosscutting Concepts:**
Engaging in Argument from Evidence Engaging in argument from evidence in 9–12 builds on K–8 experiences and progresses to using appropriate and sufficient evidence and scientific reasoning to defend and critique claims and explanations about the natural and designed world(s). Arguments may also come from current scientific or historical episodes in science. ● Evaluate the evidence behind currently accepted explanations or solutions to determine the merits of arguments. (HS-LS4-5)	LS4.C: Adaptation ● Changes in the physical environment, whether naturally occurring or human induced, have thus contributed to the expansion of some species, the emergence of new distinct species as populations diverge under different conditions, and the decline–and sometimes the extinction–of some species. (HS-LS4-5) ● Species become extinct because they can no longer survive and reproduce in their altered environment. If members cannot adjust to change that is too fast or drastic, the opportunity for the species' evolution is lost. (HS-LS4-5)	Cause and Effect ● Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. (HS-LS4-5)

Possible Preconceptions/Misconceptions:
Students may have the following misconceptions about scientific evidence:
-All scientific evidence is equally as useful to supporting claims
-Numeric or quantitative data is more useful than other types of data
-New evidence or breakthroughs instantly are the "best" evidence available

LESSON PLAN – 5-E Model

ENGAGE: Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions:

Scientists are marking claims that "climate change is resulting in some new species emerging while others are going extinct." Today we will explore this claim.

Before starting, ask student to think about and then discuss the following 3 questions:

1) *What is a species?*
2) *What makes one species different from another species?*
3) *How do you think new species are discovered?*

Review the first two questions answers
Species:

Next, explain that we are going to see a tropical biologist named Phil Torres and he is going to explain how he is looking for new species in the wild. Then show the video "Wild About Animals with Discovery Channel Host Phil Torres".

After watching the video, ask students to *Explain how Phil Torres is working to discover new species.*

EXPLORE: Lesson Description – Materials Needed / Probing or Clarifying Questions:

Species can be found in numerous ways, but as Phil explained in the video, the funding for these studies is decreasing. This means that species may never be discovered because of limited funding. The i-naturalist citizen science program allows regular citizens the opportunities to document the species found in their community.

Today, your task will be to go to the website inaturalist.org and complete the following tasks:

1. *Explore the organisms you find when searching for "spiders" on the site. Based on your observations, are there any potential new species on the site? What evidence did you use to make this claim?*
2. *Compare the results of two organisms. One should be flagged "research quality" and one should not have this flag. Based on your observations, what do you think this flag means? What evidence did you use to make this claim?*
3. *Explore the organisms in your local area by searching with a zip code, city or state name. Based on your observations, are there any potential new species near your location What evidence did you use to make this claim?*

As a class, discuss students' findings at the end of their exploration time. Highlight different evidence that students used to make their claims.

EXPLAIN: Concepts Explained and Vocabulary Defined:

Scientists are using a variety of methods to track species types over time. Students will complete a jigsaw activity to determine various methods used to collect evidence about species.

Break students into 4 expert groups. Assign each group one of the following four articles:

Article 1: Digital Records of preserved plants and animals change how scientists explore the world
Article 2: Scientists pull animal DNA out of thin air
Article 3: How to discover a new species of fish
Article 4: Itching to discover a new species? Follow this map

As students read their article, they should collect the following information to share with others:

a. *What type of evidence is used in this article?*
b. *How is the evidence used to track the type of species?*
c. *What pros/cons are there in using this type of evidence to track species over time?*

Have students meet with other students in their expert group who read the same article to compare their answers. If there are disagreements, they should discuss and come to a consensus about what they will share with people who read other articles.
Group students into sharing groups–there should be one (or more) members in each group that read each of the articles above.
Have students share their findings with the other students.
After all students have shared, have them discuss which methods are most beneficial to tracking species data. Then discuss it as a whole class. There is not one right answer, but students should be asked to support their ideas with evidence from the text.

ELABORATE: Applications and Extensions:

Now students will each explore a recently discovered new species from the Natural History Museum in London. (There are enough that each student can have a unique species)

Once again, as they read the text, they will collect the following information to share with others:

a. *What type of evidence is used in this article?*
b. *How is the evidence used to track the type of species?*

c. *What pros/cons are there in using this type of evidence to track species over time?*

When it is time to share data, students should use the Whip Around Strategy to share their learning with their peers. As they are sharing, students should keep information about types of evidence used to find new species.

After all students have shared, have them discuss which methods are most beneficial to tracking species data. Then discuss it as a whole class. There is not one right answer, but students should be asked to support their ideas with evidence from the text.

EVALUATE:
Formative Monitoring (Questioning / Discussion):
Formative questions throughout this lesson are found in *italics.*

Summative Assessment (Exit Ticket): Have students respond individually to the following prompt:
What form of evidence best helps track species over time? Support your claim with examples and facts from text and use clear reasoning to justify why this evidence supports your claim.

Use the NSTA CER Rubric to assess student work.

Elaborate Further / Reflect: Enrichment:
Become a citizen scientist and help collect data on wildlife species. Visit https://www.citizenscience.gov and search for programs that are asking citizens to collect data in their communities. You can search the program catalog by field of science, government organization collecting the data, or current project status.

SOCIAL EMOTIONAL LEARNING ACTIVITY

CASEL Competency: Self-Management
Phil Torres discussed in the video how his passions as a child exploring nature turned into his career. What kind of careers would match your passions? We will take an interest- inventory to see what types of jobs match the things you enjoy doing.

Visit the ONet Interest Profiler and take the online assessment. For each activity, you will select how much you like the activity from Strongly dislike to Strongly like. After completing the inventory, you will find out your scores in six areas. The areas with the highest scores are the ones that might be a good job fit for you.

Explore these jobs and share three (3) that you find interesting with your partner. Explain how these jobs relate to interests or skills you have.

INTERDISCIPLINARY CONNECTIONS/IDEAS

Associated Classes:
-Art: The decoy spider discovered by Phil Torres is the only other animal known to create sculptures of themselves. Create a sculpture that represents you and your passions!
-Geography: One new technology that is showing promise for collecting biodiversity data is satellite mapping. Research this technology and use maps of land cover to predict what areas of the world scientists should focus their searches for new species.
-Mathematics: Investigate species data using the Data Nuggets Activite "Are you my species?"

Materials Required for This Lesson/Activity			
Quantity	**Description**	**Potential Supplier (item #)**	**Estimated Price**
	No Materials Needed for this Lesson		

Lesson Created by Jess Noffsinger.
For questions please contact info@usasciencefestival.org