

CHEETAH FUN!

9th-12th Activity Guide



Lifestyles of the Fast and Fabulous

Biomimicry has created a world of opportunity for humankind. Evaluate the adaptations of the cheetah that allow it to be super fast. Identify how we can benefit from similar technology and design a plan of action utilizing the scientific method to test out your plan in a simulated experiment.



Imminent Extirpation

The Cheetah is facing imminent extirpation, analyze and evaluate the challenges facing the cheetah and identify the roll Zoos play in keeping these animals from full extinction. Debate the positive or negative effect Zoo's



The Cheetah Challenge

Youth are the future, their ideas and unique perspectives open the world to a plethora of opportunity. Use that perspective to craft a solution to the cheetah challenge.



Take Action

Getting involved in conservation can be relatively easy and enjoyable. As a class, participate in a citizen science project called Snapshot Ruaha.



Curriculum Connection

Have ideas to make this curriculum better? Please share them at CheetahSAFE@livingdesert.org

SEVEN WAYS TO JOIN THE RACE TO SAVE THE CHEETAH



Join us at The Living Desert or right in your classrooms every December 4th for cheetah fun facts, activities and conservation action in observance of International Cheetah Day.



Spread the word with friends and family about what you are learning. Encourage others to take action with you.



Adopt a cheetah at The Living Desert as a class and help us support the Species Survival Program by helping us to provide our coalition with the best care possible during their stay!



Help sponsor an Anatolian shepherd dog for farmers in Namibia to help reduce livestock-cheetah conflicts as a class.



Be a cheetah champion by seeking out and participating in Citizen Science opportunities.



Tell your friends and family to join the International Cheetah Day celebration annually on December 4th with you!



Take pictures of your class taking action for cheetahs this December 4th and submit them on our website to be shared on social networks highlighting how your class is a champion for conservation!



International Cheetah Day Suggested Activities HS

Overall Goal:

Students will become more aware of how cheetahs are unique and have amazing adaptations. They will be introduced to the unique story of the cheetah and humans are working hard to save this remarkable species from extinction.

1. **Lifestyles of the Fast and Fabulous (Science + Technology + Engineering + Art + Math) (ELA)**

NGSS Standard :

HS-LS2-7

Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.*

Objective:

Students will learn about the amazing adaptations of the cheetah while learning and experiencing the concepts of biomimicry.

Vocabulary:

Biomimicry Brainstorming Engineering Imitate Invent

Materials:

Video: <https://youtu.be/FBUpnG1G4yQ>
<https://internationalcheetahday.com/> - For facts on cheetah
 Lessons on biomimicry if you would like to use them as curriculum:
<https://biomimicry.org/what-is-biomimicry/>
<https://biomimicry.org/biomimicry-examples/>
<https://biomimicry.org/stories-field/>
<https://biomimicry.org/resources/>

Paper, pencils, markers or colored pencils, ruler, pictures of cheetahs and fact sheets, the internet, books, cheetah worksheets

Informational Resources:

<https://biomimicry.org> Find the tab that says Biomimicry 101

Introduction:

Cheetahs have amazing adaptations that allow them to run up to 70-75PMH. Take a look at some of there adaptations that make this possible:

1. Rough paw pads – like a dog for traction
2. Semi-retractable claws for traction –(felines have fully retractable claws, only the cheetah has this semi-canine trait)
3. Flexible and muscular spine similar to a greyhound, that springs them forward reaching strides that can surpass 21 ft!
4. Long slender legs that can take high impact like a greyhound
5. Aerodynamic body structure that provides little resistance
6. A muscular tail that acts as a rudder to allow for sharp sudden turns
7. Tear marks on their face help reflect the glare of the sun while hunting during the day
8. Large sinuses for maximum air intake
9. Large lungs and heart to take that air in and distribute massive amounts of oxygen to the rest of the body

This is not all inclusive, there are other amazing adaptations but discovering those can be a fun activity too for your students.

From their claws to their spine, it is clear cheetahs are made for speed. Cheetahs can reach their top speed of 70-75 MPH in 3 seconds, faster than a Lamborghini! Watch this video of a cheetah running and learn all about how they spend most of their time completely in the air while running at these remarkable speeds! <https://www.youtube.com/watch?v=icFMTB0Pi0g>

Nature has perfected the concepts of aerodynamics and so much more with the cheetah's design in order to create the fastest land animal. What can we learn from this animal's adaptations that can help us to be more sustainable, or more efficient? Biomimicry is the science of doing just this. Nature has perfected existence on this planet over millions of years. By looking at these designs we can make our technology better and thus, our lives.

Procedure:

1. Give a background either through video or oral communication about biomimicry. Having pictures of this in action is great like a hummingbird and helicopters.
2. Divide the class into 3-4 groups and hand out their cheetah workbooks
3. Have the students gather information on cheetahs and record their findings taking note of the advantages and disadvantages of their features.
4. After gathering this information they should brainstorm what kinds of things humans do or try to do that could benefit from the designs found in the cheetah, such as their flexible spine and its spring like action for propelling them forward. They should follow the guidelines set on their brainstorming page, to keep comments positive, be wild and adventurous in your ideas, all ideas are to be recorded, and each idea should be explored by the group while they stay focused on the topic and respect each other by holding one conversation at a time.
5. When all ideas have been explored the group should choose one and begin designing and sketching their idea.
6. They will need to brainstorm materials that would be needed, the dimensions, both for a scaled prototype and the real thing and create a shopping list of supplies required.
7. Students should do research if possible on Amazon.com to find out how much their supplies would cost and make a budget.
8. When the design, materials list and budget are complete the group will need to come up with a group name.
9. Then they will present their idea to the class detailing the entire process with an emphasis given to how this idea was stemmed from the features of a cheetah.
10. Have all of the groups put their ideas on a separate table and lay one piece of blank poster paper next to it. Let the groups wander around to each table and give their positive feedback about the group's idea. They can also leave a positive addition, a personal idea to expand upon those already suggested.
11. Groups will reconvene and take in the new concepts, tighten up their plans and prepare to implement.
12. If recycled materials work for prototypes and are easily accessible have the students build a scaled prototype of their idea and again present it to class.

Closure Please take pictures - Send the picture/s to CheetahSAFE@livingdesert.org

Have a collective discussion on biomimicry and how we have learned so much from nature's designs but have so much still to learn. Ask the students to consider the dinosaurs. How can we use biomimicry with extinct animals. Is it harder? Why? It is important we protect the species we have and continue to allow them to inspire us.



Evaluation:

Once this is complete the students will come together and share what their biggest take away was from this activity. Where did they struggle, what was the easiest? Gauge from this their interest and possibly move on to the Extension opportunity.

Extension Option:

If it is possible to do, have the students build a true prototype and really get kinesthetic experience with biomimicry and begin to take these engineering concepts to the next level. Perhaps tie these in with a science fair or similar event to showcase what the students have achieved.



Lifestyles of the Fast and Fabulous!

Group: _____

Team Members:



Design Process Directions:

Follow this worksheet to organize your design process.

1. **Gather Information** about cheetahs: What are the cheetah's features? What are the advantages and disadvantages to these features?

2. **Brainstorm Ideas:** List things humans do or try to do that could benefit from the cheetah's design.

3. **Select a Design** and Sketch it: After discussing all of the ideas, select the most promising one.

Provide a brief description of your design:



Lifestyles of the Fast and Fabulous!

Group: _____

4. Sketch idea: In the space below, draw a sketch of your idea. Include dimensions (the size) of each piece and the final product. Both for a scale prototype and the final piece.



SAFE
SAVING ANIMALS
FROM EXTINCTION
CHEETAH



Lifestyles of the Fast and Fabulous!

Group: _____

Materials needed: What recyclable materials do you need for your project and cost out Amazon.com materials list to create a budget.



5. Evaluate and Finalize

1. List feed back and ideas collected after presentations from their peers:

2. Identify which feedback you have chosen to include in your final piece and why:

Paste a picture of the team working on their project here



2. Imminent Extirpation (ELA)

NGSS Standard:

HS-ESS3-4

Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.

HS-LS2-8

Evaluate evidence for the role of group behavior on individual and species' chances to survive and reproduce

Objective:

Students will learn about the struggles facing the cheetah and about the debate over the role of Zoo's in conservation for species like the cheetah. They will immerse themselves in argumentation and the format and construction of debating affirmative and negative cases.

Vocabulary:

Debate Accreditation Extirpated Imminent

Materials:

The internet, pencils and paper, handouts

Informational Resources:

Video: <https://www.youtube.com/watch?v=Z5byQBJVKv8>

<https://www.aza.org/>

<http://www.livingdesert.org>

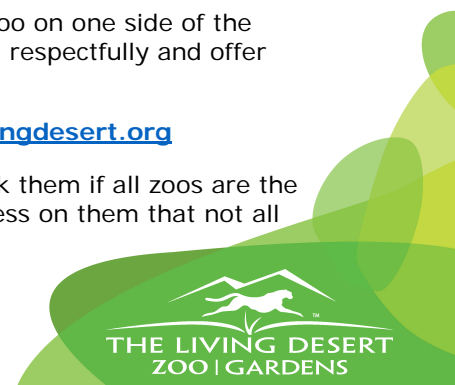
Extension resource just for starters: <https://www.myewa.org/blog/hunting-conservation-tool/>

Procedure:

1. Talk to the students about the cheetah, its amazing speed and adaptations. Then tell them about its struggle and share with them that conservation organization worldwide are working hard to save cheetahs from extinction. This threat is very real and it is the center of a hot debate.
2. Each student will individually research the role of zoo's in conservation and they have evolved over time. The handout included should provide direction in this process.
3. Split the class into two assigned groups, a pro-zoo group and an anti-zoo group.
4. Students from each group will create a list from the gathered research and conduct more research if necessary to solidify their stance
5. A team lead should be chosen and the group should unanimously agree on this lead as they will be the primary for the debate on their side. Once chosen, the team leader's name should be written on the board.
6. Each group should write out their arguments and work to find possible counter-arguments in order to properly prepare for the debate.
7. They will find the handout to be helpful in crafting their debate. It will keep them focused and prepared.
8. Once everyone is ready (or set a time limit) have the students pro-zoo on one side of the room and the anti-zoo on the other. Let each side defend their stand respectfully and offer counter-arguments.

Closure: Please take pictures - Send the picture/s to CheetahSAFE@livingdesert.org

Talk to the class about the value of debate and having your voice heard. Ask them if all zoos are the same? Play AZA video and share with them what accreditation means. Impress on them that not all



zoos are created equal. Some of very conservation focused while others not so much. It is much easier to identify a conservation zoo that has been evaluated and weighed against a high standard of best practices.

Conservation focused zoos are critical to species survival. In the past century alone, there have been times when a species has become extirpated, extinct in the wild, only to survive and become a stable populations because of the efforts of zoos. Share with them the comeback story of the Arabian Oryx, the Channel Island Fox and the Mexican Wolf from shared efforts with our local zoo, The Living Desert. These species came back because of the efforts of your local zoo. Give them time to digest and ask them their thoughts on the subject.

Send the picture/s to CheetahSAFE@livingdesert.org

Evaluation:

By observing and assisting students throughout the process and by listening carefully during the debate you will be able to gauge the students understanding and identify areas of growth and focus.

Extension option:

Have the students research endangered species like the Addax and organization that breed Addax just for hunting. Have them take down notes and choose a stance in regards to whether breeding for hunting should be allowed and whether it helps or hinders conservation.



Imminent Extirpation

Group: Pro Zoo / Anti Zoo

Team Lead: _____

Team Members:



Debate Preparation:

Follow this worksheet to organize your design process.

1. **Gather Information** about the role of zoos in conservation and how they have evolved over time. Are all zoos the same? Do all zoos operate by the same standards? Is there a set of standards zoos are measured by? How can you find out if the zoo you want to visit is up to those standards and is actively working toward conservation or not? Answer these questions below and begin to formulate your own questions.

2. **Make a list** of gathered research below:



Imminent Extirpation

Group: Pro Zoo / Anti Zoo

Team Lead: _____

Team Members:



Arguments:

Possible counter-arguments

Paste a picture of the team during the debate



3. The Cheetah Challenge (Science + Art + Math) (ELA)

NGSS Standard:

HS-LS2-7

Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.*

Objective:

Students will learn about some creative ways people/organizations around the world are working to save the cheetahs from extinction. They will be introduced to the concept that the natural instincts of specific species have unique benefits for the coexistence and sustainability of multiple species including humans. By looking at the natural instincts, adaptations and behaviors of wildlife and domestic animals we can find uncommon solutions to common problems. Students will use a 4 Step Problem-Solving Plan to create solutions to complex environmental issues.

Vocabulary:

Deterrence Analyze Devise Scat

Materials:

Video 1 – Anatolian Shepherd Dogs (Protection and Deterrence):

<https://www.youtube.com/watch?v=tnqiBEb9imw>

Video 2 – Scat Sniffing Dogs (Identification and Research):

<https://www.youtube.com/watch?v=yYw7UK6cX8E>

Article: <https://ensia.com/features/conservation-dogs/>

(6-7) Pill bottles/sealable vials, cotton balls, 3-4 different essential oils for scents, map of cheetah habitat with tracking stickers (optional: dog ears headbands) (This can also be done with a scenario much like an Easter egg hunt. Each egg has a scent and is placed around a mapped out location. The students then have to investigate their surroundings for the eggs and once found identify if the scent is a cheetah).

Video 3 - Polya's 4-step problem-solving process:

<https://www.youtube.com/watch?v=aMIVcGEn7EE>

Informational Resources:

<https://cheetah.org/2009/04/latest-on-ccf-scat-dog/>

<https://www.wired.com/2015/02/meet-poop-sniffing-dogs-saving-endangered-wildlife/>

<https://cheetah.org/2009/03/dogs-finding-cheetahs/>

Introduction:

Cheetahs used to roam all over Africa and even into Asia but today due to habitat loss and fragmentation, they only live in 10% of their once expansive habitat. How would you find out where the cheetahs are living in the wild today? The answer is in their poop!

Organizations like CCF and Cheetah Conservation Botswana use **scat sniffing dogs** to find cheetah poop to help collect important data on: where individual cheetahs are moving, how they are using their habitat, how many cheetahs are there and how much space cheetahs are using. Knowing this information will help inform where conservation biologist do their work and save critical habitat space.

Another important role that dogs play in the conservation of cheetahs has to do with their relationship with farmers. In the first video in the materials section you will hear from Dr. Laurie Marker about the out of the box solution that involves dogs, to save these cats. In Namibia cheetahs have been long



blamed for livestock loss, the very livelihood of many of the people in coexisting with the cheetah. The solution came in “man’s best friend”, the Anatolian Shepherd dog armed with their size, protective instinct and trainability.

These sheep dogs protect the livestock without attacking the cheetah, it is a win-win for conservation. Learn more in the video and article above.

Polya’s 4 Step Problem-Solving Plan: Yes for mathematics but a good starting point.

1. Understand the problem – Identify what is known and what a positive outcome would be
2. Devise a plan – Look for patterns, make a model, look at what is already being done
3. Carry out the plan – Solve the problem
4. Look back - Examine the solution – Check the results (simulated in this circumstance) and check the reasonableness of the solution

Procedure:

1. Before the students get into class:
 - a. Print Africa range map and dog paw print stickers.
 - b. Prepare scent vials as “scat”
 - i. Label one vial as “cheetah scat” and scented with one essential oil
 1. This is the key or base smell that guests will be smelling for.
 - c. Label all other vials as “unknown scat” and place them on the range map.
 - d. Scent 2 vials with “cheetah scat” essential oil
 - e. Scent the other vials with other essential oils
 - i. These will be other sympatric animals of cheetahs like leopard, lion, etc
2. Have the students cool down from their race by watching one or both of the videos listed in the materials section. For a more literary approach there is also an article listed that can be used for reading and discussion.
3. After the videos and a brief discussion get the students prepared for an activity
 - a. Provide each student (that wants it) with a dog ears headband tell them they are scat sniffing dogs and have to track the movements of a cheetah through its range so we can study how it uses its environment.
4. Give them the vial labeled “cheetah scat” to smell
5. Let the students smell the “unknown scat” vials and place a dog paw print sticker on the map where they believe they found “cheetah scat” smell.
6. Reveal locations of “cheetah scat” and compare with their answers.
7. Explain that this out of the box solution was created to try and save cheetahs from extinction and it is not the only idea people are using right now.
8. Put the students into 3-4 groups and have them use their worksheet to problem-solve the cheetah challenge.
 - a. Understand/Explore the problem: research what the problem is (choose only one problem, not the entire situation. Research what is already known, what would be an acceptable outcome for you – Be Reasonable
 - b. Devise/Develop a plan: look for patterns, make a model of the situation, what is already being done and to what conclusion
 - c. Carry out the plan/Solve the problem: Using your model, simulate the plan being carried out. What possible outcomes positive and negative could come from this. Have the students present their ideas to the class.
 - d. Look back/Examine the solution: their peers will be instrumental on giving feedback that could be possible results. What could happen with their solution positive or negative. These results should be collected and analyzed. Have them adjust and revisit.
 - e. Final presentation of solution – tell the students to take this seriously because you never know where the defining solution may come from. We want to hear their ideas. Please submit them with pictures as stated below.



Closure: Please take pictures - **Send the picture/s to CheetahSAFE@livingdesert.org**

Close by discussing asking the students why scat sniffing dogs are so important. Remind them that Anatolian shepherd dogs are just as important and go over the key points on the part they play in cheetah conservation.

Evaluation:

Evaluate through observation and content questions especially during closure.

Extension option:

Have the students further discuss the situation facing cheetahs and the other endangered species in their area. Have them use the process of problem-solving to brainstorm and construct as many ideas as possible and present them at science fairs, or share them with conservation focused entities like The Living Desert and lets think outside the box and save species from extinction together!



4. Take Action (Science + Art) (ELA)

NGSS Standard:

HS-LS2-8

Evaluate evidence for the role of group behavior on individual and species' chances to survive and reproduce

Objective:

Students will take part in a citizen science conservation project to contribute to a research database on the community assemblages of savannah habitats and animal interactions in Tanzania.

Vocabulary:

Ungulate Fragmented Gazelle Conservation Elongated

Materials:

Laptop with internet connection, pictures of camera trap images (if available, camera trap)

Informational Resources:

<https://www.zooniverse.org/projects/meredithspalmer/snapshot-ruaha>

Introduction:

Cheetahs used to roam all over Africa and even into Asia but today due to habitat loss and fragmentation, they only live in 10% of their once expansive habitat. How would you find out where the cheetahs are living in the wild today without scat sniffing dogs? How can you explore the relationships carnivores have with the communities that live around them?

Citizen science has the answer! Researchers have developed an innovative model of community camera trapping to identify wildlife in different habitats while educating, employing villages.

"The mission of the Ruaha Carnivore Project is to achieve successful human-carnivore coexistence by empowering local communities, and to develop effective strategies for long-term carnivore conservation. We aim to reduce the costs and improve the benefits associated with wildlife, particularly carnivores, on village land and directly engage and empower local people in conservation.

We are also collecting the first detailed data on large carnivore conservation in this landscape, as this has been highlighted as a priority in regional and national carnivore conservation action plans. Our ecological research has led to the first scientific data and publications on Ruaha's carnivore populations, and has provided vital information for future conservation planning."

(<https://www.zooniverse.org/projects/meredithspalmer/snapshot-ruaha/about/research>)

Procedure:

Depending on if each student has their own computer or not, you can do this individually or as a group. This will be oriented toward individual users applies if presenting it as a class.

Depending on if each student has their own computer or not, you can do this individually or as a group. This will be oriented toward individual users applies if presenting it as a class.

1. Start by going to the Snapshot Ruaha research page found in the introduction section just above and having this up when the students arrive. Talk with them about the project and tell them that often people think that getting involved in conservation take money they do not have. However, there are ways to participate that can be fun and free such as Snapshot Ruaha! This is a Citizen Science activity everyone can participate in.
2. Have students go to the Snapshot Ruaha (link in Information resources but you can also just click the top left of the research page where it says the name in white letters) and click on get

started. From here, they just need to read the instructions on the auto start tutorial and they are off to the races! This may take some time to get used to so I suggest doing this at home before class so you can be prepared to help them.

3. Encourage students not to stop participating. They can make a profile and continue to contribute as a citizen scientist at home!

Closure: Please take pictures - [Send the picture/s to CheetahSAFE@livingdesert.org](mailto:CheetahSAFE@livingdesert.org)

Talk to the students about getting involved in conservation with everyday small actions like sharing the message on their social networks or just turning the water off when they brush their teeth. We can all make a big difference with our little actions. Share with them the seven ways to join the race on your invitation handout especially those that they can do themselves, for free.

Evaluation:

Ask the students to share how many animals they saw, how many different species. Did you see any you had never seen before? Gauge their involvement and understanding through dialogue and while you walk around during the activity.

Extension option:

Search out other Citizen Science projects and have your class get more connected to conservation right here at home!

