



2017-2018 ENRICHMENT DESIGN CHALLENGE

The ZOOMS design challenge offers students a chance to develop a solution to a 'real' problem faced by Zookeepers and staff at the Minnesota Zoo. From designing an enrichment, to building a model of a renovated animal exhibit, the problem will challenge students to use the engineering design process while applying their science and math knowledge, creativity, and problem solving skills to best solve the problem and present a solution. Selected students are invited to showcase their design challenge solution in the ZOOMS Design Challenge Exhibition in March at the Minnesota Zoo for a chance to win a backstage pass experience with our animals!



THE CHALLENGE

The Minnesota Zoo has recently expanded our Amur Tiger pack from three to four, with the addition of a new female tiger cub. The tiger keepers now have their hands full caring for the diverse pack, as they all have different needs, likes/dislikes, and set goals for enrichment. Keepers would love to help the new mother, Sundari, feel comfortable being visible to the public with her new cub. Patricie, our cautious female tiger, needs help building her confidence to play openly and comfortably and to build trust with the keepers. Putin, the sociable lone male and new father, needs encouragement through engaging enrichment to play independently away from the females and learn how to enjoy his time away from them. Keepers need help meeting their enrichment goals through new innovative enrichment ideas that not only encourage tiger natural behaviors, but also consider their individual needs, safety, and exhibit use.

THE TASK

The Enrichment Design challenge will require students to design a durable and unique enrichment device to engage an Amur Tiger(s) at the Minnesota Zoo.

Level 1: Design one enrichment device to be used by choice of one tiger.

Level 2: Design two separate enrichment devices to be used by choice of two tigers. Students will need to make special considerations such as:

- What type of enrichment would serve the species best?
- How can the enrichment be designed with the exhibit layout in mind?
- How will you expect the animal to interact with the enrichment?
- How will the enrichment encourage natural behaviors?
- What materials are most durable and safe to avoid immediate destruction from the animal?
- How will the enrichment help to meet the enrichment goals set by the zookeepers?

A CLOSER LOOK AT ENRICHMENT

Animals in zoos don't have the same opportunities for physical and mental stimulation that wild animals do, so zookeepers provide the animals with objects or changes to their environment that will stimulate the behaviors of healthy wild animals. Enrichment can help to improve animal welfare and reduce stress.

Enrichment gives animals something to think about, encourages exercise and gives animals a degree of control of their environment by giving them choices. Basically, enrichment helps keep animals active and interested in their environment. Zoos may do this by presenting objects for animals to explore (manipulable), or changing how their food is presented to encourage natural foraging and hunting behaviors (dietary enrichment).

- Encourage animals to use their natural abilities
- Increase their activity
- Allow them to make choices
- Give them new experiences.
- Animals in a stimulating environment have fewer physical problems, breed more successfully, are better parents and live longer.
- Challenges and stimulation make animal life in captivity more normal and visitors are more likely to see natural behavior from behaviorally-enriched animals.



PROJECT REQUIREMENTS

Level 1: 3rd – 5th Grade Enrichment Design Challenge

- Develop **one** enrichment prototype to meet the enrichment goals and needs of one Amur Tiger of choice. (Putin, Patricie, or Sundari)
- Measurements/Dimensions** of enrichment
 - Length, Width, Height of key features, including dimensions of openings/holes if applicable (English or metric)
 - Optional:
 - Volume: How much food it can hold
 - Area of any openings/holes
 - Area of any key measurable surfaces

Level 2: 6th-8th Grade Enrichment Design Challenge

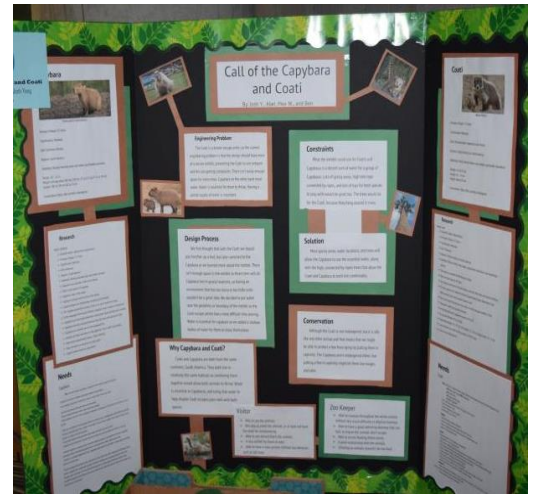
- Develop **two** enrichment prototypes that must be designed for use by two Amur Tigers of choice (Putin, Patricie, or Sundari)
- Metric measurements/dimensions**, of each device
 - Length, width, height of key features
 - Total Surface Area
 - Include if applicable to design:
 - Volume of Feeder/Amount of food it can hold
 - Surface area and circumference of any openings/holes



ADDITIONAL REQUIREMENTS FOR ALL LEVELS

Poster Tri-Fold: A visual presentation documenting the following:

- Problem:** Why is this solution needed?
- Research:** What are the natural behaviors of the animal? What does its natural habitat look like? What adaptations and other facts are important to know before designing? What are typical enrichments used with the animal? What does the animal like/dislike?
- Design Process:** Prototype planning. How did you modify your design along the way? Save sketches and documents created through the process
- Prototype Description:** What will the design be called? What individual does it serve? What are the main features? What are the instructions for use by the keeper? What are the dimensions/measurements?
- Constraints:** What factors prevented a perfect design? Could your solution exist in real life? If the animal was to use your prototype, what might impact a successful use of the enrichment?
- Solution:** How does the enrichment act as a solution to the problem?
 - Does the enrichment encourage natural behaviors?
 - Is the enrichment object safe, functional, and engaging? What are the main features?
 - How will the zookeeper use the enrichment with the animal?
 - How can the enrichment be modified to serve the other species? Is the enrichment challenging enough without being too difficult? It is realistic?
 - How does it meet the enrichment goals set by the zookeepers?
- Conservation Connection:** How does designing and using enrichment help the Minnesota Zoo with conservation efforts? How is the animal doing in the wild? How can enrichment help encourage visitors to want to help protect wildlife?





EVALUATION

Exhibits will be evaluated based on the following criteria: *(A rubric will be provided at the teacher workshop)*

1. **Creative Ability (10 pts):** Approach and solution is innovative and unique.
2. **Use of Engineering Process (30 pts):** Presentation and demonstration of engineering design process was used in development of exhibit redesign solution. Evidence of design/redesign and connection to conservation.
3. **Addressing Solution Requirements (20 pts)**
 - How does the exhibit balance and meet the needs animal, keeper, and visitor needs?
 - Is the design realistic? Is the new design an overall improvement for the space? Have all challenges of the space been considered?
 - Model and blueprint (Level 2) represents a scaled version of the actual zoo space.
 - Profile drawing including measurements of key features
4. **Teamwork/Presentation (15 pts)** Effective communication, organized presentation, demonstrates collaboration. Tri- fold board is well organized and follows guidelines of what to include.

ADVANCING TO THE ZOOMS EXHIBITION

How do I select the top projects to advance to the ZOOMS Exhibition?

Option 1: Host an Exhibition Event at your school attended by Minnesota Zoo Staff

One or two education staff members may be available to assist in informally evaluating or listening to student presentations. Appointments for zoo staff to attend your school's Exhibition Day must be scheduled 2 weeks in advance. We cannot guarantee availability to attend. Please contact Kristi.Berg@state.mn.us to arrange.

Option 2: Plan a Classroom Showcase

Teachers may use the evaluation criteria rubric (provided in workshop) and host their own Design Challenge Classroom Showcase with the teacher submitting the top student designs to the Minnesota Zoo before the deadline.



How many projects can I submit to the Zoo for review?

- Each teacher may submit maximum of $\frac{1}{4}$ of the number of projects created.
 - *Example: 15 total projects = 3 to 4 project submissions*
- All teachers can submit a minimum of one project
- Not all projects submitted will advance to the March ZOOMS Exhibition. Projects will be narrowed by zoo staff and announced in mid-February.

What must be included in each project submission?

- Online Submission Form
 - Student written description of the solution and how it met design requirements
- 1 Word document including:
 - 1-2 Photos of up close views Tri-Fold Board
 - 1-2 Photos of students with prototype
- Signed Media Release Form (*optional*)

Conditions

- Open to all 3rd-8th grade teachers and their students
- Students must work in a group of 2-4 students
- Teachers must register to participate no later than Friday September 15th.

REGISTRATION

Teacher and student participation in the ZOOMS Design Challenge is FREE! Teachers can also attend a full one-day training either on **August 17th** or **September 26th** to gain background knowledge of each challenge and gather resources to implement into the classroom.

Register online by visiting mnzoo.org/stem and clicking the 'Apply Now' link under the 2016-2017 Design Challenge. The first 10 elementary teachers and 10 middle school teachers who register will receive a \$200 stipend upon completion of the following:

- Attendance to one of the ZOOMS Design Challenge Workshops offered
- Participate in a pre/post ZOOMS program assessment surveys
- Implement the ZOOMS design challenge in your classroom
- Submit student projects to be considered for the ZOOMS Design Challenge Exhibition in March.



IMPORTANT DATES

Closing date for Registration	Friday September 15 th , 2017
ZOOMS Design Challenge Workshop <i>(Choose one to attend)</i>	August 17, 2017 9 am-3:00 pm September 26, 2017 9 am – 3:00 pm
Design Challenge Implementation Support <i>(Optional)</i>	Saturday October 14, 2017 9 am -12 pm
Closing Date for Top Project Submissions	Thursday February 15, 2018 by 12 pm
Projects Advancing to Exhibition Notified	Wednesday February 21, 2018
Elementary ZOOMS Design Challenge Exhibition	Tuesday March 20, 2018 9 am-2:30 pm
Middle School ZOOMS Design Challenge Exhibition	Thursday March 22, 2018 9 am-2:30 pm

CONTACT

Contact Kristi Berg for further questions and information.

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Visit mnzoo.org/stem to learn more!

