2017-2018 EXHIBIT DESIGN CHALLENGE

The ZOOMS design challenge offers students a chance to develop a solution to a 'real' problem faced by Zoo Keepers 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 currently offers two exhibits for viewing the Amur Tigers, Tiger Basecamp and Tiger Lair. Right now, because of the diverse needs of each tiger and the exhibit features of both spaces, Sundari is the only tiger that currently can use both exhibits. Putin and Patricie are only able to use the Tiger Basecamp which limits the keepers with shifting the tigers throughout the day and providing them with a new environment to explore. While the Tiger Basecamp exhibit has an interactive area for visitors, the design and layout of the space needs improvement to resolve many issues and to accommodate all tigers, including the newest female tiger cub born to Sundari in April. The Minnesota Zoo would love to see new design ideas to see how the space could better accommodate the tigers will still meeting the needs of the keepers and visitors.

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THE TASK

The Exhibit Design Challenge will require students to redesign and build an exhibit model of the current Tiger Basecamp exhibit to meet tiger, visitor, and keeper needs. Students will need to make special considerations such as:

- ☐ What will need to be changed/added to meet keeper, animal and visitor needs?
- ☐ How can the space be used to provide more enrichment opportunities?
- ☐ Can the new design improve the quality of the visitor's experience and prevent objects from falling in to improve the safety of the guests and the animals?
- ☐ What will guests learn from visiting this exhibit? How can the space be redesigned to be more immersive with a keeping a conservation focus?
- ☐ How can a new design better accommodate the needs of the tiger so all individuals can use the space?
- ☐ How can the design improve visibility of the animal in the space?

A CLOSER LOOK AT EXHIBIT DESIGN

Zoos are frequently welcoming new animals, whether it be in a brand-new exhibit or in an existing one. Whatever the case may be, the zoo's exhibit designer's job is to design the best environment for the animals as well as the keepers and the visitors.



Designing an exhibit starts by researching the animal's natural environment to learn all they can about the animal's habitat, including the plants, climate, and topography. Research might also include a consideration of the animal's behavior, such as how much space it needs, if it climbs, jumps, or swims, and how strong it is.

Working cooperatively with curators, zookeepers, educators, artists, engineers, and many others, exhibit designers must also consider the needs of the keepers, through creating functional and easy to clean spaces, and the visitors, by creating exhibits that are educational, interactive, and deliver an important message about conservation. Balancing these needs in one design is a difficult job with many differing opinions and constraints!

PROJECT REQUIREMENTS

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

- ☐ Development of a **3D model** that closely resembles the shape/size of the current Amur Tiger Basecamp exhibit space. (No rectangular dioramas)
- ☐ **Profile drawing** of the exhibit (See Figure 1 or Figure 2)
  - Identify all of viewing angles from each key visitor location. (see Figure 2)
- ☐ Include **measurements/dimensions of key exhibit features** (tree height, barrier height, etc.)
  - If applicable to design, include substrate or water feature depth.



Figure 1
Profile drawing of an exhibit.

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

- ☐ Development of a **3D model** that is scaled according to Tiger Basecamp Zoo blueprint measurements.
- ☐ **Birds Eye detailed blueprint of new design which includes:**
  - **Label key features** and their real-world measurements as well as the **scale being used**.
  - Length of walls/sides of enclosure including viewing space for visitors and keeper access areas.
  - Total square ft. of the enclosure and any water or shelter features.
- ☐ **Profile drawing** of the exhibit (See Figure 1 or Figure 2)
  - Identify all of viewing angles from each key visitor location. (see Figure 2)
  - Label key exhibit features (trees, ramps, enclosure barriers)

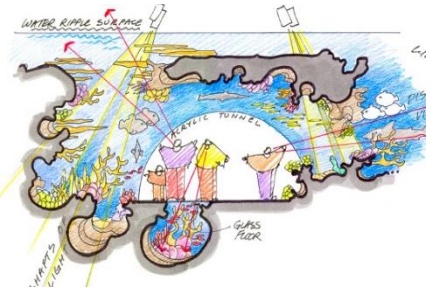

Figure 2
Viewing angles drawn (in red) in a profile drawing of an exhibit.

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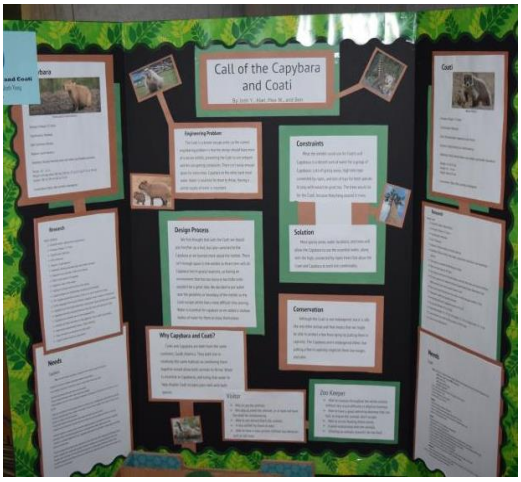
ADDITIONAL REQUIREMENTS FOR ALL LEVELS



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? Does research support decision making throughout the design process?
- ☐ ***Design Process:*** Prototype planning. How did you modify your design along the way? Save sketches and documents created through the process
- ☐ ***Prototype Description*:** What are the main features of the exhibit? What are the measurements/dimensions? How are animal, keeper, and visitor needs met? How does it differ from the current space? Is there a theme?
  Include Final Profile Drawings and Blueprint
- ☐ ***Constraints*:** What factors prevented a perfect design? Could your solution exist in real life? What issues might you encounter if your plan was chosen to build?
- ☐ ***Solution****:* How does the exhibit design act a solution to the problems mentioned in the challenge?
  - Does the exhibit include opportunities for environmental enrichment?
  - Is the space functional, safe, and does it mimic the animal's natural habitat?
  - Does the new design improve current challenges of the exhibit?
- ☐ ***Conservation Connection****:* How does exhibit design help the Minnesota Zoo with conservation efforts? How is the animal doing in the wild? What can visitors learn at the exhibit to help them act on behalf of 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)**
    a. How does the exhibit balance and meet the needs animal, keeper, and visitor needs?
    b. Is the design realistic? Is the new design an overall improvement for the space? Have all challenges of the space been considered?
    c. Model and blueprint (Level 2) represents a scaled version of the actual zoo space.
    d. Profile drawing including measurements of key features
4. **Teamwork/Presentation (15 pts)** Effective communication, organized presentation, demonstrates collaboration.

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 **¼** 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.

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IMPORTANT DATES

Closing date for Registration	Friday September 15th, 2017
ZOOMS Design Challenge Workshop *(Choose one to attend)*	August 17, 2017 9 am-3:00 pm September 26, 2017 9 am – 3:00 pm
Design Challenge Implementation Support *(Optional)*	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.

Email: STEM@mnzoo.org
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Visit mnzoo.org/stem to learn more!



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