Engineering Design Challenge – Math, Science and Engineering Day at Six Flags St. Louis

Students will form a focus group team of two to four students and will evaluate the design and function of one of the two challenges listed in this packet. Each team will create a collage of ideas about the ride. Engineers will evaluate submitted ideas and select the best ideas. First, second and third place prizes will be awarded to both high school and middle school students for the challenge.

Engineering Design Challenge Headquarters
Students will check in at the Empire Theater located near BATMAN: The Ride between 9am-10am. At this time, they will be given a time to come back and present their project to a team of judges. Presentations will be limited to 10 minutes per team. Judging will take place between 9:30am-12:00pm. All groups will be asked to return to the theater at 2pm when the winners will be announced.

Timeline
9:00am-10:00am – Student teams will register at the Empire Theater located near Batman: The Ride and receive a time to return and present their project to the judges.
9:00am – 2:00pm – Students can visit exhibits outside the Empire Theater at their leisure.
9:30am-12:00pm – Teams will be presenting to the judges inside the Empire Theater. Presentations will be limited to 10 minutes per team.
2:00pm – 2:30pm (approximately) – Students and teachers invited to the Empire Theater for the winners of the design challenge to be announced.

Deliverables
Be prepared to provide a well-organized oral and visual presentation to the engineers. Each team will provide a detailed Engineer’s Notebook documenting the design process they followed to arrive at a design solution. Presentations will be given between 9:30am – 12:00pm at the Empire Theater. Computers and monitors will be provided. Each team must provide a virus clean thumb drive with their presentation (Power Point software preferred). It is recommended each team bring a backup thumb drive with presentation loaded.

Teachers
This event can be a real-world hands-on opportunity for your students. Both Middle School and High School age participants are invited to work on the design challenge. Student groups will need to work on the projects ahead of time in order to have their completed presentation on a flash drive to hand to the judges on the day of the event. Each group will need a separate flash drive and are encouraged to bring a backup.
Design Challenge 2017 – Screamin’ Eagle

Background
Six Flags St. Louis
Six Flags St. Louis, originally known as Six Flags Over Mid-America, is an amusement park located in Eureka, Missouri. The park opened in 1971 as the third theme park of the Six Flags chain and was the last park built under the Six Flags name. Currently this park and 17 sister parks around the nation, are owned and operated by limited partnerships and managed by Six Flags. The park is built around the 10 roller coasters and a water theme park. Over time the park has added, changed, and eliminated different adult, kiddie, and extra charge rides and attractions.

Screamin’ Eagle

The Screamin’ Eagle opened on April 10, 1976 and would hold the Guinness World Record for the Longest, Tallest and Fastest Roller Coaster in the World for two years. The last coaster designed by the late John Allen, dean of North American Coaster Design, the Screamin’ Eagle is ranked #7 in North American for Speed by the Roller Coaster Data base and remains a guest favorite. It is the second roller coaster to be built at Six Flags St. Louis and is the park’s first wooden coaster.

- Type: Out and Back
- Track Length: 3,873 feet
- Maximum Speed: 62 mph
- Maximum Drop: 92 and 87 feet
- Other Features: Swoop Curve – slows the cars momentarily before the first drop
- Designer: John Allen
- Contractor: W. Norm Howells, Jr., Frontier Construction Co.

For more information on this ride, visit: https://www.sixflags.com/stlouis/attractions/screamin-eagle
For POV footage of this ride, visit: https://www.youtube.com/watch?v=NtBbEwoT0G4
For video footage of this ride, visit: https://www.youtube.com/watch?v=r1qc89Nrhkm
To view a map of Six Flags St. Louis, visit: https://static.sixflags.com/website/files/sfsl_park-map-and-guide.pdf

Screamin’ Eagle Design Challenge

The following questions are intended to guide the Design Team in the design process. Team members should not limit themselves to these questions. Collect and record as much information as needed to make a quality, well thought out design concept decision. The Design Team should use this data as support during the Design Concept Presentation phase of the challenge.

1) Finding the Ride in the Park-
   - Can you see the ride you are looking for from your current and other locations?
Do you think this ride is easy to see from most park locations?
Is the entrance to the ride easy to locate?
If you have never ridden this ride, what are your initial thoughts (based on the ride entrance) about what the ride experience will be? What do you think the ride does?

2) The Ride Entrance-
The entrance to a ride often sets the mood for the rider. Many rides attempt to increase the adrenaline of the rider before they enter the ride. This can help elevate the experience and attract people who may be navigating to a different park location.
   - What are your initial feelings about the ride as you enter?
   - Does the theme of the ride increase your excitement?

3) Waiting in Line for the Ride-
   - Do you feel like you are waiting for a long time for the ride?
   - Are you constantly moving or moving and stopping?
   - Are you entertained as you are waiting?
   - Do you feel safe (no potential hazards/dangers) while moving through the line?
   - List the mechanical, electrical, pneumatic, and/or hydraulic components you see as you watch the ride?

4) Transitioning from the line to your seat on the Ride-
   - Is this just a process, or part of the ride experience?
   - How long does this take from the moment the ride (the vehicle you will be sitting/standing in) enters the loading zone until the moment it moves out of the loading area?
   - Are there any concerns as you board the ride?

5) The Ride-
   - Was the ride thrilling, yet safe?
   - Were there any interactive components to the ride (vehicle)?
   - What type of mechanical systems were used to power the ride?

6) Exiting the Ride-
   - Is it clear where to exit?
   - Were there any concerns as you exit the ride?
   - Do you still feel like you are part of the ride as you are leaving?
   - Would you ride this ride again?
   - Do you think your next experience on this ride will be uniquely different?
Equipment

- Engineering Notebook
- PowerPoint presentation on a Flash Drive. (One Flash Drive per team.)
- Six Flags admission ticket