

Wheelchair Ramp Project Guidelines

Background

The Americans with Disabilities Act (ADA) is a federal law that enforces mandates to make American life more accessible for people with disabilities. One of those stipulations is the requirement for wheelchair ramp construction. Wheelchair ramps must have a slope of 1:20 for the flattest ramps and a slope of 1:12 for the steepest ramps. Using inverse trigonometry, we know that the angle of the flattest ramp is 2.8624° and the angle of the steepest ramp is 4.7636° .

Purpose

Students will experience the design process of designing a wheelchair ramp for the school from multiple perspectives. The final product will be a 3D-printed wheelchair ramp prototype and a pitch for the ramp construction from the perspective of the team's "company."

Student Roles - Teams of 4-5 students

Whole Team

Below are the components of the project that must be completed by the entire team:

1. Find a location on campus that would benefit from a wheelchair ramp. Take pictures of this location from multiple angles.
2. Calculate minimum size of the ramp by using the steepest angle possible by ADA standards.
3. Calculate the maximum size of the ramp by using the flattest angle possible by ADA standards.
4. Choose a size for the ramp within the range you calculated.
5. At the end of the project, every student in the group should have a role in the final presentation.

Engineers (2-3 per team)

The engineers are responsible for designing the ramp in OnShape. Below are the steps that must be completed:

1. Learn how to use different OnShape tools by jointly working on the skateboard design posted in Google Classroom.
2. Based on the team's wheelchair ramp specifications, sketch the design and scale it to fit in a 7 in x 7 in x 7 in cube.
3. Create a digital version of the scaled design in OnShape.
4. Oversee the 3D printing process for the team's prototype.

Deliverables

1. 3D-printed prototype of the wheelchair ramp
2. A drawn sketch of the full-size ramp from multiple angles and the dimensions of each measurement

Graphic Designers (1-2 per team)

The graphic designers are responsible for their team's branding. Below are the steps that must be completed:

1. Create a company name to represent your team. The name should have some significance or meaning for your entire team.
2. Design a digital company logo that contains at least two colors. It may be advisable to draw the logo first, then design it digitally using software like Canva, Google Drawing, or Photoshop.
3. Oversee the vinyl printing of the logo. The logo should be sized to fit on the ramp. Collaborate with the engineers to get these dimensions.
4. Assemble the logo vinyls and place it on the ramp.

Deliverables

1. Vinyl logo on the wheelchair ramp
2. A written description of the meaning behind the company name and logo

Business Managers (1-2 per team)

The business managers are responsible for assembling and organizing the team's documents and synthesizing all of the steps into a narrative for the presentation.

Below are the steps that must be completed:

1. Aid the engineers and graphic designers and ensure that everyone in the team is on the same page throughout the project.
2. Summarize the team's progress after every work block.
3. Create an aesthetically pleasing presentation in Canva, Google Slides, or Microsoft PowerPoint that describes the narrative of the team. The design of the presentation should match the design of the logo. The presentation should cover:
 - a. An introduction of each of the engineers, graphic designers, and business managers.
 - b. The story/background/meaning of the company name and logo.
 - c. The location where the wheelchair ramp will be located and why that location would be better with a wheelchair ramp.
 - d. The dimensions of the final design and the dimensions of the scaled design.
 - e. A summary of the design process and any challenges you faced as a team and how you overcame them.
 - f. A conclusion that ties everything together.

Deliverables

1. The slideshow that will be used during the presentation
2. Written updates of the team's progress along the way

Grading

The grading for this project will be split into two pieces: a peer score and a rubric score. The two scores will be multiplied together to receive your final grade. For example, if your groupmates score your participation as a 90% and your group receives a 95% according to the rubric, your grade in Infinite Campus will be $90\% \times 95\% = 85.5\%$.

Peer Scoring

Each group member will grade their peers based on the following criteria. Those scores will be averaged for the member's peer score.

Criterion	Description	Score (% out of 100%)
Reliability	A highly reliable team member exhibits quick and clear communication, follows through on their commitments, and helps the team set reasonable expectations. They help the team fill in gaps and assist their teammates when they need help.	
Teamwork	A team member shows strong teamwork when they handle conflict thoughtfully and respectfully, is invested in other team members' work, and ensures that tasks are divided equally.	
Output	A team member displays high output when they produce high quality work that the entire team is proud of, aligns their piece of the project with the vision of the rest of the team, and carries their weight through the entire process.	
Average Peer Score		Average of the above 3 percentages.
Comments		

Rubric Scoring

The entire team will receive the same rubric score based on the criteria below.

Criteria	Proficient (4-5)	Adequate (2-3)	Insufficient (0-1)	Category Score
Ramp Construction	Ramp fit the legal requirements of wheelchair ramps by the ADA and served a specific purpose on the FDHS campus. The prototype is well-constructed and scaled accurately.	Ramp fit the legal requirements of wheelchair ramps by the ADA had a generic use. The prototype wasn't necessarily scaled correctly.	Ramp did not meet the ADA requirements.	
Team Logo	Logo was creative and original. The sketch contained at least two colors and the overall design had meaning behind it.	Logo was creative and used only one color. The design didn't have a strong meaning behind it.	Logo was unoriginal and meaningless.	
Pitch/Presentation	Presentation was aesthetically pleasing, in-depth, and accurately explained the team's process.	Presentation accurately described the team's design processes, but was not detailed or aesthetically pleasing.	Presentation was minimal and generic.	
Conventions	Project was thoroughly completed and submitted on time with no errors.	Project was completed on time with some errors or omissions.	Project was not submitted on time or contained many errors or omissions.	
Total Score (out of 20)				
Score as a Percentage				