



2023 NJ TSA HIGH SCHOOL DESIGN PROBLEMS

Coding

Pet Rescue Startup

New Jersey residents love their pets, but unfortunately there are many dogs and cats without good homes. New pet rescue organizations have many things to do, in addition to finding a facility and a volunteer staff.

Conduct research to determine how successful pet rescue organizations operate and brainstorm to identify ideas that will help a new pet rescue organization get off to a good start.

Create a model app that can be used to guide the work of a new pet rescue organization, with photos of 10 pets. Note: the photos you include in your app should be of family pets that already have homes. For each pet, include 1-2 sentences of additional information. Also, as part of your app, include at least 5 links for activities that will assist the organization, such as making a cash donation, donating food, fostering a pet, adopting a pet or volunteering to help.

Keep in mind, that the goal is to show the startup, a model app with examples of how they can promote their own organization.

- **PLATFORM:** The app can be on any platform.
- **PROGRAMMING LANGUAGE:** Use any programming language.
- **FUNCTIONALITY:** The app must have some degree of functionality.
- **CONTENT SUITABILITY:** All content must be in good taste and observe all school rules.
- **ORIGINALITY:** The app must be original in design and content.
- **VIDEO:** Create a 1-3 minute video that contains the following information:
 - First name of each team member
 - The name of the app
 - Clearly explain the purpose of the app
 - The tools and coding language used to create the app
 - Show how the app works
- **SUBMIT THE VIDEO** through YouTube
- **IN ADDITION** submit a document that includes the following information:
 - Your ID number(s)
 - Title of the app
 - Explain the app in ONE sentence.
 - What is your app trying to accomplish? (200 characters max.)
 - What technical /coding difficulty did you face in programming your app, and how did you address this technical challenge? (500 characters max.)
 - With what you've learned, what improvements would you make to version 2.0 of your app? (500 characters max.)

EVALUATION

- **VIDEO** (50 points)
 - The purpose of the app is explained (10 points)
 - Tools and coding language are explained (10 points)
 - At least 3 features of the app are demonstrated and explained (30 points)

- **DOCUMENTATION** (50 points)
 - Written description of the app's purpose (10 points)
 - Technical difficulty and solution are explained (20 points)
 - Improvements that should be included in version 2.0 are explained (20 points)

SUBMISSION INSTRUCTIONS

- Follow directions in the NJ Supplement to submit your entry.

Computer-Aided Design (CAD), 2D Architecture

Design Problem:

More than 2,000 octagon houses have been built. They were especially popular in the mid 1800's, when eight-sided houses were among the most unique Victorian-era homes built in the US and Canada. Some of the original octagon houses are now museums. Other more modest versions remain, and some have been built fairly recently.

After visiting an octagon home in Key West, Florida, a New Jersey family is interested in building a modern, full octagon home on a lot they own at the Jersey shore. They hope that at least half the rooms in their new home will have ocean views.

Design Brief:

Design a modern 2,000 square foot octagon home for a 100' x 100' lot at the shore. Each of the 2 floors should be 1,000 square feet. A deck for the 1st floor great room, and a balcony for the 2nd floor primary bedroom, should be included within the footprint of the perfect octagon.

Specifications/Drawing Requirements:

- Working drawings that include a floor plan as well as front, side and rear elevations;
- Include notes that identify at least 5 advantages of an octagon home;
- Include any other views that will enhance the presentation; and
- Use proper scale, dimensions and notes.
- The maximum paper size is 24" x 36" or smaller sheets mounted on a 24" x 36" sheet with no overlapping papers.

Follow directions in the NJ TSA Supplement to submit your entry.

Computer-Aided Design (CAD) 3D, Engineering

Design Problem

WeatherTech® is well known for the high-quality products that they manufacture in the USA. Most of their products are automobile-related, although they also manufacture products for pets and the home. Every year, they introduce several new products. For 2023, they plan to add several new products for automobile passengers, and for people who travel by mass transit.

Design Brief

Design a prototype lap desk that is aesthetically compatible with other WeatherTech® products. It should include at least 2 electrical/electronic features, and at least 2 mechanical features. Your product should fold, so that it will fit into a travel case, or bag, that will be included with every lap desk.

Specifications/Drawing Requirements:

- Include a parts list that identifies all the major mechanical and support components of the lap desk;
- Show the top and bottom of the lap desk and the travel case/bag; and
- Include any views or renderings that will enhance the presentation.
- The maximum paper size is 24" x 36" or smaller sheets mounted on a 24" x 36" sheet with no overlapping papers.

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Optical Engineering

Headlamps are useful tools for people of all ages and for many purposes.

Your challenge is to design and build a multipurpose headlamp that comes with at least 2 easy-to-change lenses. The headlamp should work well for use by someone doing close up work while seated, and for outdoor activities such as hiking, running, and camping.

The headlamp you design should be attractive and comfortable to wear. It can use 1-3 LED's and be powered by AA or AAA batteries. In addition to the physical prototype, prepare the documentation outlined in the NJ TSA Supplement.

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System Control Technology

Mixed Nuts

Design and build a computer-controlled system that can separate ¼"-20 brass nuts and ¼"-20 steel nuts. Your model system will need to demonstrate that it can process a mixture of at least 12 nuts (minimum of 6 of each kind) and place them in separate containers.

Your model working system should be no larger than 2' x 2'.

Follow directions in the NJ TSA Supplement to submit your entry.