Engineering Design Process Questions

Team Collaboration

1. How was your team formed? Was your team assigned or did you choose to work with each other?
2. Provide a detailed description of each team member's responsibilities and jobs during your work on the Mission Folder.
3. Did your team face any problems working together? If so, how did you solve them? If not, why do you think you were able to work together so well?
4. What were some possible advantages to working together as a team on this project? How would working as individuals have made this project more difficult?

Use of Engineering Design

- **Problem Statement**
    1. What problem in your community will your team attempt to solve using the engineering design process? Why did your team choose this problem to try to solve?
    2. Research your problem. You must learn more about the problem you are trying to solve and also what possible solutions already exist. Find AT LEAST 10 different resources and list them here. They should include books, periodicals (magazines, journals, etc.), websites, experts, and any other resources you can think of. Be specific when listing them, and do not list your search engine (Google, etc.) as a resource.
    3. What did you find out about your problem that you didn't know before? What kinds of possible solutions already exist? Be sure to put this in your OWN words, do not just copy and paste information. Also, be sure to cite your sources.

- **Design Development**
    1. What MUST be a part of your solution? This is called the criteria. Explain what criteria are needed to solve the problem. Make sure your criteria are measureable, connected to the problem, and related to your research.
    2. What limits are there on your solution? These are called constraints. Does it need to be a certain size? A certain weight? Is the cost a factor? Write down all of the limits on your solution.
    3. Based on your criteria and constraints, what is your proposed solution to the problem you chose? Explain what it will look like and how it will work. If you can, include a detailed, labeled drawing.
    4. How will you test your solution? The BEST way to test your solution is to build a working model or a prototype that you can actually use. Or you can guess how your solution will work BASED ON your research. Which method will you use and why?

- **Build Model or Prototype**
    1. If you built a prototype or model, explain how you built your prototype or model, step-by-step including ALL SAFETY PRECAUTIONS. If you guessed how your solution would work BASED ON your research, explain important information from your research that you used to prove how your solution would work and be sure to cite your sources.

- **Test Model or Prototype**
  1. Explain how you tested your prototype or model. Be sure to include every step of your testing including all safety precautions that were taken. If not stated it will be assumed no safety precautions were taken. If you are using research to guess how your solution will work, explain step-by-step how it will work and why.
  2. What problems did you find with your solution? Be specific since you will need to redesign based on these problems.
  3. Describe all of the changes you made to your prototype or model (or proposed prototype) after your first test. Why will these changes improve your solution?
  4. Present the data you collected from your tests or from your research. If you tested a prototype or model, then include all of the numbers you gathered during your testing and all observations you made. Use of graphs and charts is HIGHLY encouraged. If you used research to prove how your solution would work, be sure to include all of the numbers, charts, and graphs you used to make your case.
  5. What are your potential sources of error? Remember, this doesn't mean "Did everything work?", all tests have potential sources of error, so make sure you understand what that means. Explain how these sources of error could have affected your results.
- **Drawing Conclusions**
  1. What conclusions can you draw based on the data you gathered during your tests? Your conclusion should be related to your original problem and your test, include the data you collected, and refer to your proposed solution.

Benefit to the Community

1. Explain how investigating the problem your team chose will help the community. Be sure to include the impacts your research will have on individuals, business, organizations, and the environment in your community (if any). Make it very clear why solving this problem would help your community.