SfS Away from the Classroom!

E01: What's the Best Vehicle (Recommended for Grades 3-8)

Please use the following resources to learn about criteria and constraints.

Watch these Videos:

What are the criteria for engineers?

What are the constraints for engineers?

Answer these questions:

- What is the first step in the engineering process?
- What makes the engineer's solution successful?
- Why are constraints important to scientists and engineers?

Activities: Follow these directions to learn about criteria and constraints. Decide if the given information is a criteria or a constraint, design, and then build.

You will need:

• Legos, blocks, or other building materials	• Paper	• Pencil

1. We have to build a new science building for your school, but first we need to have a plan.
2. Identify the problem: We need a new building for the school's science labs.
3. The research says: (circle one)
   a. The building must have two levels. Criteria Constraint
   b. The school can only afford a small building. Criteria Constraint
   c. The building must have big windows. Criteria Constraint
   d. The building must have 4 or more classrooms. Criteria Constraint
   e. The building has to be built in 4 weeks. Criteria Constraint
4. Draw a design of the building you think would be ideal, including the criteria and constraints above.
5. Build a prototype (model) of your design with legos, blocks, or other building materials.

Is your solution a success?

1. Is your prototype close to the design you drew?

2. Does your prototype include all, or most, of the criteria and constraints mentioned above?

3. Which criteria and constraints were not easy to include in the model?

4. Which criteria and constraints were easy to include in the model?

With a lab partner, imagine a new building or vehicle. Before you design it, think about these questions:

- What will it be used for?
- Are there criteria; things that you must have in your new building or vehicle? List them.
- Are there constraints; things that may limit what you can build? List them.
- Draw your new building or vehicle, remember to include the criteria and constraints.
- Build your prototype.
- Check off the criteria and constraints you included in your prototype.
- Is this design a successful solution?

Make observations & use Claims, Evidence, and Reasoning!

1. **Claim**: Engineers use criteria to know if their solution will be successful.
   - **Evidence**:
   - **Reasoning**:
2. **Claim**: Constraints limit what solution an engineer can use to solve a problem.
   - **Evidence**:
   - **Reasoning**: