The Engineering Design Process

1. **ASK**
   - What are the Problems?
   - What are the Constraints?

2. **IMAGINE**
   - Brainstorm Ideas
   - Choose the Best One

3. **PLAN**
   - Draw a Diagram
   - Gather Needed Materials

4. **CREATE**
   - Follow the Plan
   - Test It Out!

5. **IMPROVE**
   - Discuss What Can Work Better
   - Repeat Steps 1-5 to Make Changes
As engineers work on projects they make lots of changes, so when there is a failure (or improvement), it may be difficult to determine the cause. There are so many possibilities, that without a log, it could take along time to run all the tests to identity the cause. Therefor logs should describe everything done, be organized with a date and time, and be in chronological order

**Engineering Log Criteria**

- Date
- Time
- Logs in chronological order
- Records of every change and action
- Notes of ongoing observations
- Documents of adjustments to techniques and methods
- Provide a space for questions and speculations
- Include drawings, numbers and words
## Water Bottle Challenge

<table>
<thead>
<tr>
<th>First Design</th>
<th>Second Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did it work?</td>
<td>Did it work?</td>
</tr>
<tr>
<td>Third Design</td>
<td>Fourth Design</td>
</tr>
<tr>
<td>Did it work?</td>
<td>Did it work?</td>
</tr>
</tbody>
</table>
Lesson 5

What was something that you **imagined** in your design that didn’t quite work the way you envisioned it?

<table>
<thead>
<tr>
<th>What I imagined . . .</th>
<th>What actually happened . . .</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

What did you learn about the materials that you worked with?