Soft Landing
Day 10: Report It Out!

Grade Level | Middle School
Lesson Length | 50-minute lesson

Lesson Overview

On the final day of the unit, students summarize their relevant experiences and data in a written testing report for Soft Landing Systems. Consider adding an additional day to the module for students to present their Testing Reports to the class.

Connecting to the Next Generation Science Standards

On Day 10, students demonstrate understanding of the performance expectations and three dimensions developed throughout the module. These lessons serve as a performance assessment in which all of the performance expectations and dimensions are addressed in the final presentation. Revisit the performance expectations, disciplinary core ideas, science and engineering practices, and crosscutting concepts referenced in this module’s front matter. In addition, students dive more deeply into the engineering design performance expectations.

Basic Teacher Preparation

Students use all of the data they collected as well as their testing experiences to create their summative presentations. Refer to the Soft Landing Student Handbook ahead of time so you can address any questions students might have. All documents for this lesson can be found on pages 3–7 and 22 in the Soft Landing Student Handbook. The documents used in this lesson are:

- Student Reflections and New Questions (page 3)
- Soft Landing Design Problem (pages 4–6)
- KLEWS Chart (page 7)
- Final Test Report (page 22)

Required Preparation | Links/Additional Information
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- Review suggested teacher preparation resources | Refer to the Suggested Teacher Resources at the end of this lesson

Materials List

No new purchased or outside materials are necessary for this lesson.
Introduction (5 minutes)

Today, students create their test reports for Soft Landing Systems. The report should be written to Soft Landing Systems to justify their design decisions and to argue for the adoption of their capsule and tower design.

Students should use computers to complete this task. Student reports should include the following:

- Design Challenge with criteria, constraints, design trades, and budget
- Initial design and redesign(s)
- Science ideas informing the initial design and redesign(s)
- Recommendations for future designs to correct failure points and/or optimize the design
- A final argument to support the claim that the capsule will keep the astronaut safe and the testing apparatus is safe, reliable, and cost-effective.

A rubric for the Final Test Report can be found on page 22 in the Soft Landing Student Handbook and Appendix E. Students may want to use sentence stems found in Appendix B as prompts.

Spend time introducing the team report and answering questions.

Individual Work: Test Reports (30 minutes)

Students work individually on the team test reports. Prompt students to format their reports as formally as possible. Students should include data charts and references to blueprints.

Lesson Close (10 minutes)

Remind the class about the old saying that you should build things twice—once to learn how to build it and then the second time to build the version you want to use. Unfortunately, most projects do not have the time or budget to build things twice.

Explain to students that regardless of whether they are successful, engineers always document their results for many reasons, including:

- Stakeholders may require written documentation to consider the project complete.
- Future engineers can learn what was done and why, and use that information to improve the design the next time something similar is created.
- Engineers and technicians may need to understand the system in order to improve it, duplicate it, or repair it.

Inform students that some engineers may not enjoy having to copiously capture results, but it is very important to do so. Ask them to think about all of the documentation they have produced during this module (blueprints, test reports, and so forth). How hard would it be for a new group
of students to re-create their designs without having to ask questions? Could they do it without looking at the apparatus?

Even when a project fails, documenting it can be an important part of preventing others from having the same failure. For example, consider the amount of documentation surrounding the loss of the Challenger Space Shuttle. The Rogers Commission report, which contained details about what happened and what could be done to ensure it would not happen again. When the Shuttle Columbia was lost years later, there was another investigation and report.

**Student Reflection (5 minutes)**

Refer students to the growing KLEWS Chart, and ask them to add to any of the columns.

Students write in their science notebooks or on Day 10 of the Student Reflections and New Questions (page 3 in the Soft Landing Student Handbook). Possible questions to address include:

- What was challenging about today?
- What changes would you make if you had the chance to do everything again?

Have students place all handouts in their team folders.

**Assessment**

Use the Final Test Report on page 22 in the Soft Landing Student Handbook or the Argument Rubric (Appendix E) as a summative assessment for the unit.

Reference Appendix B for suggestions for meeting the needs of all learners.

**Community Connections**

A showcase celebration might be a rewarding extension. Invite engineers, designers, and entrepreneurs to visit your classroom to create an authentic audience experience.
## Suggested Teacher Resources

<table>
<thead>
<tr>
<th>Resource</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>KLEWS Chart</td>
<td>Ongoing from earlier lessons</td>
</tr>
<tr>
<td>Meeting the Needs of All Learners</td>
<td>Soft Landing Teacher Handbook, Appendix B</td>
</tr>
<tr>
<td>The Rogers Commission Report</td>
<td>[Web Link]</td>
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<tr>
<td>Shuttle Columbia Report</td>
<td>[Web Link]</td>
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