Science and Innovation
A Boeing/Teaching Channel Partnership

BOLT CATCHER
Teacher Handbook
Lesson Overview

In this culminating lesson, student teams present a synopsis of the learning that has occurred throughout the module. Team presentations should include a description of the project in students’ own words, an explanation of the science concepts being applied (speed and energy), how the team improved on their design, and how their product could be applied in other real-life applications. The presentations should also include what students have learned about the field of engineering. Presentations involve verbal and visual elements that are scored using a rubric.

Connecting to the Next Generation Science Standards

On Day 10, students demonstrate understanding of the performance expectations and three dimensions developed throughout the entire module. This lesson serves as a performance assessment in which all of the performance expectations and dimensions are addressed in the final presentation. Please reference the performance expectations, disciplinary core ideas, science and engineering practices, and crosscutting concepts referenced in the front matter of this module.

Basic Teacher Preparation

During this culminating lesson, students present their findings and reflect on the Bolt Catcher project.

<table>
<thead>
<tr>
<th>Required Preparation</th>
<th>Links/Additional Information</th>
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<tbody>
<tr>
<td>Download, print, and copy the Presentation Rubric</td>
<td>Bolt Catcher Teacher Handbook, Appendix C</td>
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</tbody>
</table>

Materials List

<table>
<thead>
<tr>
<th>Item</th>
<th>Description/Additional Information</th>
<th>Quantity</th>
<th>Where to Locate/Buy</th>
</tr>
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<tbody>
<tr>
<td>Presentation Rubric</td>
<td></td>
<td>1 copy per team</td>
<td>Bolt Catcher Teacher Handbook, Appendix C</td>
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Day 10: Final Presentation

Introduction (5 minutes)

Remind students that the Driving Question for the module is, *How can we design a bolt catcher to catch the bolts that help a crew capsule separate from a rocket?*

Tell students they must conduct a Critical Design Review for NASA based on their work throughout this module.

Encourage students to determine their team’s work assignments to ensure that each presentation addresses the Critical Design Review for NASA Criteria.

Critical Design Review for NASA Criteria

Each presentation should address the following criteria:

- *Description of the project in students’ own words*
- *Explanation of the science concepts being applied (speed and energy)*
- *Description of the energy transfers in the bolt catcher*
- *Explanation of how they improved on their design and how the product they designed could be applied in other real-life applications*
- *Description of what students learned about the field of engineering*
- *Final model of their design, including descriptions of speed and energy transfer*

Review the Presentation Rubric in Appendix C with students before they begin their work.

Design Work: Presentation Planning (20 minutes)

Allow the student teams time to prepare their presentations. Depending on time constraints, students can either give their presentations to other engineering teams or to the whole class.

Helpful Tip

Consider making a handout for each student team with the Critical Design Review for NASA Criteria.

Helpful Tip

If needed, consider adding an additional day for students to prepare and give their presentations.
**Whole Group Discussion: Final Presentations (20 minutes)**

Students make their presentations and respond to questions. Use the Presentation Rubric found in Appendix C to assess student presentations.

**Lesson Close (5 minutes)**

Have students reflect in their science journals about the following questions:

- *Did you enjoy this module? Why or why not?*
- *What did you learn from it?*
- *What surprised you about the engineering design process?*
- *How does this experience relate to something in your daily lives or the products/machines you most like to use?*
- *After this, what would you like to learn/study next?*

**Assessment**

The final presentation can be used as a summative assessment for the module. Consider using the Presentation Rubric in Appendix C to assess the final presentations. Reference Appendix B for suggestions for meeting the needs of all learners.

**Community Connections**

Consider having students present and defend their designs as part of a “high stakes” showcase engineering design presentation to invited engineers, designers, and entrepreneurs.

**Suggested Teacher Resources**

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<thead>
<tr>
<th>Meeting the Needs of All Learners</th>
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