



Overview Teacher Support *Design to Stop a Thief*

Problem-Based Learning

STEMQuests are problem-based learning projects for students to complete along with a particular chapter or module. They help to bring the chapter content alive for students. By taking on a real-world problem and solving it, students come to understand *why* it is important to know about the topic. The Quests also provide the opportunity for students to engage in the Science and Engineering Practices and to practice 21st Century skills, such as problem solving, communication, and collaboration.

The STEMQuest *Design to Stop a Thief* pairs with the module *Sound and Light*.

Overview

The driving question that students will answer is *How can you design a system to stop a thief?*

In this STEMQuest, students explore how lenses and mirrors affect the way light behaves. They demonstrate their expertise in making light go where they want it for a museum director who wants to protect a gemstone exhibition.

Plan

All student-facing activities, including digital interactivities and hands-on labs, can be found at PearsonRealize.com.

STEMQuest Kick-Off *Design to Stop a Thief* You may start the module with the Kick-Off to establish a context for learning about light. In this digital activity, students are asked to demonstrate their expertise of the behavior of waves. They are given criteria and constraints for their task and plan how to use a model to help design a solution. They watch a video about lasers. To help students stay focused and organized, go online for a Checklist and Rubric to download and give to them.

Check-In 1 *Light Behavior* In this digital activity, students consider how light behaves when it interacts with a mirror or lens. They start to think about how they can use lenses and mirrors to change the direction and intensity of a light wave. This activity can be paired with the chapter *Characteristics of Waves*.

Check-In 2 *Make Light Go Where You Want It* In this hands-on lab, students continue to experiment and make observations using mirrors and lenses. They describe what happens when light waves are reflected or transmitted. This activity can be paired with the lesson *Reflection and Mirrors* in the chapter *Light*.

Check-In 3 *Optical Demonstration* In this digital activity, students draw their demonstration model in their science notebook several times and sketch possible solutions. They evaluate the solutions and choose one to test. This activity can be paired with the lesson *Refraction and Lenses* in the chapter *Light*.



Check-In 4 An Optimal Optical Solution In this hands-on lab, students build and test their optical security system. They identify ways the system could better focus the light from the source onto the target and how it could direct the light around the obstacle. This activity can be completed after students have finished the module *Sound and Light*.

STEMQuest Findings Reflect on Your Demonstration In this digital activity, students reflect on the work they did in this STEMQuest. Students should emphasize which part of the engineering and design process they enjoyed the most and which part of the process was the most difficult or frustrating. They will also reflect on the kinds of careers that require a good understanding of light. This activity can be completed after students have finished the module *Sound and Light*.

Connect to ELA

The STEMQuest *Design to Stop a Thief* provides students an excellent opportunity to practice many of the skills found in ELA Standards, including the skill of following a multistep procedure when carrying out experiments.

Career Connection

Security systems for homes and businesses are set up and maintained by security systems installers. A security system usually has a control panel, sensors, motion detectors, and a high-pitched alarm. It may also have security cameras. Installers need to know how all parts of the system work. During the installation, they will test the circuits and sensors. If the system does not work as expected, an installer will need to locate the problem and repair the system.

Teacher Support

Go online to [PearsonRealize.com](https://www.pearsonrealize.com) to find teacher support for each activity. Support includes connections to Science and Engineering Practices, Crosscutting Concepts, and STEM. Additional support can be found online for teachers interested in:

- Teaching With Technology
- Differentiated Instruction
- Career and College Readiness
- Best Practices
- Teaching Tips
- Community and Collaboration