Engineering Medicine Coolers
Connections to Next Generation Science Standards

NGSS Performance Expectation		In this unit, students:
MS-PS1-6	Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.	investigate how dissolving different amounts of potassium chloride in water lowers the temperature of the mixture.
MS-PS3-3	Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.	apply their knowledge of insulative materials to design a medicine cooler that minimizes thermal energy transfer.
MS-ETS1-1	Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.	determine that their medicine coolers should meet the needs (criteria) of those who are most impacted by the problem of high temperatures being harmful to medications and utilize a cost constraint to ensure that their designs are accessible to all.
MS-ETS1-2	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.	work with their teams to test and evaluate how well their designs meet the criteria and constraints of the problem. Based on this analysis, they iterate on their designs and consider which of the users' needs their design best meets.

Crosscutting Concept

Energy and Matter

In this unit, students observe that thermal energy flows from areas of high to low temperature. They also observe that materials can be used to slow thermal energy transfer. They apply this knowledge to articulate that one criterion of the medicine cooler they are designing is to slow thermal energy transfer as much as possible.

Computer Science Module: *Heatwave Visualizations*
Connections to Standards

CSTA K-12 Computer Science Standard		In this module, students:
2-AP-10	Use flowcharts and/or pseudocode to address complex problems as algorithms.	Connect the steps of an unplugged activity to a data visualization algorithm executed by a computer.
2-IC-21	Discuss issues of bias and accessibility in the design of existing technologies.	Discuss how a person might intentionally or inadvertently select parameters for a data visualization such that it supports their views and experiences.

NGSS Performance Expectation		In this module, students:
MS-ESS3-2	Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.	Interpret data visualizations of heatwaves in the U.S. in 2021 to identify which regions are most impacted.

Computer Science Module: *Medicine Cooler Alarms*
Connections to Standards

CSTA K-12 Computer Science Standard		In this module, students:
2-DA-08	Collect data using computational tools and transform the data to make it more useful and reliable.	Use the temperature sensor on a micro:bit to monitor the temperature inside a medicine cooler.
2-IC-21	Discuss issues of bias and accessibility in the design of existing technologies.	Discuss what could happen if a device collects data in a way the user does not expect and how often data needs to be collected by devices to be useful to users.