

NGSS Performance Expectation		In this unit, students:
4-PS3-4	Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.	Engineer a safety vest that uses electrical circuits to light signals. Students use their knowledge of energy flow and communication systems to design electric devices.
4-PS4-3	Generate and compare multiple solutions that use patterns to transfer information.	Imagine multiple ways to communicate using signals on safety vests, then negotiate a group plan. They share their designs with the entire class to compare solutions.
3-5-ETS1-1	Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.	Determine that the safety vest must display three important signals for their particular user and be understood by others in the intersection (criteria) while working with limited materials and space (constraints).
3-5-ETS1-2	Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	Independently imagine multiple ways to design a safety vest problem, then negotiate a group plan. They test and evaluate their design solutions against the criteria and constraints and use those findings to improve their designs.

Crosscutting Concepts

Patterns

Students look for patterns in their data when they analyze their communication system scores. They identify similarities and differences in groups' designs to identify features (color, shapes, or symbols) of communication systems that are most easily understood.

Energy and Matter

Students need to understand the flow of electrical energy to create functioning circuits. They consider how electrical energy is transformed into light energy in their safety vest signals.