	Wire Diagram	Switch & Circuit Prototypes	The Light-House Build & Blueprint
Student Experience	Students use circuit schematics to create a wire diagram for their house. Students must get diagram approved by “the city” (teacher) in order to get project materials.	Students receive essential project materials (listed below) and must build prototypes of their series and parallel lights circuits, including switches. They determine a way to power both prototyped circuits from the same voltage source.	Students design and build a functional model of their "dream house." Minimum requirements: 2 lights in series, 3 wired in parallel, and 1 stand-alone light, powered from a 9V battery with individual off and on switches. Students create design poster showing wire diagram and blue building blueprint.
Material	--	For each student: 6 Christmas lights + wire 3 paper clips 6 brads Section of cardboard or foam core	The cart
Big Idea	Diagrams allow engineers, architects, and contractors to analyze the performance of a circuit before building it.	The three “branches” of lights are in parallel with each other so they may operate independently.	Engineering requires an planning, prototyping, and analysis. Blueprints are accurately-scaled diagrams of structures or machines.
Connection to Culminating Activity	The approved circuit diagram will guide the wiring of lights, switches, and voltage source in the house.	The prototypes allow students to quickly test switches on their series and parallel circuits.	--
Time	One 55-min period	One 55-min period	Two 55-min periods, plus time (~1 week) for students to work on projects at home.

Physics –Electricity – The Light-House Project

CA Standards:

PH5. a.	Students know how to predict the voltage or current in simple direct current (DC) electric circuits constructed from batteries, wires, resistors, and capacitors.
PH5. b.	Students know how to solve problems involving Ohm’s law.
PH5. c.	Students know any resistive element in a DC circuit dissipates energy, which heats the resistor. Students can calculate the power (rate of energy dissipation) in any resistive circuit element by using the formula Power = V (potential difference) x I (current) = I^2R.

These lessons are not intended to be a complete unit, but rather a learning activity guide for concept attainment. Teachers should supplement these lessons with appropriate reading material and problem sets.

The idea and student handouts for the Light-House project were generously shared by Bree Barnett Dreyfuss, who teaches physics at Amador Valley High School in California.