LED Constellation displays

Tools, materials, technologies used:	Experience level required:
corrugated plastic	beginner
soldering equipment (optional)	beginner, but intermediate recommended
circuitry: copper tape, battery, LEDs, crimps or other connectors, etc.	beginner

Grade Level: 5-8

Content Standards:

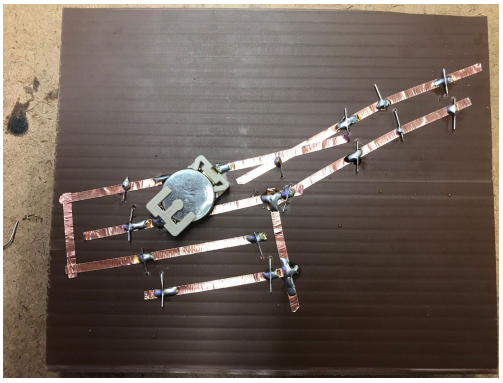
STEM - astronomy
ELA/Social Studies - mythology and civilization
See **Possible Content Explorations**, below

Summary of Project:

Students will use a push pin and corrugated plastic to create a constellation that meet design criteria designated by the teacher. They will then map out a pattern and set up simple circuitry so the box will light in desired locations using leds and copper tape. They can work individually or in a group to complete the project, and later present to the class along with other supporting deliverables.

This project might also potentially be used as an intro to soldering depending on the complexity of the constellation.

Example:
Ar right, we can see that these circuit joints are given wide berths, requiring only a beginner-level expertise with a soldering iron. Circuitry, too, is pretty simple. This allows students to focus their design efforts on the arrangement of the wiring. (Arranging the wiring, or “wire dressing,” can become challenging for larger constellations.)



As time and target content allow, teachers might have students design their their own box structures, use breadboards to wire their circuits, incorporate more LEDs etc.

Possible Content Explorations / Expansions

ELA / Social Studies

- Mythology, Ancient Civilizations, Storytelling, Literary symbolism: - as a component of commonly taught “create a country/civilization” projects, have students regroup existing stars to form and name constellations unique to their fictional civilization. Students create a story about their constellation and link it to cultural practice, important symbols/beliefs, etc.

STEM

- Astronomy, Algebra: Have students use star maps to design a constellation matrix in a large light-sealed box or room, so that it only appears in the shape we see from Earth when viewed from the correct angle. (See this online 3D Constellation lesson from the Astronomical Society of the Pacific for inspiration.) Have students use the star distance table (as in lesson) to scale the model appropriately.
- Classes or groups might choose to create one multi-constellation matrix in a large black-out room for a community event, with multiple stars
- Astronomy, electric circuits: Design a circuit that accurately represents the relative brightness of each star in the given constellation

Ideas for advanced builders and high school students:

- rigging a collection of constellation boxes to a class-created book of myths or astrological facts - when a reader turns the page to info about the relevant constellation, it’s the only thing that lights up
- make a “Lite Brite” display case with interchangeable bulbs
- make a frame for the constellations, to be able to swap tiles in and out
- larger-scale project using scrounged lamp parts
- create a puzzle-map of the night sky with 3 selectable difficulty levels -
    - each constellation lights up as it’s placed in the correct location
    - constellations light up only once all are placed in the correct location
    - constellations light up only once all are placed in the correct location and orientation