

## Grade 4 Design Challenge Quick Guide: Design a Light-up Greeting Card– Cycle 2

**Lesson Objective(s):** Students will use what they have learned about electric circuits and apply that information to the design of a light-up greeting card.

**Materials:**

*For each team of 2 students*

- Design logs
- Card stock
- Two brass fasteners
- A paper clip
- Clear tape
- Scissors
- 1 LED (3 volt) light, per team
- 1 Coin battery (CR 2032)
- A variety of art supplies to artistically design for the card (markers, glue, construction paper, glitter, etc.)
- “Electrical Power Survey” handout
- 21 Century Skills rubric for grading project

• Websites

- <http://www.andythelwell.com/blobz/guide.html>
- <http://tinkering.exploratorium.edu/paper-circuits>
- <http://www.learningcircuits.co.uk/flashmain.htm>
- [http://www.bbc.co.uk/schools/scienceclips/ages/6\\_7/electricity\\_fs.shtml](http://www.bbc.co.uk/schools/scienceclips/ages/6_7/electricity_fs.shtml)
- [http://www.bbc.co.uk/schools/scienceclips/ages/8\\_9/circuits\\_conductors\\_fs.shtml](http://www.bbc.co.uk/schools/scienceclips/ages/8_9/circuits_conductors_fs.shtml)
- <http://www.educationandsafety.com/shared/Louies/games/hazards.html>
- [http://www.bbc.co.uk/schools/scienceclips/ages/10\\_11/changing\\_circuits\\_fs.shtml](http://www.bbc.co.uk/schools/scienceclips/ages/10_11/changing_circuits_fs.shtml)
- <http://vimeo.com/36388753#at=0>
- <http://www.instructables.com/id/Fun-circuits-with-conductive-paint/>
- <http://tinkering.exploratorium.edu/tinkering/2013/10/22/choose-your-own-adventure-circuit#.U2EABvldXnj>
- <http://hideousdreadfulstinky.com/2013/12/1-e-d-reindeer-greeting-card.html>
- <http://www.evilmadscientist.com/2008/edge-lit-holiday-cards/>
- <http://makezine.com/projects/led-pop-up-cards/>



**TEKS:**

*Science*

SCI 4.6.A Differentiate among forms of energy, including mechanical, sound, electrical, light, and heat/thermal.

\*SCI 4.6C Demonstrate that electricity travels in a closed path, creating an electrical circuit, and explore an electromagnetic field.

*Math*

-  MATH 4.1A Apply mathematics to problems arising in everyday life, society, and the workplace.
-  MATH 4.1E Create and use representations to organize, record, and communicate mathematical ideas.

ELPS	CCRS Science	CCRS Math	CCRS Cross-Disciplinary
C3D, C3E	8I2B, 4A1A	6B2A, 6B2B	1C1C, 1E2C

**Engineering Design Loop:** *For more details, refer to the overview page.*

**Identify the Need:** Teams of 2 students will be challenged to design a light-up greeting card.

**Research the Problem** Teams will conduct research on current electricity and circuits using kid-friendly websites.

**Math Connection:** Students will complete a survey, collect, organize, and graphically display the data for further analysis and inspection.

**Develop Possible Solutions:** Teams will use their researched information to create a basic circuit with a switch.

**Select the Most Promising Solution:** Teams will design two greeting cards that use a circuit to light up a LED. Next, they will decide which of the 2 to make into their final light-up greeting card.

**Construct a Prototype:** Teams will build their light-up greeting card according to their established procedures.

**Test & Evaluate:** Teams will test their light-up cards to make certain they work consistently via the switch and then evaluate the overall final product.

**Communicate their Design:** Teams will give their card to its recipient and provide an explanation about its design.

**Redesign:** Teams will research other variations of light-up cards to brainstorm ideas for card redesign.