

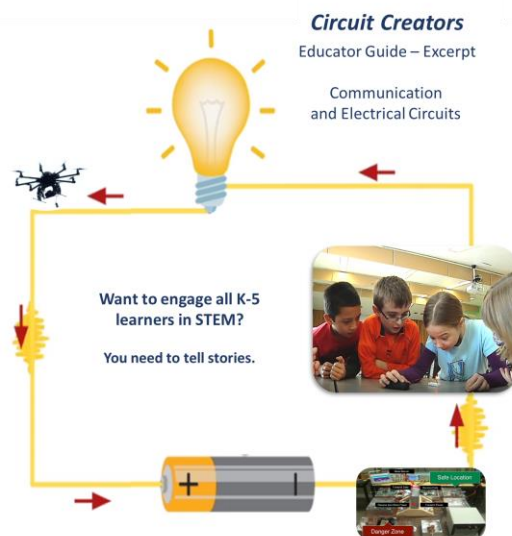
CreositySpace Educator Guides and curricular materials are designed to support a variety of implementation methods:

For the Classroom Teacher

- A variety of introduction tools to assess prior knowledge and create common experiences.
- Detailed **weekly learning objectives** and instructional lessons lists/pacing guides.
- **Cross-curricular activities** to support ELA and math learning objectives.

For the STEM/Afterschool Teacher

- A variety of introduction tools to assess prior knowledge and create common experiences.
- **Flexible lesson plans** that can adjust to your instructional method and schedule
- **Leveled content** that supports students at different reading, writing, and language levels.



Circuit Creators

Primary Curriculum	Grade 4
Supplemental Curriculum	Grades 3–5+
Notes	Standard unit comes with enough materials for 30 students.

Description

How can you communicate during an emergency?

Communication and electricity are the lifeblood of technology as we know it. We’ve come a long way from smoke signals and from computers that take up an entire room! Join Jon as he connects these two concepts to the natural world with stories, songs, and demonstrations.

Using the overarching question of how to communicate during an emergency, students explore properties of communication, circuits, natural hazards, and engineering as they ask themselves: *“What would help my community stay connected during a time of need?”*

Main Investigations

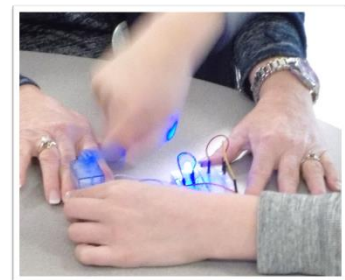
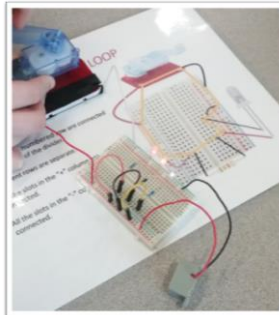
Code Breakers communication design challenge

Word	Light Pattern
milkshakes	
peas	
juice	
Luna	
Pat	
went for	
you	
Do	
?	buzz
!	two buzzes

Code Cards:

Write down your code here and then share it with your friends so they can decode the secret message.

Circuit Building



Number of Lessons*

Full unit – 25 lessons

Supplemental program – minimum 5 lessons

**Lesson = 30–40 min. block, 50% of full unit lessons can be delivered in non-science classes*

Best Suited For

- Classroom science instruction
- STEM class instruction or afterschool programs (with regular attendance)

Overarching Enduring Understanding

How are do we communicate (especially with electrical devices) and what are the challenges that arise when communities face challenges?

Number of Lessons*

Full unit – 27 lessons

Supplemental program – minimum 5 lessons

*Lesson = 30 – 40 min block, 50% of full unit lessons can be delivered in non-science classes

FLOW OF INSTRUCTION

Investigation: Introduction to Circuit Building (hands-on activity, occurs during weeks 2 & 3)

In parts 1 and 2 of the investigation as students build their circuits they must observe and identify different versions of energy—motion, sound, light—and use those observations as evidence in their explanations of how energy is transferred throughout the circuit.

Students must also qualitatively compare hand speed to the brightness of the LEDs and the sound (both pitch and volume) of the buzzer. In this qualitative hand speed–energy correlation investigation, students will use the evidence and observations from their investigations—specifically the relationship between increased speed of the hand crank to the increased brightness of the LED or volume of the buzzer—to construct an explanation about the relationship between hand speed and energy produced by the hand crank generator.

In part 3 of the investigation students will complete more quantitative assessment, as they use the multimeter to generate evidence that increase of speed of the hand crank relates to an increase in measured voltage. (Note: This is beyond the stated scope of the NGSS/NYSSLS standards but can be used to level up the activity, to reinforce the concept, and/or to increase student confidence.)

Investigation: Without Words (short activity, occurs during week 1)

Students explore, generate, test out, and compare different ways to communicate/transfer information without using words as they are challenged to come up with a way to communicate a specific message or idea without using words.

Investigation: Code Breaker (design project, occurs during week 4)

Warm-Up: Class discussion on the history of communication and different ways patterns have been used to transfer information.

Main Activity: Students must decide on a secret message that they want to communicate with the following design constraints: it must be between 4–7 words long and they must use their circuit equipment to communicate the message. Students must generate a cipher to connect the pattern of lights to the words in their message and generate the corresponding circuit. Students will share their patterns either between groups or as a class. They will compare results by assessing how far away people could read their message and suggest ideas to improve that.

Investigation: Map It! (research activity, occurs during week 5)

As preparation for the summative challenge, Communication Challenges, students will analyze and interpret data from a variety of maps that include patterns in Earth’s geological features and the location of various natural disasters.

Students will generate a composite map of the United States that links geographical features and natural disasters. They will also complete a table describing natural disasters and the patterns in geological features that predict where they are most likely to occur.

Investigation: Communication Challenges (summative challenge, occurs during weeks 6 through 8)

After some practice analyzing patterns in the Earth’s features, students will select and research a place that is prone to natural disasters. They must connect patterns of the region’s features to the natural disaster they are studying.

Students must describe the communication challenges that arise during that natural disaster. They must also describe and compare the communication solutions in place to reduce the impact of that natural disaster on the people who live there.

Students must design or suggest an alternative communication method and compare it to the solutions already in place.