CreositySpace – Circuit Creators
Activity Descriptions and Standards Alignment

General Activity Descriptions:

Below you will find brief descriptions of the hands-on activities associated with the *Circuit Creators* **TEC** module. The main cost associated with the activities are the Hand Crank Generators, which retail for about $12 each.

Activity 1: Breadboard Lights

Objective:

To teach students how to build a basic circuit with a resistor and LED.

We will describe key components of circuits including:

a) The circuit needs to be a loop.
b) Electricity flows differently between different materials
c) Introduction to the breadboard, hand crank generator, LED and resistor.
d) A circuit schematic is like a map or set of instructions for how each component is hooked up.

There will also be opportunities to explore different circuit designs – including using multiple LEDs, resistors, etc.

Materials:

Hand crank generator, resistors, jumper wires, breadboard, a light emitting diode (LED)

Activity 2: Buzzing Lights

Objective:

Will we add to the circuit described above by including a buzzer.

Materials:

Hand crank, resistors, jumper wires, breadboard, a light emitting diode (LED) and buzzer.

Connecting Kids to STEM Through Entrepreneurship

Education Standards supported by this module

Common Core ELA Standards

Grade 3

Reading Informational Text:

CCSS.ELA-LITERACY.RI.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.
CCSS.ELA-LITERACY.RI.3.2 Determine the main idea of a text; recount the key details and explain how they support the main idea.
CCSS.ELA-LITERACY.RI.3.4 Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a *grade 3 topic or subject area*.

Writing:

CCSS.ELA-Literacy.W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons.
CCSS.ELA-Literacy.W.3.1.a Introduce the topic or text they are writing about, state an opinion, and create an organizational structure that lists reasons.
CCSS.ELA-Literacy.W.3.1.b Provide reasons that support the opinion.
CCSS.ELA-Literacy.W.3.1.c Use linking words and phrases (e.g., *because, therefore, since, for example*) to connect opinion and reasons.
CCSS.ELA-Literacy.W.3.1.d Provide a concluding statement or section.
CCSS.ELA-Literacy.W.3.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
CCSS.ELA-Literacy.W.3.2.a Introduce a topic and group related information together; include illustrations when useful to aiding comprehension.
CCSS.ELA-Literacy.W.3.2.b Develop the topic with facts, definitions, and details.
CCSS.ELA-Literacy.W.3.2.c Use linking words and phrases (e.g., *also, another, and, more, but*) to connect ideas within categories of information.
CCSS.ELA-Literacy.W.3.2.d Provide a concluding statement or section.
CCSS.ELA-Literacy.W.3.4 With guidance and support from adults, produce writing in which the development and organization are appropriate to task and purpose. (Grade-specific expectations for writing types are defined in standards 1-3 above.)
CCSS.ELA-Literacy.W.3.5 With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, and editing.
CCSS.ELA-Literacy.W.3.6 With guidance and support from adults, use technology to produce and publish writing (using keyboarding skills) as well as to interact and collaborate with others.
CCSS.ELA-Literacy.W.3.7 Conduct short research projects that build knowledge about a topic.
CCSS.ELA-Literacy.W.3.8 Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories.

Speaking & Listening:

CCSS.ELA-LITERACY.SL.3.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grade 3 topics and texts*, building on others' ideas and expressing their own clearly.
CCSS.ELA-LITERACY.SL.3.1.A Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.
CCSS.ELA-LITERACY.SL.3.1.B Follow agreed-upon rules for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion).
CCSS.ELA-Literacy.SL.3.1.c Ask questions to check understanding of information presented, stay on topic, and link their comments to the remarks of others.
CCSS.ELA-Literacy.SL.3.1.d Explain their own ideas and understanding in light of the discussion.
CCSS.ELA-Literacy.SL.3.3 Ask and answer questions about information from a speaker, offering appropriate elaboration and detail.
CCSS.ELA-Literacy.SL.3.4 Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace.
CCSS.ELA-Literacy.SL.3.6 Speak in complete sentences when appropriate to task and situation in order to provide requested detail or clarification.

Language:

CCSS.ELA-LITERACY.L.3.1 Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
CCSS.ELA-LITERACY.L.3.1.A Explain the function of nouns, pronouns, verbs, adjectives, and adverbs in general and their functions in particular sentences.
CCSS.ELA-LITERACY.L.3.2 Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.
CCSS.ELA-LITERACY.L.3.4 Determine or clarify the meaning of unknown and multiple-meaning word and phrases based on grade 3 reading and content, choosing flexibly from a range of strategies.

Grade 4

Reading Informational Text:
CCSS.ELA-LITERACY.RI.4.1 Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.
CCSS.ELA-LITERACY.RI.4.2 Determine the main idea of a text and explain how it is supported by key details; summarize the text.
CCSS.ELA-LITERACY.RI.4.4 Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a *grade 4 topic or subject area*.
CCSS.ELA-LITERACY.RI.4.5 Describe the overall structure (e.g., chronology, comparison, cause/effect, problem/solution) of events, ideas, concepts, or information in a text or part of a text.
CCSS.ELA-LITERACY.RI.4.7 Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.

Writing:

[CCSS.ELA-LITERACY.W.4.1](#) Write opinion pieces on topics or texts, supporting a point of view with reasons and information.
[CCSS.ELA-LITERACY.W.4.1.A](#) Introduce a topic or text clearly, state an opinion, and create an organizational structure in which related ideas are grouped to support the writer's purpose.
[CCSS.ELA-LITERACY.W.4.1.B](#) Provide reasons that are supported by facts and details.
[CCSS.ELA-LITERACY.W.4.1.C](#) Link opinion and reasons using words and phrases
[CCSS.ELA-LITERACY.W.4.1.D](#) Provide a concluding statement or section related to the opinion presented.
[CCSS.ELA-LITERACY.W.4.2](#) Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
[CCSS.ELA-LITERACY.W.4.2.A](#) Introduce a topic clearly and group related information in paragraphs and sections; include formatting (e.g., headings), illustrations, and multimedia when useful to aiding comprehension.
[CCSS.ELA-LITERACY.W.4.2.B](#) Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related to the topic.
[CCSS.ELA-LITERACY.W.4.2.C](#) Link ideas within categories of information using words and phrases.
[CCSS.ELA-LITERACY.W.4.2.D](#) Use precise language and domain-specific vocabulary to inform about or explain the topic.
[CCSS.ELA-LITERACY.W.4.2.E](#) Provide a concluding statement or section related to the information or explanation presented.
[CCSS.ELA-LITERACY.W.4.4](#) Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience.
[CCSS.ELA-LITERACY.W.4.8](#) Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.

Speaking & Listening:

[CCSS.ELA-LITERACY.SL.4.1](#) Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grade 4 topics and texts*, building on others' ideas and expressing their own clearly.
[CCSS.ELA-LITERACY.SL.4.1.A](#) Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.
[CCSS.ELA-LITERACY.SL.4.1.B](#) Follow agreed-upon rules for discussions and carry out assigned roles.
[CCSS.ELA-LITERACY.SL.4.1.C](#) Pose and respond to specific questions to clarify or follow up on information, and make comments that contribute to the discussion and link to the remarks of others.
[CCSS.ELA-LITERACY.SL.4.1.D](#) Review the key ideas expressed and explain their own ideas and understanding in light of the discussion.
[CCSS.ELA-LITERACY.SL.4.3](#) Identify the reasons and evidence a speaker provides to support particular points.

Language:

[CCSS.ELA-LITERACY.L.4.1](#) Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
[CCSS.ELA-LITERACY.L.4.1.A](#) Use relative pronouns (*who, whose, whom, which, that*) and relative adverbs (*where, when, why*).
[CCSS.ELA-LITERACY.L.4.2](#) Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.
[CCSS.ELA-LITERACY.L.4.3](#) Use knowledge of language and its conventions when writing, speaking, reading, or listening.
[CCSS.ELA-LITERACY.L.4.3.A](#) Choose words and phrases to convey ideas precisely.
[CCSS.ELA-LITERACY.L.4.4](#) Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 4 reading and content, choosing flexibly from a range of strategies.

Grade 5

Reading Informational Text:

[CCSS.ELA-LITERACY.RI.5.2](#) Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.
[CCSS.ELA-LITERACY.RI.5.3](#) Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.
[CCSS.ELA-LITERACY.RI.5.4](#) Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a *grade 5 topic or subject area*.

Writing:

[CCSS.ELA-LITERACY.W.5.1](#) Write opinion pieces on topics or texts, supporting a point of view with reasons and information.
[CCSS.ELA-LITERACY.W.5.1.A](#) Introduce a topic or text clearly, state an opinion, and create an organizational structure in which ideas are logically grouped to support the writer's purpose.
[CCSS.ELA-LITERACY.W.5.1.B](#) Provide logically ordered reasons that are supported by facts and details.
[CCSS.ELA-LITERACY.W.5.1.C](#) Link opinion and reasons using words, phrases, and clauses
[CCSS.ELA-LITERACY.W.5.1.D](#) Provide a concluding statement or section related to the opinion presented.
[CCSS.ELA-LITERACY.W.5.2](#) Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
[CCSS.ELA-LITERACY.W.5.2.A](#) Introduce a topic clearly, provide a general observation and focus, and group related information logically; include formatting (e.g., headings), illustrations, and multimedia when useful to aiding comprehension.
[CCSS.ELA-LITERACY.W.5.2.B](#) Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related to the topic.
[CCSS.ELA-LITERACY.W.5.2.C](#) Link ideas within and across categories of information using words, phrases, and clauses (e.g., *in contrast*, *especially*).
[CCSS.ELA-LITERACY.W.5.2.D](#) Use precise language and domain-specific vocabulary to inform about or explain the topic.
[CCSS.ELA-LITERACY.W.5.2.E](#) Provide a concluding statement or section related to the information or explanation presented.
[CCSS.ELA-LITERACY.W.5.4](#) Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience.
[CCSS.ELA-LITERACY.W.5.8](#) Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.

Speaking & Listening:
[CCSS.ELA-LITERACY.SL.5.1](#) Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grade 5 topics and texts*, building on others' ideas and expressing their own clearly.
[CCSS.ELA-LITERACY.SL.5.1.A](#) Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.
[CCSS.ELA-LITERACY.SL.5.1.B](#) Follow agreed-upon rules for discussions and carry out assigned roles.
[CCSS.ELA-LITERACY.SL.5.1.C](#) Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others.
[CCSS.ELA-LITERACY.SL.5.1.D](#) Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.
[CCSS.ELA-LITERACY.SL.5.3](#) Summarize the points a speaker makes and explain how each claim is supported by reasons and evidence.

Language:
[CCSS.ELA-LITERACY.L.5.1](#) Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
[CCSS.ELA-LITERACY.L.5.1.A](#) Explain the function of conjunctions, prepositions, and interjections in general and their function in particular sentences.
[CCSS.ELA-LITERACY.L.5.2](#) Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.
[CCSS.ELA-LITERACY.L.5.3](#) Use knowledge of language and its conventions when writing, speaking, reading, or listening.
[CCSS.ELA-LITERACY.L.5.4](#) Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 5 reading and content, choosing flexibly from a range of strategies.

Common Core Math Standards (Grades 3–5)
Grade 3

MP.1 Make sense of problems and persevere in solving them.

MP.2 Reason abstractly and quantitatively.

3.OA.1-3 Represent and solve problems involving multiplication and division.

3.OA.7 Multiply and divide within 100.

Grade 4

MP.1 Make sense of problems and persevere in solving them.

MP.2 Reason abstractly and quantitatively.

4.OA.1-3 Use the four operations with whole numbers to solve problems.

Grade 5

MP.1 Make sense of problems and persevere in solving them.

MP.2 Reason abstractly and quantitatively.

Next Generation Science Standards/NY State Science Learning Standards 3–5

Performance Expectations

4-PS3-2. Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.

4-PS3-4. Apply scientific ideas to design, test and refine a device that converts energy from one form to another.

5-PS1-1. Develop a model to describe that matter is made up of particles too small to be seen.

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.

3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

Example NGSS "Big Idea" and Topic Bundle: How do we move energy and information from place to place? (4-PS3-2, 4-PS3-4, 5-PS1-1) In this bundle the abstract concept that energy transfer is introduced along the idea of information transfer.

Science and Engineering Practices	Disciplinary Core Ideas	Cross Cutting Concepts
Asking questions / defining problems; Planning and carrying out investigations; Analyzing and interpreting data Experiments with completing various circuits, working through trial and error of different configurations have students asking questions and investigating why and how things work. **Using math & computational thinking** Math word problems give students a chance to think how math is used in S&E. **Constructing explanations/designing solutions; Engaging in argument from evidence; Obtaining, evaluating, and communicating information** Challenge extensions and innovation prompts in the *Book of Ideas* - Young Inventors Journal enable students to design and support their solutions to a variety of challenges. --- *Connections to Nature of Science* **Scientific investigations use a variety of methods; Scientific knowledge is based on empirical evidence** Entrepreneur story/presentation and hands on activities illustrate how scientific investigations are conducted and how that information is put to use.	**ESS3.A Natural resources** Discussion of the environmental impact of energy and electricity usage have students thinking about natural resources. **PS1.A Structure of matter** **PS3.B Conservation of energy and energy transfer** The activities around building a circuit, using different components, and monitoring performance, illustrates concepts of the structure of matter, chemical reactions and energy transfer. **PS3.A Definition of energy** Videos and historical timeline give students and introduction to energy and electricity. **PS3.D Energy in chemical processes and everyday life** Writing prompts, challenge extensions and math questions have students thinking about energy in their everyday life. **ETS1.A: Defining and delimiting engineering problems** **ETS1.B: Developing possible solutions** **ETS1.C: Optimizing the design solution** Science and technology based writing prompts, challenge questions and group activities support the three phases of Engineering Design.	**Cause and effect** The activities give the students a chance to explore the cause and effect of circuit design on system performance **Energy and matter: Flows, cycles, and conservation; Structure and function** Entrepreneur story and activities highlight how the structure and properties of materials can be used to perform specific functions. --- *Connections to Nature of Science* **Science is a way of knowing; Science addresses questions about the natural and material world** Activities give firsthand experience in questioning, observing and concluding. **Science is a human endeavor** Entrepreneur story and historical timeline highlight the human aspect of science and engineering. *Connections to Engineering, Technology, and Applications of Science* **Interdependence of Science, Engineering, and Technology; Influence of Engineering, Technology and Science on Society and the Natural World** Introduction text, historical timeline and entrepreneur story highlight above interactions and interdependencies.

Connections to Common Core State Standards

See previous Common Core Standards section for the ELA and Math standards addressed by these activities.