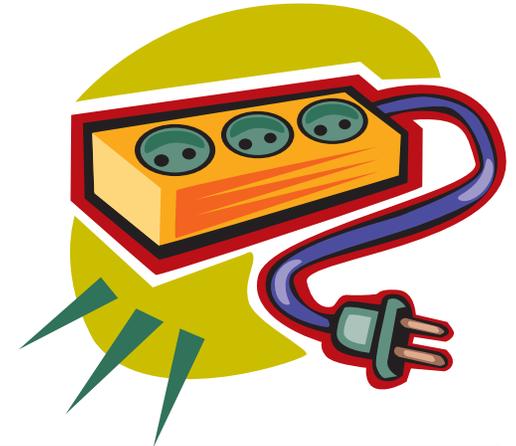# Electrifying Language

Background: Electricity has been helping humans live a more comfortable life for many years. Now, you are going to use it to help increase your knowledge of language arts and test your friends.

Design Challenge: Design and create a game that uses electrical circuits to create a signal when correct answers are given to a variety of language arts questions.

Criteria:

☐ Your device must signal correct answers.
☐ Your device should include current language arts material.
☐ Your device must use series and parallel circuits.
☐ Your device should be no larger than a shoebox.

Materials: Select from the list below.		**Tools:** Select from the list below.
• batteries • buzzer (optional) • cardstock • glue • light bulb (flashlight)	• paper fasteners • recyclable materials • straws • wire • yarn or string	• battery holder (optional) • hole punch • low-heat hot glue gun (optional) • markers/colored pencils/crayons • ruler • scissors

Targeted Standards of Learning: English 4.7, 4.8
Supporting SOL: English 4.2, 4.4, 4.5, 4.6; Science 4.3

Targeted Standard for Technological Literacy: 16
Supporting STL: 3, 5, 8, 9

Tips for Teachers

Targeted Standards of Learning:

English 4.7   The student will write cohesively for a variety of purposes.
a)   Identify intended audience.
b)   Focus on one aspect of a topic.
c)   Use a variety of pre-writing strategies.
d)   Organize writing to convey a central idea.
e)   Recognize different modes of writing have different patterns of organization.
f)   Write a clear topic sentence focusing on the main idea.
g)   Write two or more related paragraphs on the same topic.
h)   Use transition words for sentence variety.
i)   Utilize elements of style, including word choice and sentence variation.
j)   Revise writing for clarity of content using specific vocabulary and information.
k)   Include supporting details that elaborate the main idea.

English 4.8   The student will edit writing for correct grammar, capitalization, spelling, punctuation, sentence structure, and paragraphing.
a)   Use subject-verb agreement.
b)   Include prepositional phrases.
c)   Eliminate double negatives.
d)   Use noun-pronoun agreement.
e)   Use commas in series, dates, and addresses.
f)   Incorporate adjectives and adverbs.
g)   Use correct spelling for frequently used words, including common homophones.
h)   Use singular possessives.

Supporting SOL: English 4.2, 4.4, 4.5, 4.6; Science 4.3

Targeted Standards for Technological Literacy:

16   Students will develop an understanding of and be able to select and use energy and power technologies.

Supporting STL: 3, 5, 8, 9

Tips for Teachers, continued

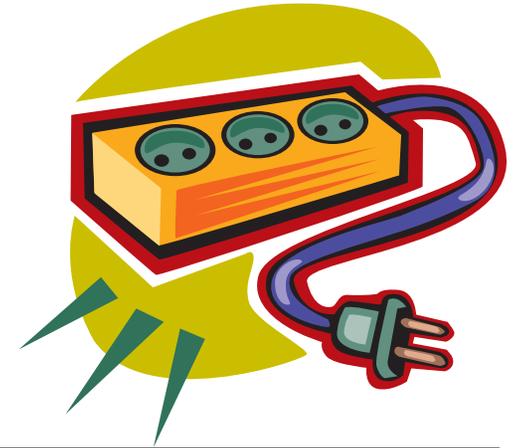| Prior Knowledge & Skill	Materials & Preparation	Safety Issues	Class Management	Materials Provided	Design Process
• Relevant language arts topics • Series and parallel electrical circuits	• Check Design Brief for recommended materials.	• Use of hot glue guns	• Individually or in pairs • Each student keeps a portfolio.	• Design Brief • Guided Portfolio (adapt as appropriate/ optional) • Rubric Assessments	Follow the Design Process: • Restate the problem. • Brainstorm solutions. • Create the best solution. • Test the solution. • Evaluate the solution.

Extension Idea: Have students create an *ad lib* word game (like Mad Libs™), using same style of design.

Differentiation Option: For students with more advanced reading skills, the following page is provided as an alternative to page 1.

Electrifying Language

Background: Electricity has been helping humans live a more comfortable life for many years. Now, you are going to use it to help increase your knowledge of language arts and test your friends.

Design Challenge: Design and create a game that uses electrical circuits to create a signal when correct answers are given to a variety of current language arts material questions. The device must use series and parallel circuits and be no larger than a shoebox.

Materials: Select from the list below.		**Tools:** Select from the list below.
• batteries • buzzer (optional) • cardstock • glue • light bulb (flashlight)	• paper fasteners • recyclable materials • straws • wire • yarn or string	• battery holder (optional) • hole punch • low-heat hot glue gun (optional) • markers/colored pencils/crayons • ruler • scissors

Targeted Standards of Learning: English 4.7, 4.8
Supporting SOL: English 4.2, 4.4, 4.5, 4.6; Science 4.3

Targeted Standard for Technological Literacy: 16
Supporting STL: 3, 5, 8, 9

Guided Portfolio

Name _____

Group Members _____

1.   What is the problem? State the problem in your own words.

_____

_____

_____

_____

_____

_____

_____

_____

Name _____

2. Brainstorm solutions. Sketch and/or describe some possible solutions.

Name   _____

3.   Create the solution you think is best.
Keep notes about your problems and how you solve them. Make sketches if they help.

Name _____

4. Test your solution.

Does your game signal correct answers?   YES   NO

Does your game test current language arts material?   YES   NO

What topics did you cover? _____

_____

_____

How do series and parallel circuits differ? _____

_____

_____

Draw the different circuits used in your game.

Name   _____

5.   Evaluate your solution.

Was it the best solution? Would one of your other ideas have been better? Why, or why not?

_____

_____

_____

Describe one thing you could have done differently in the construction of your device.

_____

_____

_____

Describe one thing you could add to your device to make it better.

_____

_____

_____

Rubric for Electrifying Language

Name _____ Date _____

0—no evidence; 1—limited understanding; 2—some understanding with room for improvement; 3—good understanding with room for improvement; 4—substantial understanding

Design Brief Rubric	0	1	2	3	4
The student restated the problem in his/her own words.					
The student brainstormed more than one idea.					
The student kept notes and/or made sketches while creating a solution, to include problems and how they were solved.					
The student tested the game to make sure					
• it signals correct answers					
• it uses series and parallel circuits					
• it covers current language arts material					
• it is no larger than a shoebox.					
The student evaluated how he/she could make it better next time.					

Rubric for Electrifying Language

Name _____   Date _____

0—no evidence; 1—limited understanding; 2—some understanding with room for improvement; 3—good understanding with room for improvement; 4—substantial understanding

Communication: Speaking, Listening, Media Literacy Rubric	0	1	2	3	4
4.1 The student will use effective communication skills in a variety of settings.					
a) Present accurate directions to individuals and small groups.					
b) Contribute to group discussions across content areas.					
c) Seek ideas and opinions of others.					
d) Use evidence to support opinions.					
e) Use grammatically correct language and specific vocabulary to communicate ideas.					
f) Communicate new ideas to others.					
g) Demonstrate the ability to collaborate with diverse teams.					
h) Demonstrate the ability to work independently.					
4.2 The student will make and listen to oral presentations and reports.					
a) Use subject-related information and vocabulary.					
b) Listen to and record information.					
c) Organize information for clarity.					
d) Use language and style appropriate to the audience, topic, and purpose.					

Standards of Learning

English (2010)

Communication: Speaking, Listening, Media Literacy

4.2   The student will make and listen to oral presentations and reports.
   a)   Use subject-related information and vocabulary.
   b)   Listen to and record information.
   c)   Organize information for clarity.
   d)   Use language and style appropriate to the audience, topic, and purpose.

Reading

4.4   The student will expand vocabulary when reading.
   a)   Use context to clarify meanings of unfamiliar words.
   b)   Use knowledge of roots, affixes, synonyms, antonyms, and homophones.
   c)   Use word-reference materials, including the glossary, dictionary, and thesaurus.
   d)   Develop vocabulary by listening to and reading a variety of texts.
   e)   Use vocabulary from other content areas.

4.5   The student will read and demonstrate comprehension of fictional texts, narrative nonfiction texts, and poetry.
   a)   Explain the author's purpose.
   b)   Describe how the choice of language, setting, characters, and information contributes to the author's purpose.
   c)   Identify the main idea.
   d)   Summarize supporting details.
   e)   Identify the problem and solution.
   f)   Describe the relationship between text and previously read materials.
   g)   Identify sensory words.
   h)   Draw conclusions/make inferences about text.
   i)   Make, confirm, or revise predictions.
   j)   Identify cause-and-effect relationships.
   k)   Use reading strategies throughout the reading process to monitor comprehension.
   l)   Read with fluency and accuracy.

4.6   The student will read and demonstrate comprehension of nonfiction texts.
   a)   Use text structures, such as type, headings, and graphics, to predict and categorize information in both print and digital texts.
   b)   Formulate questions that might be answered in the selection.

c) Explain the author's purpose.
d) Identify the main idea.
e) Summarize supporting details.
f) Draw conclusions and make simple inferences using textual information as support.
g) Distinguish between cause and effect.
h) Distinguish between fact and opinion.
i) Use prior knowledge and build additional background knowledge as context for new learning.
j) Identify new information gained from reading.
k) Use reading strategies throughout the reading process to monitor comprehension.
l) Read with fluency and accuracy.

Writing

4.7 The student will write cohesively for a variety of purposes.
a) Identify intended audience.
b) Focus on one aspect of a topic.
c) Use a variety of pre-writing strategies.
d) Organize writing to convey a central idea.
e) Recognize that different modes of writing have different patterns of organization.
f) Write a clear topic sentence focusing on the main idea.
g) Write two or more related paragraphs on the same topic.
h) Use transition words for sentence variety.
i) Utilize elements of style, including word choice and sentence variation.
j) Revise writing for clarity of content using specific vocabulary and information.
k) Include supporting details that elaborate the main idea.

4.8 The student will edit writing for correct grammar, capitalization, spelling, punctuation, sentence structure, and paragraphing.
a) Use subject-verb agreement.
b) Include prepositional phrases.
c) Eliminate double negatives.
d) Use noun-pronoun agreement.
e) Use commas in series, dates, and addresses.
f) Incorporate adjectives and adverbs.
g) Use correct spelling for frequently used words, including common homophones.
h) Use singular possessives.

Science (2010)

Force, Motion, and Energy

4.3   The student will investigate and understand characteristics and interactions of moving objects. Key concepts include
   a)   motion is described by an object's direction and speed;
   b)   changes in motion are related to force and mass;
   c)   friction is a force that opposes motion; and
   d)   moving objects have kinetic energy.

Standards for Technological Literacy

Standard 3:   Students will develop an understanding of the relationships among technologies and the connections between technology and other fields of study.

Standard 5:   Students will develop an understanding of the effects of technology on the environment.

Standard 8:   Students will develop an understanding of the attributes of design.

Standard 9:   Students will develop an understanding of engineering design.

Standard 16:   Students will develop an understanding of and be able to select and use energy and power technologies.

Please give us some feedback.

Complete the form below to let us know how this design brief worked for you and your students. Please be specific so that we might use your suggestions to improve the activity. *You can fill this out on your computer, or you can print it, fill it out manually, and scan it.*

Teacher: _____

School: _____

School division: _____

Design brief title: _____

Background *Put an X in the appropriate column:*	Needs to be rewritten	Needs minor adjustment	Is ready for classroom use
Does it set the context for the activity?			
Is it age-appropriate in language, length, and complexity?			
Does it reference prior learning and/or research that the students did that will facilitate designing a solution to a problem?			
Is it detailed enough that an adult will understand the purpose for the design brief?			
COMMENTS. *If any of the questions above are marked other than "ready for classroom use," please provide suggestions here.*			

Design Challenge	Needs to be rewritten	Needs minor adjustment	Is ready for classroom use
Does the challenge support your curriculum?			
Is it age-appropriate in language, length, and complexity?			
Is it detailed enough that an adult will understand the purpose for the design brief?			
COMMENTS. *If any of the questions above are marked other than "ready for classroom use," please provide suggestions here.*			

Criteria Criteria are part of the challenge. They set the limitations for the design. They are not directions.	Needs to be rewritten	Needs minor adjustment	Is ready for classroom use	N/A
Are the limitations age-appropriate?				
Do the limitations encourage critical thinking?				
Is the application of mathematic knowledge/skills integrated into the criteria? If not, should the skill area be addressed?				
Is the application of science knowledge/skills integrated into the criteria? If not, should the skill area be addressed?				
Is the application of social studies knowledge/skills integrated into the criteria? If not, should the skill area be addressed?				
Are language skills integrated into the criteria? If not, should the skill area be addressed?				
COMMENTS. *If any of the questions above are marked other than "ready for classroom use," please provide suggestions here.*				

Materials Materials help set the limitations for the design. The list should include materials that might work.	Needs to be rewritten	Needs minor adjustment	Is ready for classroom use	N/A
Does the materials list encourage a variety of design solutions?				
Does the materials list include a variety of choices for joining items?				
Does the materials list include materials that force students to make decisions?				
COMMENTS. *If any of the questions above are marked other than "ready for classroom use," please provide suggestions here.*				

Tools Tools can be used in the construction of the designed product. They are used to manipulate materials. They cannot become part of the product.	Needs to be rewritten	Needs minor adjustment	Is ready for classroom use
Are the tools listed age appropriate?			
Are all tools needed for the activity included?			
COMMENTS. *If any of the questions above are marked other than "ready for classroom use," please provide suggestions here.*			

Standards of Learning	Yes	No
Does the design brief reinforce the targeted Standard of Learning(s)?		
Are the supporting Standards of Learning appropriate?		
What Standards of Learning would you add or remove?		

Standards for Technological Literacy	Yes	No
Does the design brief reinforce the targeted Standard(s) for Technological Literacy?		
Are the supporting Standards for Technological Literacy appropriate?		
What Standards for Technological Literacy would you add or remove?		

Tips for Teachers	Yes	No
Are the tips listed in the chart helpful for a first-time teacher?		
What tips would you add?		

Guided Portfolio	Needs to be rewritten	Needs minor adjustment	Is ready for classroom use
Are the instructions and questions age appropriate and clear?			
In the "Test your solution" section, do the questions force students to thoroughly test their solutions?			
In the "Evaluate your solution" section, do the questions force students to honestly evaluate their solutions			
COMMENTS. *If any of the questions above are marked other than "ready for classroom use," please provide suggestions here.*			

Additional Comments
Please use this area to provide general suggestions for improving this design brief.