Electric Circuits - STC

STANDARDS ALIGNMENT KEY

♦ - Unit is aligned as is.

♦V - Unit is aligned with the intentional use of vocabulary from the Washington Science Standards

♦R - Unit is aligned with the intentional use of the STC Children's Book

♦r - Unit is aligned with the intentional use of the readings within the unit.

♦E - Unit is aligned with the intentional use of the lesson extensions

▲ - Unit needs identified changes or additions to be aligned

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EALR	GB	Code	Content Standard	Performance Expectation	Lesson Number	AS	Comments/Evidence
Addressed Throughout The Unit							
Inquiry	4-5	INQA	Scientific investigations involve asking and answering *questions* and comparing the answers with *evidence* from the real world.	Identify the *questions* being asked in an investigation. Gather scientific evidence that helps to answer a *question.*	Addressed throughout the unit.	♦	In this unit, students engage in multiple scientific investigations where they predict, observe, collect data, and answer a question posed to them by the unit.
Inquiry	4-5	INQB	Scientists plan and conduct different kinds of investigations, depending on the *questions* they are trying to answer. Types of investigations include systematic *observations* and descriptions, *field studies*, *models*, and *open-ended explorations* as well as *experiments*.	Given a research *question*, plan an appropriate investigation, which may include systematic *observations, field studies, models, open-ended explorations*, or *controlled experiments*. Work collaboratively with other students to carry out an investigation, selecting appropriate tools and demonstrating safe and careful use of equipment.	Addressed throughout the unit.	♦	This unit is strong on *systematic observations* with open-ended explorations. Students work collaboratively with others to carry out investigations.
Inquiry	4-5	INQD	Investigations involve systematic collection and recording of relevant *observations* and data.	Gather, record, and organize data using appropriate units, tables, graphs, or maps.	Addressed throughout the unit.	♦	

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Inquiry	4-5	INQH	Scientists communicate the results of their investigations verbally and in writing. They review and ask *questions* about the results of other scientists' work.	Display the findings of an investigation, using tables, graphs, or other visual means to represent the data accurately and meaningfully. Communicate to peers the purpose, procedure, results, and conclusions of an investigation. Respond non-defensively to comments and questions about their investigation. Discuss differences in findings and conclusions reported by other students.	Addressed throughout the unit.	♦	To meet **all** of the Performance Expectations of this standard, teachers will need to emphasize: -Communicate to peers the purpose, procedure, results, and conclusions of an investigation. -Respond non-defensively to comments and questions about their investigation.
Inquiry	4-5	INQI	Scientists report the results of their investigations honestly, even when those results show their predictions were wrong, or when they cannot *explain* the results.	*Explain* why records of *observations* must never be changed, even when the *observations* do not match expectations.	Addressed throughout the unit.	♦	To meet this standard, teachers must intentionally emphasize that honesty is an important trait scientists must possess even when they predict a different outcome or when the data does not support their prediction.
Inquiry	2-3	INQA	Scientific investigations are *designed* to gain knowledge about the *natural world*.	Explain how observations can lead to new knowledge and new *questions* about the *natural world*.	Addressed throughout the unit.	♦	The teacher should intentionally take advantage of the multiple opportunities for sharing that all of the scientific investigations students are conducting enhance their understanding of electricity.
Inquiry	2-3	INQB	A scientific investigation may include making and following a plan to accurately observe and *describe* objects, events, and *organisms*; make and record measurements: and *predict* outcomes.	Work with other students to make and follow a plan to carry out a scientific investigation. Actions may include accurately observing and describing objects, events, and *organisms*; measuring and recording data; and predicting outcomes.	Addressed throughout the unit.	♦	This unit is strong on systematic observations with open-ended explorations where students observe and describe objects and events as well as predicting outcomes.

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EALR	GB	Code	Content Standard	Performance Expectation	Lesson Number	AS	Comments/Evidence
Inquiry	2-3	INQG	Scientists make the results of their investigations public, even when the results contradict their expectations.	Communicate honestly about their investigations, describing how *observations* were made, and summarizing results.	Addressed throughout the unit.	♦	The teacher should model honesty when recording and reporting data. As students are collecting and communicating data, teachers need to be intentional about discussing the importance of honesty when they communicate with others the findings of their investigations.
Physical Science	4-5	PS3A	*Energy* has many forms, such as *heat*, light, sound, *motion*, and electricity.	Identify different forms of *energy* (e.g., *heat*, light, sound, *motion*, electricity) in a given *system*.	Addressed throughout the unit.	♦ ▲	This unit is strongly connected to this standard's elements of heat, light, and electricity. The teacher should be intentional about using the terms light energy, heat energy, electrical energy, and sound energy existing in a system. The unit has the potential of also addressing sound with the addition of a buzzer placed in the simple circuit. A suggested placement of the buzzer might be thought of after Lesson 7 as another example of something that would conduct electricity or Lesson 12 with the switch to turn on and off the buzzer.
Physical Science	4-5	PS3E	Electrical energy in *circuits* can be changed to other forms of energy, including light, *heat*, sound, and *motion*. *Electric circuits* require a complete loop through conducting materials in which an electric current can pass.	Connect wires to produce a complete circuit involving a battery and at least one other electrical component to produce observable change (e.g., light a bulb, sound a buzzer, and make a bell ring). Repair an electric circuit by completing a closed loop. Describe how electrical energy is transferred from one place to another, and how it is transformed from electrical energy to different kinds of energy in the circuit above.	Addressed throughout the unit.	♦ ♦ ♦V	A teacher must be intentional about the use of the term *transformed* when discussing transformation of electrical energy to light and heat energy in a bulb.

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EALR	GB	Code	Content Standard	Performance Expectation	Lesson Number	AS	Comments/Evidence
Physical Science	2-3	PS3A	*Heat* , light, *motion* , electricity, and sound are all forms of energy.	Use the word *energy* to *explain* everyday activities (e.g., food gives people energy to play games). Give examples of different forms of energy as observed in everyday life: light, sound, and *motion* . Explain how light, sound, and motion are all energy.	Addressed throughout the unit.	♦ ▲	This unit is strongly connected to this standard's elements of heat, light, and electricity. The teacher should be intentional about using the terms light energy, heat energy, electrical energy, and sound energy existing in a system. The unit has the potential of also addressing sound with the addition of a buzzer placed in the simple circuit. A suggested placement of the buzzer might be thought of after Lesson 7 as another example of something that would conduct electricity or Lesson 12 with the switch to turn on and off the buzzer.

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EALR	GB	Code	Content Standard	Performance Expectation	Lesson Number	AS	Comments/Evidence
Lesson 1							

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EALR	GB	Code	Content Standard	Performance Expectation	Lesson Number	AS	Comments/Evidence
Lesson 2							

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EALR	GB	Code	Content Standard	Performance Expectation	Lesson Number	AS	Comments/Evidence
Lesson 3							
Systems	4-5	SYSA	Systems contain *subsystems*.	Identify at least one of the *subsystems* of an object, plant, or animal (e.g., an airplane contains *subsystems* for propulsion, landing, and *control*).	Lessons 3, 4, 5, 6, 7, 9, 11, 12, 13, 16	♦V	In this unit, multiple opportunities exist to use the term *subsystem*. Teachers must intentionally use the vocabulary word *subsystem.* An example of a *subsystem* for a circuit might be the switch or the bulb or the battery. Note that each subsystem (bulb, battery, switch) can be systems in and of themselves.
Systems	4-5	SYSC	Systems have *inputs* and *outputs*. Changes in inputs may change the *outputs* of a *system*.	*Describe* what goes into a *system (input)* and what comes out of a *system (output)* (e.g., when making cookies, inputs include sugar, flour, and chocolate chips; *outputs* are finished cookies).	Lessons 3, 4, 5, 6, 7, 9, 11, 12, 13, 16	♦V	In the unit, in general, every time a complete circuit is created, it is a *system*.
Systems	4-5	SYSD	One defective part can cause a subsystem to malfunction, which in turn will affect the system as a whole.	*Predict* what might happen to a *system* if a part in one or more of its *subsystems* is missing, broken, worn out, mismatched, or misconnected (e.g., a broken toe will affect the skeletal *system*, which can greatly reduce a person's ability to walk).	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	The teacher needs to be intentional about discussing the complete circuit as the *system* which can function when all of the *subsystems* (bulb, switch, battery) are working properly. But if the *subsystems* are malfunctioning, the *system* does not function. Lesson 6 is especially strong in reinforcing this standard as students struggle to troubleshoot the circuit which includes the faulty bulb.
Systems	2-3	SYSA	A *system* is a group of interacting parts that form a whole.	Give examples of simple living and physical *systems* (e.g., a whole animal or plant, a car, a doll, a set of table and chairs). For each example, *explain how* different parts make up the whole.	Lessons 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 16	♦V	Every time students create a complete circuit, they are creating a *system*. The teacher needs to make sure to use the term *system* intentionally when discussing complete circuits.

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EALR	GB	Code	Content Standard	Performance Expectation	Lesson Number	AS	Comments/Evidence
Systems	2-3	SYSB	A whole object, plant, or animal may not continue to *function* the same way if some of its parts are missing.	*Predict* what may happen to an object, plant, or animal if one or more of its parts are removed (e.g., a tricycle cannot be ridden if its wheels are removed). Explain how the parts of a system depend on one another for the system to function.	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	Students are asked to make *predictions* throughout the unit. The teacher needs to be intentional about discussing what might happen to the *function* of the circuit *system* if a part is missing (e.g. bulb or battery).
Systems	2-3	SYSC	A whole object, plant, or animal can do things that none of its parts can do by themselves.	Contrast the *function* of a whole object, plant, or animal with the *function* of one of its parts (e.g., an airplane can fly, but wings and propeller alone cannot; plants can grow, but stems and flowers alone cannot).	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	Intentional use of the term *function* is needed when talking about a working complete circuit. A bulb by itself will not *function* (light) unless it is included in a complete circuit.
Systems	2-3	SYSD	Some objects need to have their parts connected in a certain way if they are to *function* as a whole.	*Explain* why the parts in a *system* need to be connected in a specific way for the *system* to *function* as a whole (e.g., batteries must be inserted correctly in a flashlight if it is to produce light).	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	Parts of a complete circuit (*system*) need to be connected in a specific way for the circuit to *function* as a whole.

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EALR	GB	Code	Content Standard	Performance Expectation	Lesson Number	AS	Comments/Evidence
Lesson 4							
Systems	4-5	SYSA	Systems contain *subsystems* .	Identify at least one of the *subsystems* of an object, plant, or animal (e.g., an airplane contains *subsystems* for propulsion, landing, and *control*).	Lessons 3, 4, 5, 6, 7, 9, 11, 12, 13, 16	♦V	In this unit, multiple opportunities exist to use the term *subsystem* . Teachers must intentionally use the vocabulary word *subsystem.* An example of a *subsystem* for a circuit might be the switch or the bulb or the battery. Note that each subsystem (bulb, battery, switch) can be systems in and of themselves.
Systems	4-5	SYSB	A *system* can do things that none of its *subsystems* can do by themselves	Specify how a *system* can do things that none of its *subsystems* can do by themselves (e.g., a forest *ecosystem* can sustain itself, while the trees, soil, plant, and animal *populations* cannot).	Lessons 4, 5, 6, 12	♦V	In Lesson 4, the students examine the *subsystem* of the bulb. Use of the term *subsystem* needs to be explicit.
Systems	4-5	SYSC	Systems have *inputs* and *outputs* . Changes in inputs may change the *outputs* of a *system* .	*Describe* what goes into a *system (input)* and what comes out of a *system (output)* (e.g., when making cookies, inputs include sugar, flour, and chocolate chips; *outputs* are finished cookies).	Lessons 3, 4, 5, 6, 7, 9, 11, 12, 13, 16	♦V	In the unit, in general, every time a complete circuit is created, it is a *system* .
Systems	4-5	SYSC	Systems have *inputs* and *outputs* . Changes in inputs may change the *outputs* of a *system* .	*Describe* the *effect* on a *system* if its *input* is changed (e.g., if sugar is left out, the cookies will not taste very good).	Lessons 4, 11	♦V	Lesson 4, the bulb will have a faint glow with just a few batteries. As energy is added by *inputting* more and more batteries into the *system* , the *output* is observed as the bulb gets brighter and brighter.

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Systems	4-5	SYSD	One defective part can cause a subsystem to malfunction, which in turn will affect the system as a whole.	*Predict* what might happen to a *system* if a part in one or more of its *subsystems* is missing, broken, worn out, mismatched, or misconnected (e.g., a broken toe will affect the skeletal *system*, which can greatly reduce a person's ability to walk).	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	The teacher needs to be intentional about discussing the complete circuit as the *system* which can function when all of the *subsystems* (bulb, switch, battery) are working properly. But if the *subsystems* are malfunctioning, the *system* does not function. Lesson 6 is especially strong in reinforcing this standard as students struggle to troubleshoot the circuit which includes the faulty bulb.
Systems	2-3	SYSA	A *system* is a group of interacting parts that form a whole.	Give examples of simple living and physical *systems* (e.g., a whole animal or plant, a car, a doll, a set of table and chairs). For each example, *explain how* different parts make up the whole.	Lessons 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 16	♦V	Every time students create a complete circuit, they are creating a *system*. The teacher needs to make sure to use the term *system* intentionally when discussing complete circuits.
Systems	2-3	SYSB	A whole object, plant, or animal may not continue to *function* the same way if some of its parts are missing.	*Predict* what may happen to an object, plant, or animal if one or more of its parts are removed (e.g., a tricycle cannot be ridden if its wheels are removed). Explain how the parts of a system depend on one another for the system to function.	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	Students are asked to make *predictions* throughout the unit. The teacher needs to be intentional about discussing what might happen to the *function* of the circuit *system* if a part is missing (e.g. bulb or battery).
Systems	2-3	SYSC	A whole object, plant, or animal can do things that none of its parts can do by themselves.	Contrast the *function* of a whole object, plant, or animal with the *function* of one of its parts (e.g., an airplane can fly, but wings and propeller alone cannot; plants can grow, but stems and flowers alone cannot).	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	Intentional use of the term *function* is needed when talking about a working complete circuit. A bulb by itself will not *function* (light) unless it is included in a complete circuit.

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Systems	2-3	SYSD	Some objects need to have their parts connected in a certain way if they are to *function* as a whole.	*Explain* why the parts in a *system* need to be connected in a specific way for the *system* to *function* as a whole (e.g., batteries must be inserted correctly in a flashlight if it is to produce light).	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	Parts of a complete circuit (*system*) need to be connected in a specific way for the circuit to *function* as a whole.
Physical Science	4-5	PS3A	*Energy* has many forms, such as *heat*, light, sound, *motion*, and electricity.	Identify different forms of *energy* (e.g., *heat*, light, sound, *motion*, electricity) in a given *system*.	Lessons 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16	♦ ▲	This unit is strongly connected to this standard's elements of heat, light, and electricity. The teacher should be intentional about using the terms light energy, heat energy, electrical energy, and sound energy existing in a system. The unit has the potential of also addressing sound with the addition of a buzzer placed in the simple circuit. A suggested placement of the buzzer might be thought of after Lesson 7 as another example of something that would conduct electricity or Lesson 12 with the switch to turn on and off the buzzer.
Physical Science	4-5	PS3B	Energy can be t*ransferred* from one place to another.	Draw and label diagrams showing several ways that *energy can be transferred* from one place to another (e.g., sound energy passing through *air*, electrical energy through a wire, *heat* energy conducted through a frying pan, light energy through space).	Lessons 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16 STC Children's Book	▲ ♦R	Use of the terms *transfer of energy* must be intentional when describing how electrical energy is transferred through the complete circuit system (battery to wire, wire to switch, switch to wire, wire to bulb, and bulb to battery). STC Children's Book: ·Where Does Electricity Come From?

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Physical Science	4-5	PS3C	*Heat* energy can be *generated* a number of ways and can move (*transfer*) from one place to another. *Heat energy* is *transferred* from warmer things to colder things.	Identify several ways to *generate heat* energy (e.g., lighting a match, rubbing hands together, or mixing different kinds of chemicals together). Give examples of two different ways that heat energy can move from one place to another, and explain which direction the heat moves (e.g., when placing a pot on the stove, heat moves from the hot burner to the cooler pot).	Lessons 4, 8	♦V ♦R	In Lesson 4, an opportunity exists to address this concept. Students can feel *heat* energy *generated* in the large bulb. The heat, in this case, is moving or is *transferred* from the hot bulb to the students' cool hands. In Lesson 8, the nichrome wire, which should NOT be touched by the students, *generates* heat that can also be observed and felt from a distance (hot bulb heats air around it that can be felt). STC Children's Book: Where Does Electricity Come From?
Physical Science	4-5	PS3D	Sound energy can be *generated* by making things vibrate.	Demonstrate how sound can be *generated* by vibrations, and *explain* how sound energy is *transferred* through the air from a source to an observer.	Lesson 4 or 7	▲	With the addition of a buzzer to this unit would allow students to feel the buzzer's vibrations (sound energy) and hear the buzzer (sound energy transferred through the air) addresses this standard.

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Lesson 5							
Systems	4-5	SYSA	Systems contain *subsystems* .	Identify at least one of the *subsystems* of an object, plant, or animal (e.g., an airplane contains *subsystems* for propulsion, landing, and *control*).	Lessons 3, 4, 5, 6, 7, 9, 11, 12, 13, 16	♦V	In this unit, multiple opportunities exist to use the term *subsystem* . Teachers must intentionally use the vocabulary word *subsystem.* An example of a *subsystem* for a circuit might be the switch or the bulb or the battery. Note that each subsystem (bulb, battery, switch) can be systems in and of themselves.
Systems	4-5	SYSB	A *system* can do things that none of its *subsystems* can do by themselves	Specify how a *system* can do things that none of its *subsystems* can do by themselves (e.g., a forest *ecosystem* can sustain itself, while the trees, soil, plant, and animal *populations* cannot).	Lessons 4, 5, 6, 12	♦V	In Lesson 5, the battery holder and bulb socket can be shown as *subsystems* within the larger circuit *system.*
Systems	4-5	SYSC	Systems have *inputs* and *outputs* . Changes in inputs may change the *outputs* of a *system* .	*Describe* what goes into a *system (input)* and what comes out of a *system (output)* (e.g., when making cookies, inputs include sugar, flour, and chocolate chips; *outputs* are finished cookies).	Lessons 3, 4, 5, 6, 7, 9, 11, 12, 13, 16	♦V	In the unit, in general, every time a complete circuit is created, it is a *system* .
Systems	4-5	SYSD	One defective part can cause a subsystem to malfunction, which in turn will affect the system as a whole.	*Predict* what might happen to a *system* if a part in one or more of its *subsystems* is missing, broken, worn out, mismatched, or misconnected (e.g., a broken toe will affect the skeletal *system* , which can greatly reduce a person's ability to walk).	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	The teacher needs to be intentional about discussing the complete circuit as the *system* which can function when all of the *subsystems* (bulb, switch, battery) are working properly. But if the *subsystems* are malfunctioning, the *system* does not function. Lesson 6 is especially strong in reinforcing this standard as students struggle to troubleshoot the circuit which includes the faulty bulb.

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Systems	2-3	SYSA	A *system* is a group of interacting parts that form a whole.	Give examples of simple living and physical *systems* (e.g., a whole animal or plant, a car, a doll, a set of table and chairs). For each example, *explain how* different parts make up the whole.	Lessons 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 16	♦V	Every time students create a complete circuit, they are creating a *system*. The teacher needs to make sure to use the term *system* intentionally when discussing complete circuits.
Systems	2-3	SYSB	A whole object, plant, or animal may not continue to *function* the same way if some of its parts are missing.	*Predict* what may happen to an object, plant, or animal if one or more of its parts are removed (e.g., a tricycle cannot be ridden if its wheels are removed). Explain how the parts of a system depend on one another for the system to function.	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	Students are asked to make *predictions* throughout the unit. The teacher needs to be intentional about discussing what might happen to the *function* of the circuit *system* if a part is missing (e.g. bulb or battery).
Systems	2-3	SYSC	A whole object, plant, or animal can do things that none of its parts can do by themselves.	Contrast the *function* of a whole object, plant, or animal with the *function* of one of its parts (e.g., an airplane can fly, but wings and propeller alone cannot; plants can grow, but stems and flowers alone cannot).	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	Intentional use of the term *function* is needed when talking about a working complete circuit. A bulb by itself will not *function* (light) unless it is included in a complete circuit.
Systems	2-3	SYSD	Some objects need to have their parts connected in a certain way if they are to *function* as a whole.	*Explain* why the parts in a *system* need to be connected in a specific way for the *system* to *function* as a whole (e.g., batteries must be inserted correctly in a flashlight if it is to produce light).	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	Parts of a complete circuit (*system*) need to be connected in a specific way for the circuit to *function* as a whole.

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Physical Science	4-5	PS3A	*Energy* has many forms, such as *heat*, light, sound, *motion*, and electricity.	Identify different forms of *energy* (e.g., *heat*, light, sound, *motion*, electricity) in a given *system*.	Lessons 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16	♦ ▲	This unit is strongly connected to this standard's elements of heat, light, and electricity. The teacher should be intentional about using the terms light energy, heat energy, electrical energy, and sound energy existing in a system. The unit has the potential of also addressing sound with the addition of a buzzer placed in the simple circuit. A suggested placement of the buzzer might be thought of after Lesson 7 as another example of something that would conduct electricity or Lesson 12 with the switch to turn on and off the buzzer.
Physical Science	4-5	PS3B	Energy can be t*ransferred* from one place to another.	Draw and label diagrams showing several ways that *energy can be transferred* from one place to another (e.g., sound energy passing through *air*, electrical energy through a wire, *heat* energy conducted through a frying pan, light energy through space).	Lessons 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16 STC Children's Book	▲ ♦R	Use of the terms *transfer of energy* must be intentional when describing how electrical energy is transferred through the complete circuit system (battery to wire, wire to switch, switch to wire, wire to bulb, and bulb to battery). STC Children's Book: ·Where Does Electricity Come From?

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Lesson 6							
Systems	4-5	SYSA	Systems contain *subsystems* .	Identify at least one of the *subsystems* of an object, plant, or animal (e.g., an airplane contains *subsystems* for propulsion, landing, and *control*).	Lessons 3, 4, 5, 6, 7, 9, 11, 12, 13, 16	♦V	In this unit, multiple opportunities exist to use the term *subsystem* . Teachers must intentionally use the vocabulary word *subsystem.* An example of a *subsystem* for a circuit might be the switch or the bulb or the battery. Note that each subsystem (bulb, battery, switch) can be systems in and of themselves.
Systems	4-5	SYSB	A *system* can do things that none of its *subsystems* can do by themselves	Specify how a *system* can do things that none of its *subsystems* can do by themselves (e.g., a forest *ecosystem* can sustain itself, while the trees, soil, plant, and animal *populations* cannot).	Lessons 4, 5, 6, 12	♦V	In Lesson 6, students troubleshoot various subsystems within the system.
Systems	4-5	SYSC	Systems have *inputs* and *outputs* . Changes in inputs may change the *outputs* of a *system* .	*Describe* what goes into a *system (input)* and what comes out of a *system (output)* (e.g., when making cookies, inputs include sugar, flour, and chocolate chips; *outputs* are finished cookies).	Lessons 3, 4, 5, 6, 7, 9, 11, 12, 13, 16	♦V	In the unit, in general, every time a complete circuit is created, it is a *system* .
Systems	4-5	SYSD	One defective part can cause a subsystem to malfunction, which in turn will affect the system as a whole.	*Predict* what might happen to a *system* if a part in one or more of its *subsystems* is missing, broken, worn out, mismatched, or misconnected (e.g., a broken toe will affect the skeletal *system* , which can greatly reduce a person's ability to walk).	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	The teacher needs to be intentional about discussing the complete circuit as the *system* which can function when all of the *subsystems* (bulb, switch, battery) are working properly. But if the *subsystems* are malfunctioning, the *system* does not function. Lesson 6 is especially strong in reinforcing this standard as students struggle to troubleshoot the circuit which includes the faulty bulb.

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Systems	2-3	SYSA	A *system* is a group of interacting parts that form a whole.	Give examples of simple living and physical *systems* (e.g., a whole animal or plant, a car, a doll, a set of table and chairs). For each example, *explain how* different parts make up the whole.	Lessons 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 16	♦V	Every time students create a complete circuit, they are creating a *system*. The teacher needs to make sure to use the term *system* intentionally when discussing complete circuits.
Systems	2-3	SYSB	A whole object, plant, or animal may not continue to *function* the same way if some of its parts are missing.	*Predict* what may happen to an object, plant, or animal if one or more of its parts are removed (e.g., a tricycle cannot be ridden if its wheels are removed). Explain how the parts of a system depend on one another for the system to function.	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	Students are asked to make *predictions* throughout the unit. The teacher needs to be intentional about discussing what might happen to the *function* of the circuit *system* if a part is missing (e.g. bulb or battery).
Systems	2-3	SYSC	A whole object, plant, or animal can do things that none of its parts can do by themselves.	Contrast the *function* of a whole object, plant, or animal with the *function* of one of its parts (e.g., an airplane can fly, but wings and propeller alone cannot; plants can grow, but stems and flowers alone cannot).	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	Intentional use of the term *function* is needed when talking about a working complete circuit. A bulb by itself will not *function* (light) unless it is included in a complete circuit.
Systems	2-3	SYSD	Some objects need to have their parts connected in a certain way if they are to *function* as a whole.	*Explain* why the parts in a *system* need to be connected in a specific way for the *system* to *function* as a whole (e.g., batteries must be inserted correctly in a flashlight if it is to produce light).	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	Parts of a complete circuit (*system*) need to be connected in a specific way for the circuit to *function* as a whole.

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EALR	GB	Code	Content Standard	Performance Expectation	Lesson Number	AS	Comments/Evidence
Application	4-5	APPD	Scientists and engineers often work in teams with other individuals to *generate* different *ideas* for solving a problem.	Work with other students to *generate* possible *solutions* to a problem, and agree on the most promising *solution* based on how well each different idea meets the *criteria* for a successful *solution.*	Lessons 6, 7, 8, 9, 13, 15, 16	♦	
Physical Science	4-5	PS3B	Energy can be tr*ansferred* from one place to another.	Draw and label diagrams showing several ways that *energy can be transferred* from one place to another (e.g., sound energy passing through *air*, electrical energy through a wire, *heat* energy conducted through a frying pan, light energy through space).	Lessons 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16 STC Children's Book	▲ ♦R	Use of the terms *transfer of energy* must be intentional when describing how electrical energy is transferred through the complete circuit system (battery to wire, wire to switch, switch to wire, wire to bulb, and bulb to battery). STC Children's Book: ·Where Does Electricity Come From?

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EALR	GB	Code	Content Standard	Performance Expectation	Lesson Number	AS	Comments/Evidence
Lesson 7							
Systems	4-5	SYSA	Systems contain *subsystems* .	Identify at least one of the *subsystems* of an object, plant, or animal (e.g., an airplane contains *subsystems* for propulsion, landing, and *control*).	Lessons 3, 4, 5, 6, 7, 9, 11, 12, 13, 16	♦V	In this unit, multiple opportunities exist to use the term *subsystem* . Teachers must intentionally use the vocabulary word *subsystem.* An example of a *subsystem* for a circuit might be the switch or the bulb or the battery. Note that each subsystem (bulb, battery, switch) can be systems in and of themselves.
Systems	4-5	SYSC	Systems have *inputs* and *outputs* . Changes in inputs may change the *outputs* of a *system* .	*Describe* what goes into a *system (input)* and what comes out of a *system (output)* (e.g., when making cookies, inputs include sugar, flour, and chocolate chips; *outputs* are finished cookies).	Lessons 3, 4, 5, 6, 7, 9, 11, 12, 13, 16	♦V	In the unit, in general, every time a complete circuit is created, it is a *system* .
Systems	4-5	SYSD	One defective part can cause a subsystem to malfunction, which in turn will affect the system as a whole.	*Predict* what might happen to a *system* if a part in one or more of its *subsystems* is missing, broken, worn out, mismatched, or misconnected (e.g., a broken toe will affect the skeletal *system* , which can greatly reduce a person's ability to walk).	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	The teacher needs to be intentional about discussing the complete circuit as the *system* which can function when all of the *subsystems* (bulb, switch, battery) are working properly. But if the *subsystems* are malfunctioning, the *system* does not function. Lesson 6 is especially strong in reinforcing this standard as students struggle to troubleshoot the circuit which includes the faulty bulb.
Systems	2-3	SYSA	A *system* is a group of interacting parts that form a whole.	Give examples of simple living and physical *systems* (e.g., a whole animal or plant, a car, a doll, a set of table and chairs). For each example, *explain how* different parts make up the whole.	Lessons 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 16	♦V	Every time students create a complete circuit, they are creating a *system* . The teacher needs to make sure to use the term *system* intentionally when discussing complete circuits.

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EALR	GB	Code	Content Standard	Performance Expectation	Lesson Number	AS	Comments/Evidence
Systems	2-3	SYSB	A whole object, plant, or animal may not continue to *function* the same way if some of its parts are missing.	*Predict* what may happen to an object, plant, or animal if one or more of its parts are removed (e.g., a tricycle cannot be ridden if its wheels are removed). Explain how the parts of a system depend on one another for the system to function.	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	Students are asked to make *predictions* throughout the unit. The teacher needs to be intentional about discussing what might happen to the *function* of the circuit *system* if a part is missing (e.g. bulb or battery).
Systems	2-3	SYSC	A whole object, plant, or animal can do things that none of its parts can do by themselves.	Contrast the *function* of a whole object, plant, or animal with the *function* of one of its parts (e.g., an airplane can fly, but wings and propeller alone cannot; plants can grow, but stems and flowers alone cannot).	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	Intentional use of the term *function* is needed when talking about a working complete circuit. A bulb by itself will not *function* (light) unless it is included in a complete circuit.
Systems	2-3	SYSD	Some objects need to have their parts connected in a certain way if they are to *function* as a whole.	*Explain* why the parts in a *system* need to be connected in a specific way for the *system* to *function* as a whole (e.g., batteries must be inserted correctly in a flashlight if it is to produce light).	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	Parts of a complete circuit (*system*) need to be connected in a specific way for the circuit to *function* as a whole.
Inquiry	4-5	INQE	Repeated *trials* are necessary for *reliability*.	*Explain that* additional *trials* are needed to ensure that the results are repeatable.	Lessons 7, 9	♦V	Intentional use of the term *repeated* (multiple) *trials* should be used when student teams share their data.
Inquiry	4-5	INQG	Scientific explanations emphasize *evidence*, have logically consistent arguments, and use known scientific *principles, models*, and theories.	*Generate* a conclusion from a scientific investigation and show how the conclusion is supported by *evidence* and other scientific *principles*.	Lesson 7	♦	In Lesson 7, students test a variety of materials to collect evidence to generate a conclusion on whether a material is a conductor or an insulator.

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EALR	GB	Code	Content Standard	Performance Expectation	Lesson Number	AS	Comments/Evidence
Inquiry	2-3	INQF	Scientists develop explanations, using *observations (evidence)* and what they already know about the world. Explanations should be based on *evidence* from investigations.	Accurately *describe* results, referring to the graph or other data as *evidence*. Draw a conclusion about the *question* that motivated the study using the results of the investigation as *evidence*.	Lesson 7	♦	In Lesson 7, students test a variety of materials to collect evidence to generate a conclusion on whether a material is a conductor or an insulator.
Application	4-5	APPD	Scientists and engineers often work in teams with other individuals to *generate* different *ideas* for solving a problem.	Work with other students to *generate* possible *solutions* to a problem, and agree on the most promising *solution* based on how well each different idea meets the *criteria* for a successful *solution.*	Lessons 6, 7, 8, 9, 13, 15, 16	♦	
Application	4-5	APPF	*Solutions* to problems must be communicated, if the problem is to be solved.	Communicate the *solution*, results of any tests, and modifications persuasively, using oral, written, and/or pictorial representations of the process and product.	Lessons 7, 13, 15, 16	♦	
Physical Science	4-5	PS3B	Energy can be t*ransferred* from one place to another.	Draw and label diagrams showing several ways that *energy can be transferred* from one place to another (e.g., sound energy passing through *air*, electrical energy through a wire, *heat* energy conducted through a frying pan, light energy through space).	Lessons 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16 STC Children's Book	▲ ♦R	Use of the terms *transfer of energy* must be intentional when describing how electrical energy is transferred through the complete circuit system (battery to wire, wire to switch, switch to wire, wire to bulb, and bulb to battery). STC Children's Book: ·Where Does Electricity Come From?
Physical Science	4-5	PS3D	Sound energy can be *generated* by making things vibrate.	Demonstrate how sound can be *generated* by vibrations, and *explain* how sound energy is *transferred* through the air from a source to an observer.	Lesson 4 or 7	▲	With the addition of a buzzer to this unit would allow students to feel the buzzer's vibrations (sound energy) and hear the buzzer (sound energy transferred through the air) addresses this standard.

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EALR	GB	Code	Content Standard	Performance Expectation	Lesson Number	AS	Comments/Evidence
Lesson 8							
Systems	4-5	SYSD	One defective part can cause a subsystem to malfunction, which in turn will affect the system as a whole.	*Predict* what might happen to a *system* if a part in one or more of its *subsystems* is missing, broken, worn out, mismatched, or misconnected (e.g., a broken toe will affect the skeletal *system*, which can greatly reduce a person's ability to walk).	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	The teacher needs to be intentional about discussing the complete circuit as the *system* which can function when all of the *subsystems* (bulb, switch, battery) are working properly. But if the *subsystems* are malfunctioning, the *system* does not function. Lesson 6 is especially strong in reinforcing this standard as students struggle to troubleshoot the circuit which includes the faulty bulb.
Systems	2-3	SYSA	A *system* is a group of interacting parts that form a whole.	Give examples of simple living and physical *systems* (e.g., a whole animal or plant, a car, a doll, a set of table and chairs). For each example, *explain how* different parts make up the whole.	Lessons 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 16	♦V	Every time students create a complete circuit, they are creating a *system*. The teacher needs to make sure to use the term *system* intentionally when discussing complete circuits.
Systems	2-3	SYSB	A whole object, plant, or animal may not continue to *function* the same way if some of its parts are missing.	*Predict* what may happen to an object, plant, or animal if one or more of its parts are removed (e.g., a tricycle cannot be ridden if its wheels are removed). Explain how the parts of a system depend on one another for the system to function.	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	Students are asked to make *predictions* throughout the unit. The teacher needs to be intentional about discussing what might happen to the *function* of the circuit *system* if a part is missing (e.g. bulb or battery).
Systems	2-3	SYSC	A whole object, plant, or animal can do things that none of its parts can do by themselves.	Contrast the *function* of a whole object, plant, or animal with the *function* of one of its parts (e.g., an airplane can fly, but wings and propeller alone cannot; plants can grow, but stems and flowers alone cannot).	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	Intentional use of the term *function* is needed when talking about a working complete circuit. A bulb by itself will not *function* (light) unless it is included in a complete circuit.

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EALR	GB	Code	Content Standard	Performance Expectation	Lesson Number	AS	Comments/Evidence
Systems	2-3	SYSD	Some objects need to have their parts connected in a certain way if they are to *function* as a whole.	*Explain* why the parts in a *system* need to be connected in a specific way for the *system* to *function* as a whole (e.g., batteries must be inserted correctly in a flashlight if it is to produce light).	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	Parts of a complete circuit (*system*) need to be connected in a specific way for the circuit to *function* as a whole.
Inquiry	4-5	INQF	A scientific *model* is a simplified representation of an object, event, *system*, or process created to understand some aspect of the *natural world*. When learning from a *model*, it is important to realize that the *model* is not exactly the same as the thing being modeled.	Create a simple *model* to represent an event, *system*, or process. Use the model to learn something about the event, system, or process. Explain how the model is similar to and different from the thing being modeled.	Lessons 8, 10, 12, 13, 15, 16	♦V	In making a filament in Lesson 8 or diagramming a circuit in Lessons 10, 12, 13, 15-16, students are creating and using models to build systems such as flashlights or wired houses.
Inquiry	2-3	INQE	*Models* are useful for understanding *systems* that are too big, too small, or too dangerous to study directly.	Use a simple *model* to study a *system*. *Explain how* the *model* can be used to better understand the system.	Lessons 8, 10, 12, 13, 15, 16	♦	In making a filament in Lesson 8 or diagramming a circuit in Lessons 10, 12, 13, 15-16, students are creating and using models to build systems such as flashlights or wired houses.
Application	4-5	APPD	Scientists and engineers often work in teams with other individuals to *generate* different *ideas* for solving a problem.	Work with other students to *generate* possible *solutions* to a problem, and agree on the most promising *solution* based on how well each different idea meets the *criteria* for a successful *solution.*	Lessons 6, 7, 8, 9, 13, 15, 16	♦	

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EALR	GB	Code	Content Standard	Performance Expectation	Lesson Number	AS	Comments/Evidence
Physical Science	4-5	PS3B	Energy can be t*ransferred* from one place to another.	Draw and label diagrams showing several ways that *energy can be transferred* from one place to another (e.g., sound energy passing through *air* , electrical energy through a wire, *heat* energy conducted through a frying pan, light energy through space).	Lessons 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16 STC Children's Book	▲ ♦R	Use of the terms *transfer of energy* must be intentional when describing how electrical energy is transferred through the complete circuit system (battery to wire, wire to switch, switch to wire, wire to bulb, and bulb to battery). STC Children's Book: ·Where Does Electricity Come From?
Physical Science	4-5	PS3C	*Heat* energy can be *generated* a number of ways and can move (*transfer*) from one place to another. *Heat energy* is *transferred* from warmer things to colder things.	Identify several ways to *generate heat* energy (e.g., lighting a match, rubbing hands together, or mixing different kinds of chemicals together). Give examples of two different ways that heat energy can move from one place to another, and explain which direction the heat moves (e.g., when placing a pot on the stove, heat moves from the hot burner to the cooler pot).	Lessons 4, 8	♦V ♦R	In Lesson 4, an opportunity exists to address this concept. Students can feel *heat* energy *generated* in the large bulb. The heat, in this case, is moving or is *transferred* from the hot bulb to the students' cool hands. In Lesson 8, the nichrome wire, which should NOT be touched by the students, *generates* heat that can also be observed and felt from a distance (hot bulb heats air around it that can be felt). STC Children's Book: Where Does Electricity Come From?

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EALR	GB	Code	Content Standard	Performance Expectation	Lesson Number	AS	Comments/Evidence
Lesson 9							
Systems	4-5	SYSA	Systems contain *subsystems*.	Identify at least one of the *subsystems* of an object, plant, or animal (e.g., an airplane contains *subsystems* for propulsion, landing, and *control*).	Lessons 3, 4, 5, 6, 7, 9, 11, 12, 13, 16	♦V	In this unit, multiple opportunities exist to use the term *subsystem*. Teachers must intentionally use the vocabulary word *subsystem.* An example of a *subsystem* for a circuit might be the switch or the bulb or the battery. Note that each subsystem (bulb, battery, switch) can be systems in and of themselves.
Systems	4-5	SYSC	Systems have *inputs* and *outputs*. Changes in inputs may change the *outputs* of a *system*.	*Describe* what goes into a *system (input)* and what comes out of a *system (output)* (e.g., when making cookies, inputs include sugar, flour, and chocolate chips; *outputs* are finished cookies).	Lessons 3, 4, 5, 6, 7, 9, 11, 12, 13, 16	♦V	In the unit, in general, every time a complete circuit is created, it is a *system*.
Systems	4-5	SYSD	One defective part can cause a subsystem to malfunction, which in turn will affect the system as a whole.	*Predict* what might happen to a *system* if a part in one or more of its *subsystems* is missing, broken, worn out, mismatched, or misconnected (e.g., a broken toe will affect the skeletal *system*, which can greatly reduce a person's ability to walk).	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	The teacher needs to be intentional about discussing the complete circuit as the *system* which can function when all of the *subsystems* (bulb, switch, battery) are working properly. But if the *subsystems* are malfunctioning, the *system* does not function. Lesson 6 is especially strong in reinforcing this standard as students struggle to troubleshoot the circuit which includes the faulty bulb.
Systems	2-3	SYSA	A *system* is a group of interacting parts that form a whole.	Give examples of simple living and physical *systems* (e.g., a whole animal or plant, a car, a doll, a set of table and chairs). For each example, *explain how* different parts make up the whole.	Lessons 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 16	♦V	Every time students create a complete circuit, they are creating a *system*. The teacher needs to make sure to use the term *system* intentionally when discussing complete circuits.

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EALR	GB	Code	Content Standard	Performance Expectation	Lesson Number	AS	Comments/Evidence
Systems	2-3	SYSB	A whole object, plant, or animal may not continue to *function* the same way if some of its parts are missing.	*Predict* what may happen to an object, plant, or animal if one or more of its parts are removed (e.g., a tricycle cannot be ridden if its wheels are removed). Explain how the parts of a system depend on one another for the system to function.	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	Students are asked to make *predictions* throughout the unit. The teacher needs to be intentional about discussing what might happen to the *function* of the circuit *system* if a part is missing (e.g. bulb or battery).
Systems	2-3	SYSC	A whole object, plant, or animal can do things that none of its parts can do by themselves.	Contrast the *function* of a whole object, plant, or animal with the *function* of one of its parts (e.g., an airplane can fly, but wings and propeller alone cannot; plants can grow, but stems and flowers alone cannot).	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	Intentional use of the term *function* is needed when talking about a working complete circuit. A bulb by itself will not *function* (light) unless it is included in a complete circuit.
Systems	2-3	SYSD	Some objects need to have their parts connected in a certain way if they are to *function* as a whole.	*Explain* why the parts in a *system* need to be connected in a specific way for the *system* to *function* as a whole (e.g., batteries must be inserted correctly in a flashlight if it is to produce light).	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	Parts of a complete circuit (*system*) need to be connected in a specific way for the circuit to *function* as a whole.
Inquiry	4-5	INQE	Repeated *trials* are necessary for *reliability*.	*Explain that* additional *trials* are needed to ensure that the results are repeatable.	Lessons 7, 9	♦V	Intentional use of the term *repeated* (multiple) *trials* should be used when student teams share their data.

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EALR	GB	Code	Content Standard	Performance Expectation	Lesson Number	AS	Comments/Evidence
Application	4-5	APPD	Scientists and engineers often work in teams with other individuals to *generate* different *ideas* for solving a problem.	Work with other students to *generate* possible *solutions* to a problem, and agree on the most promising *solution* based on how well each different idea meets the *criteria* for a successful *solution.*	Lessons 6, 7, 8, 9, 13, 15, 16	♦	

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EALR	GB	Code	Content Standard	Performance Expectation	Lesson Number	AS	Comments/Evidence
Physical Science	4-5	PS3B	Energy can be tr*ansferred* from one place to another.	Draw and label diagrams showing several ways that *energy can be transferred* from one place to another (e.g., sound energy passing through *air* , electrical energy through a wire, *heat* energy conducted through a frying pan, light energy through space).	Lessons 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16 STC Children's Book	▲ ♦R	Use of the terms *transfer of energy* must be intentional when describing how electrical energy is transferred through the complete circuit system (battery to wire, wire to switch, switch to wire, wire to bulb, and bulb to battery). STC Children's Book: ·Where Does Electricity Come From?

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EALR	GB	Code	Content Standard	Performance Expectation	Lesson Number	AS	Comments/Evidence
Lesson 10							
Systems	2-3	SYSA	A *system* is a group of interacting parts that form a whole.	Give examples of simple living and physical *systems* (e.g., a whole animal or plant, a car, a doll, a set of table and chairs). For each example, *explain how* different parts make up the whole.	Lessons 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 16	♦V	Every time students create a complete circuit, they are creating a *system*. The teacher needs to make sure to use the term *system* intentionally when discussing complete circuits.
Inquiry	4-5	INQF	A scientific *model* is a simplified representation of an object, event, *system*, or process created to understand some aspect of the *natural world*. When learning from a *model*, it is important to realize that the *model* is not exactly the same as the thing being modeled.	Create a simple *model* to represent an event, *system*, or process. Use the model to learn something about the event, system, or process. Explain how the model is similar to and different from the thing being modeled.	Lessons 8, 10, 12, 13, 15, 16	♦V	In making a filament in Lesson 8 or diagramming a circuit in Lessons 10, 12, 13, 15-16, students are creating and using models to build systems such as flashlights or wired houses.
Inquiry	2-3	INQE	*Models* are useful for understanding *systems* that are too big, too small, or too dangerous to study directly.	Use a simple *model* to study a *system*. *Explain how* the *model* can be used to better understand the system.	Lessons 8, 10, 12, 13, 15, 16	♦	In making a filament in Lesson 8 or diagramming a circuit in Lessons 10, 12, 13, 15-16, students are creating and using models to build systems such as flashlights or wired houses.

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EALR	GB	Code	Content Standard	Performance Expectation	Lesson Number	AS	Comments/Evidence
Lesson 11							
Systems	4-5	SYSA	Systems contain *subsystems* .	Identify at least one of the *subsystems* of an object, plant, or animal (e.g., an airplane contains *subsystems* for propulsion, landing, and *control*).	Lessons 3, 4, 5, 6, 7, 9, 11, 12, 13, 16	♦V	In this unit, multiple opportunities exist to use the term *subsystem* . Teachers must intentionally use the vocabulary word *subsystem.* An example of a *subsystem* for a circuit might be the switch or the bulb or the battery. Note that each subsystem (bulb, battery, switch) can be systems in and of themselves.
Systems	4-5	SYSC	Systems have *inputs* and *outputs* . Changes in inputs may change the *outputs* of a *system* .	*Describe* what goes into a *system (input)* and what comes out of a *system (output)* (e.g., when making cookies, inputs include sugar, flour, and chocolate chips; *outputs* are finished cookies).	Lessons 3, 4, 5, 6, 7, 9, 11, 12, 13, 16	♦V	In the unit, in general, every time a complete circuit is created, it is a *system* .
Systems	4-5	SYSC	Systems have *inputs* and *outputs* . Changes in inputs may change the *outputs* of a *system* .	*Describe* the *effect* on a *system* if its *input* is changed (e.g., if sugar is left out, the cookies will not taste very good).	Lessons 4, 11	♦V	In Lesson 11, series and parallel circuits, teachers need to be explicit about using the terms *input* and *output* when talking about adding more batteries (energy *input)* and the observation of the amount of light energy given of (energy *output)* from the bulb.
Systems	4-5	SYSD	One defective part can cause a subsystem to malfunction, which in turn will affect the system as a whole.	*Predict* what might happen to a *system* if a part in one or more of its *subsystems* is missing, broken, worn out, mismatched, or misconnected (e.g., a broken toe will affect the skeletal *system* , which can greatly reduce a person's ability to walk).	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	The teacher needs to be intentional about discussing the complete circuit as the *system* which can function when all of the *subsystems* (bulb, switch, battery) are working properly. But if the *subsystems* are malfunctioning, the *system* does not function. Lesson 6 is especially strong in reinforcing this standard as students struggle to troubleshoot the circuit which includes the faulty bulb.

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EALR	GB	Code	Content Standard	Performance Expectation	Lesson Number	AS	Comments/Evidence
Systems	2-3	SYSA	A *system* is a group of interacting parts that form a whole.	Give examples of simple living and physical *systems* (e.g., a whole animal or plant, a car, a doll, a set of table and chairs). For each example, *explain how* different parts make up the whole.	Lessons 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 16	♦V	Every time students create a complete circuit, they are creating a *system*. The teacher needs to make sure to use the term *system* intentionally when discussing complete circuits.
Systems	2-3	SYSB	A whole object, plant, or animal may not continue to *function* the same way if some of its parts are missing.	*Predict* what may happen to an object, plant, or animal if one or more of its parts are removed (e.g., a tricycle cannot be ridden if its wheels are removed). Explain how the parts of a system depend on one another for the system to function.	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	Students are asked to make *predictions* throughout the unit. The teacher needs to be intentional about discussing what might happen to the *function* of the circuit *system* if a part is missing (e.g. bulb or battery).
Systems	2-3	SYSC	A whole object, plant, or animal can do things that none of its parts can do by themselves.	Contrast the *function* of a whole object, plant, or animal with the *function* of one of its parts (e.g., an airplane can fly, but wings and propeller alone cannot; plants can grow, but stems and flowers alone cannot).	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	Intentional use of the term *function* is needed when talking about a working complete circuit. A bulb by itself will not *function* (light) unless it is included in a complete circuit.
Systems	2-3	SYSD	Some objects need to have their parts connected in a certain way if they are to *function* as a whole.	*Explain* why the parts in a *system* need to be connected in a specific way for the *system* to *function* as a whole (e.g., batteries must be inserted correctly in a flashlight if it is to produce light).	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	Parts of a complete circuit (*system*) need to be connected in a specific way for the circuit to *function* as a whole.

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EALR	GB	Code	Content Standard	Performance Expectation	Lesson Number	AS	Comments/Evidence
Inquiry	4-5	INQC	An *experiment* involves a *comparison*. For an *experiment* to be valid and fair, all of the things that can possibly change the outcome of the *experiment* should be kept the same, if possible.	Conduct or critique an *experiment*, noting when the *experiment* might not be fair because some of the things that might change the outcome are not kept the same.	Lesson 11	♦E	In Lesson 11, Extension #2, students conduct an *experiment* involving a *comparison* of parallel and series circuits. Teachers must discuss with students how experiments can be valid and fair.
Inquiry	4-5	INQG	Scientific explanations emphasize *evidence*, have logically consistent arguments, and use known scientific *principles, models*, and theories.	*Generate* a conclusion from a scientific investigation and show how the conclusion is supported by *evidence* and other scientific *principles*.	Lesson 11 Extension #2 and #3	♦E	In Lesson 11, Extension #2 & #3, this standard is met. Students collect data on which circuit allows the bulb to burn the longest, and draw a conclusion, based on evidence, to justify their explanation.
Physical Science	4-5	PS3B	Energy can be tr*ansferred* from one place to another.	Draw and label diagrams showing several ways that *energy can be transferred* from one place to another (e.g., sound energy passing through *air*, electrical energy through a wire, *heat* energy conducted through a frying pan, light energy through space).	Lessons 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16 STC Children's Book	▲ ♦R	Use of the terms *transfer of energy* must be intentional when describing how electrical energy is transferred through the complete circuit system (battery to wire, wire to switch, switch to wire, wire to bulb, and bulb to battery). STC Children's Book: ·Where Does Electricity Come From?

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EALR	GB	Code	Content Standard	Performance Expectation	Lesson Number	AS	Comments/Evidence
Lesson 12							
Systems	4-5	SYSA	Systems contain *subsystems*.	Identify at least one of the *subsystems* of an object, plant, or animal (e.g., an airplane contains *subsystems* for propulsion, landing, and *control*).	Lessons 3, 4, 5, 6, 7, 9, 11, 12, 13, 16	♦V	In this unit, multiple opportunities exist to use the term *subsystem*. Teachers must intentionally use the vocabulary word *subsystem.* An example of a *subsystem* for a circuit might be the switch or the bulb or the battery. Note that each subsystem (bulb, battery, switch) can be systems in and of themselves.
Systems	4-5	SYSB	A *system* can do things that none of its *subsystems* can do by themselves	Specify how a *system* can do things that none of its *subsystems* can do by themselves (e.g., a forest *ecosystem* can sustain itself, while the trees, soil, plant, and animal *populations* cannot).	Lessons 4, 5, 6, 12	♦V	In Lesson 12 the switch can be considered a *subsystem.* The teacher needs to be intentional about discussing the circuit as the *system* which can function when all of the *subsystems* are working properly.
Systems	4-5	SYSC	Systems have *inputs* and *outputs*. Changes in inputs may change the *outputs* of a *system*.	*Describe* what goes into a *system (input)* and what comes out of a *system (output)* (e.g., when making cookies, inputs include sugar, flour, and chocolate chips; *outputs* are finished cookies).	Lessons 3, 4, 5, 6, 7, 9, 11, 12, 13, 16	♦V	In the unit, in general, every time a complete circuit is created, it is a *system*.
Systems	4-5	SYSD	One defective part can cause a subsystem to malfunction, which in turn will affect the system as a whole.	*Predict* what might happen to a *system* if a part in one or more of its *subsystems* is missing, broken, worn out, mismatched, or misconnected (e.g., a broken toe will affect the skeletal *system*, which can greatly reduce a person's ability to walk).	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	The teacher needs to be intentional about discussing the complete circuit as the *system* which can function when all of the *subsystems* (bulb, switch, battery) are working properly. But if the *subsystems* are malfunctioning, the *system* does not function. Lesson 6 is especially strong in reinforcing this standard as students struggle to troubleshoot the circuit which includes the faulty bulb.

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EALR	GB	Code	Content Standard	Performance Expectation	Lesson Number	AS	Comments/Evidence
Systems	2-3	SYSA	A *system* is a group of interacting parts that form a whole.	Give examples of simple living and physical *systems* (e.g., a whole animal or plant, a car, a doll, a set of table and chairs). For each example, *explain how* different parts make up the whole.	Lessons 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 16	♦V	Every time students create a complete circuit, they are creating a *system*. The teacher needs to make sure to use the term *system* intentionally when discussing complete circuits.
Systems	2-3	SYSB	A whole object, plant, or animal may not continue to *function* the same way if some of its parts are missing.	*Predict* what may happen to an object, plant, or animal if one or more of its parts are removed (e.g., a tricycle cannot be ridden if its wheels are removed). Explain how the parts of a system depend on one another for the system to function.	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	Students are asked to make *predictions* throughout the unit. The teacher needs to be intentional about discussing what might happen to the *function* of the circuit *system* if a part is missing (e.g. bulb or battery).
Systems	2-3	SYSC	A whole object, plant, or animal can do things that none of its parts can do by themselves.	Contrast the *function* of a whole object, plant, or animal with the *function* of one of its parts (e.g., an airplane can fly, but wings and propeller alone cannot; plants can grow, but stems and flowers alone cannot).	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	Intentional use of the term *function* is needed when talking about a working complete circuit. A bulb by itself will not *function* (light) unless it is included in a complete circuit.
Systems	2-3	SYSD	Some objects need to have their parts connected in a certain way if they are to *function* as a whole.	*Explain* why the parts in a *system* need to be connected in a specific way for the *system* to *function* as a whole (e.g., batteries must be inserted correctly in a flashlight if it is to produce light).	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	Parts of a complete circuit (*system*) need to be connected in a specific way for the circuit to *function* as a whole.

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EALR	GB	Code	Content Standard	Performance Expectation	Lesson Number	AS	Comments/Evidence
Inquiry	4-5	INQF	A scientific *model* is a simplified representation of an object, event, *system*, or process created to understand some aspect of the *natural world*. When learning from a *model*, it is important to realize that the *model* is not exactly the same as the thing being modeled.	Create a simple *model* to represent an event, *system*, or process. Use the model to learn something about the event, system, or process. Explain how the model is similar to and different from the thing being modeled.	Lessons 8, 10, 12, 13, 15, 16	♦V	In making a filament in Lesson 8 or diagramming a circuit in Lessons 10, 12, 13, 15-16, students are creating and using models to build systems such as flashlights or wired houses.
Application	4-5	APPC	Problems of moderate complexity can be solved using the *technological design process*. This process begins by defining and researching the problem to be solved.	Define a problem (e.g., a new idea for an inexpensive toy) and list several *criteria* for a successful *solution*. Research the problem to better understand the need and to see how others have solved similar problems.	Lessons 12, 13, 15, 16	♦V ▲	Using the language of *technological design process* as students design and build a flashlight or wire a house should be intentional. Teachers should add the opportunity in Lesson 12 and 13 and Lessons 15 and 16 to define the problem and research solutions.
Inquiry	2-3	INQE	*Models* are useful for understanding *systems* that are too big, too small, or too dangerous to study directly.	Use a simple *model* to study a *system*. *Explain how* the *model* can be used to better understand the system.	Lessons 8, 10, 12, 13, 15, 16	♦	In making a filament in Lesson 8 or diagramming a circuit in Lessons 10, 12, 13, 15-16, students are creating and using models to build systems such as flashlights or wired houses.

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EALR	GB	Code	Content Standard	Performance Expectation	Lesson Number	AS	Comments/Evidence
Physical Science	4-5	PS3B	Energy can be tr*ansferred* from one place to another.	Draw and label diagrams showing several ways that *energy can be transferred* from one place to another (e.g., sound energy passing through *air*, electrical energy through a wire, *heat* energy conducted through a frying pan, light energy through space).	Lessons 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16 STC Children's Book	▲ ♦R	Use of the terms *transfer of energy* must be intentional when describing how electrical energy is transferred through the complete circuit system (battery to wire, wire to switch, switch to wire, wire to bulb, and bulb to battery). STC Children's Book: ·Where Does Electricity Come From?

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EALR	GB	Code	Content Standard	Performance Expectation	Lesson Number	AS	Comments/Evidence
Lesson 13							
Systems	4-5	SYSA	Systems contain *subsystems*.	Identify at least one of the *subsystems* of an object, plant, or animal (e.g., an airplane contains *subsystems* for propulsion, landing, and *control*).	Lessons 3, 4, 5, 6, 7, 9, 11, 12, 13, 16	♦V	In this unit, multiple opportunities exist to use the term *subsystem*. Teachers must intentionally use the vocabulary word *subsystem.* An example of a *subsystem* for a circuit might be the switch or the bulb or the battery. Note that each subsystem (bulb, battery, switch) can be systems in and of themselves.
Systems	4-5	SYSC	Systems have *inputs* and *outputs*. Changes in inputs may change the *outputs* of a *system*.	*Describe* what goes into a *system (input)* and what comes out of a *system (output)* (e.g., when making cookies, inputs include sugar, flour, and chocolate chips; *outputs* are finished cookies).	Lessons 3, 4, 5, 6, 7, 9, 11, 12, 13, 16	♦V	In the unit, in general, every time a complete circuit is created, it is a *system*.
Systems	4-5	SYSD	One defective part can cause a subsystem to malfunction, which in turn will affect the system as a whole.	*Predict* what might happen to a *system* if a part in one or more of its *subsystems* is missing, broken, worn out, mismatched, or misconnected (e.g., a broken toe will affect the skeletal *system*, which can greatly reduce a person's ability to walk).	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	The teacher needs to be intentional about discussing the complete circuit as the *system* which can function when all of the *subsystems* (bulb, switch, battery) are working properly. But if the *subsystems* are malfunctioning, the *system* does not function. Lesson 6 is especially strong in reinforcing this standard as students struggle to troubleshoot the circuit which includes the faulty bulb.
Systems	2-3	SYSA	A *system* is a group of interacting parts that form a whole.	Give examples of simple living and physical *systems* (e.g., a whole animal or plant, a car, a doll, a set of table and chairs). For each example, *explain how* different parts make up the whole.	Lessons 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 16	♦V	Every time students create a complete circuit, they are creating a *system*. The teacher needs to make sure to use the term *system* intentionally when discussing complete circuits.

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EALR	GB	Code	Content Standard	Performance Expectation	Lesson Number	AS	Comments/Evidence
Systems	2-3	SYSB	A whole object, plant, or animal may not continue to *function* the same way if some of its parts are missing.	*Predict* what may happen to an object, plant, or animal if one or more of its parts are removed (e.g., a tricycle cannot be ridden if its wheels are removed). Explain how the parts of a system depend on one another for the system to function.	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	Students are asked to make *predictions* throughout the unit. The teacher needs to be intentional about discussing what might happen to the *function* of the circuit *system* if a part is missing (e.g. bulb or battery).
Systems	2-3	SYSC	A whole object, plant, or animal can do things that none of its parts can do by themselves.	Contrast the *function* of a whole object, plant, or animal with the *function* of one of its parts (e.g., an airplane can fly, but wings and propeller alone cannot; plants can grow, but stems and flowers alone cannot).	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	Intentional use of the term *function* is needed when talking about a working complete circuit. A bulb by itself will not *function* (light) unless it is included in a complete circuit.
Systems	2-3	SYSD	Some objects need to have their parts connected in a certain way if they are to *function* as a whole.	*Explain* why the parts in a *system* need to be connected in a specific way for the *system* to *function* as a whole (e.g., batteries must be inserted correctly in a flashlight if it is to produce light).	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	Parts of a complete circuit (*system*) need to be connected in a specific way for the circuit to *function* as a whole.
Inquiry	4-5	INQF	A scientific *model* is a simplified representation of an object, event, *system*, or process created to understand some aspect of the *natural world*. When learning from a *model*, it is important to realize that the *model* is not exactly the same as the thing being modeled.	Create a simple *model* to represent an event, *system*, or process. Use the model to learn something about the event, system, or process. Explain how the model is similar to and different from the thing being modeled.	Lessons 8, 10, 12, 13, 15, 16	♦V	In making a filament in Lesson 8 or diagramming a circuit in Lessons 10, 12, 13, 15-16, students are creating and using models to build systems such as flashlights or wired houses.

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EALR	GB	Code	Content Standard	Performance Expectation	Lesson Number	AS	Comments/Evidence
Inquiry	2-3	INQE	*Models* are useful for understanding *systems* that are too big, too small, or too dangerous to study directly.	Use a simple *model* to study a *system* . *Explain how* the *model* can be used to better understand the system.	Lessons 8, 10, 12, 13, 15, 16	♦	In making a filament in Lesson 8 or diagramming a circuit in Lessons 10, 12, 13, 15-16, students are creating and using models to build systems such as flashlights or wired houses.

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EALR	GB	Code	Content Standard	Performance Expectation	Lesson Number	AS	Comments/Evidence
Application	4-5	APPC	Problems of moderate complexity can be solved using the *technological design process*. This process begins by defining and researching the problem to be solved.	Define a problem (e.g., a new idea for an inexpensive toy) and list several *criteria* for a successful *solution*. Research the problem to better understand the need and to see how others have solved similar problems.	Lessons 12, 13, 15, 16	♦V ▲	Using the language of *technological design process* as students design and build a flashlight or wire a house should be intentional. Teachers should add the opportunity in Lesson 12 and 13 and Lessons 15 and 16 to define the problem and research solutions.
Application	4-5	APPD	Scientists and engineers often work in teams with other individuals to *generate* different *ideas* for solving a problem.	Work with other students to *generate* possible *solutions* to a problem, and agree on the most promising *solution* based on how well each different idea meets the *criteria* for a successful *solution.*	Lessons 6, 7, 8, 9, 13, 15, 16	♦	
Application	4-5	APPF	*Solutions* to problems must be communicated, if the problem is to be solved.	Communicate the *solution*, results of any tests, and modifications persuasively, using oral, written, and/or pictorial representations of the process and product.	Lessons 7, 13, 15, 16	♦	
Application	2-3	APPA	Simple problems can be solved through a *technological design process* that includes: defining the problem,*gathering information, exploring ideas, making a plan, testing possible *solutions* to see which is best, and communicating the results.	*Design* a *solution* to a simple problem (e.g., *design* a *tool* for removing an object from a jar when your hand doesn't fit), using a *technological design process* that includes: defining the problem,*a gathering information, exploring ideas, making a plan, testing possible *solutions* to see which is best, and communicating the results.	Lessons 13, 15, 16	♦	

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EALR	GB	Code	Content Standard	Performance Expectation	Lesson Number	AS	Comments/Evidence
Application	2-3	APPE	Successful *solutions* to problems often depend on selection of the best tools and materials and on previous experience.	Students can also *evaluate* how well it solved the problem and discuss what they might do differently the next time they have a similar problem.	Lessons 13, 15, 16	♦	
Physical Science	4-5	PS3B	Energy can be tr*ansferred* from one place to another.	Draw and label diagrams showing several ways that *energy can be transferred* from one place to another (e.g., sound energy passing through *air*, electrical energy through a wire, *heat* energy conducted through a frying pan, light energy through space).	Lessons 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16 STC Children's Book	▲ ♦R	Use of the terms *transfer of energy* must be intentional when describing how electrical energy is transferred through the complete circuit system (battery to wire, wire to switch, switch to wire, wire to bulb, and bulb to battery). STC Children's Book: ·Where Does Electricity Come From?

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EALR	GB	Code	Content Standard	Performance Expectation	Lesson Number	AS	Comments/Evidence
Lesson 14							
Physical Science	4-5	PS3B	Energy can be tr*ansferred* from one place to another.	Draw and label diagrams showing several ways that *energy can be transferred* from one place to another (e.g., sound energy passing through *air*, electrical energy through a wire, *heat* energy conducted through a frying pan, light energy through space).	Lessons 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16 STC Children's Book	▲ ♦R	Use of the terms *transfer of energy* must be intentional when describing how electrical energy is transferred through the complete circuit system (battery to wire, wire to switch, switch to wire, wire to bulb, and bulb to battery). STC Children's Book: ·Where Does Electricity Come From?

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EALR	GB	Code	Content Standard	Performance Expectation	Lesson Number	AS	Comments/Evidence
Lesson 15							
Inquiry	4-5	INQF	A scientific *model* is a simplified representation of an object, event, *system*, or process created to understand some aspect of the *natural world*. When learning from a *model*, it is important to realize that the *model* is not exactly the same as the thing being modeled.	Create a simple *model* to represent an event, *system*, or process. Use the model to learn something about the event, system, or process. Explain how the model is similar to and different from the thing being modeled.	Lessons 8, 10, 12, 13, 15, 16	♦V	In making a filament in Lesson 8 or diagramming a circuit in Lessons 10, 12, 13, 15-16, students are creating and using models to build systems such as flashlights or wired houses.
Application	4-5	APPC	Problems of moderate complexity can be solved using the *technological design process*. This process begins by defining and researching the problem to be solved.	Define a problem (e.g., a new idea for an inexpensive toy) and list several criteria for a successful solution. Research the problem to better understand the need and to see how others have solved similar problems.	Lessons 12, 13, 15, 16	♦V ▲	Using the language of *technological design process* as students design and build a flashlight or wire a house should be intentional. Teachers should add the opportunity in Lesson 12 and 13 and Lessons 15 and 16 to define the problem and research solutions.
Inquiry	2-3	INQE	*Models* are useful for understanding *systems* that are too big, too small, or too dangerous to study directly.	Use a simple *model* to study a *system*. *Explain how* the *model* can be used to better understand the system.	Lessons 8, 10, 12, 13, 15, 16	♦	In making a filament in Lesson 8 or diagramming a circuit in Lessons 10, 12, 13, 15-16, students are creating and using models to build systems such as flashlights or wired houses.
Application	4-5	APPF	*Solutions* to problems must be communicated, if the problem is to be solved.	Communicate the *solution*, results of any tests, and modifications persuasively, using oral, written, and/or pictorial representations of the process and product.	Lessons 7, 13, 15, 16	♦	

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EALR	GB	Code	Content Standard	Performance Expectation	Lesson Number	AS	Comments/Evidence
Application	2-3	APPA	Simple problems can be solved through a *technological design process* that includes: defining the problem,*gathering information, exploring ideas, making a plan, testing possible *solutions* to see which is best, and communicating the results.	*Design* a *solution* to a simple problem (e.g., *design* a *tool* for removing an object from a jar when your hand doesn't fit), using a *technological design process* that includes: defining the problem,*a gathering information, exploring ideas, making a plan, testing possible *solutions* to see which is best, and communicating the results.	Lessons 13, 15, 16	♦	
Application	4-5	APPD	Scientists and engineers often work in teams with other individuals to *generate* different *ideas* for solving a problem.	Work with other students to *generate* possible *solutions* to a problem, and agree on the most promising *solution* based on how well each different idea meets the *criteria* for a successful *solution.*	Lessons 6, 7, 8, 9, 13, 15, 16	♦	
Application	2-3	APPE	Successful *solutions* to problems often depend on selection of the best tools and materials and on previous experience.	Students can also *evaluate* how well it solved the problem and discuss what they might do differently the next time they have a similar problem.	Lessons 13, 15, 16	♦	
Physical Science	4-5	PS3B	Energy can be tr*ansferred* from one place to another.	Draw and label diagrams showing several ways that *energy can be transferred* from one place to another (e.g., sound energy passing through *air*, electrical energy through a wire, *heat* energy conducted through a frying pan, light energy through space).	Lessons 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16 STC Children's Book	▲ ♦R	Use of the terms *transfer of energy* must be intentional when describing how electrical energy is transferred through the complete circuit system (battery to wire, wire to switch, switch to wire, wire to bulb, and bulb to battery). STC Children's Book: ·Where Does Electricity Come From?

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EALR	GB	Code	Content Standard	Performance Expectation	Lesson Number	AS	Comments/Evidence
Lesson 16							
Systems	4-5	SYSA	Systems contain *subsystems* .	Identify at least one of the *subsystems* of an object, plant, or animal (e.g., an airplane contains *subsystems* for propulsion, landing, and *control*).	Lessons 3, 4, 5, 6, 7, 9, 11, 12, 13, 16	♦V	In this unit, multiple opportunities exist to use the term *subsystem* . Teachers must intentionally use the vocabulary word *subsystem.* An example of a *subsystem* for a circuit might be the switch or the bulb or the battery. Note that each subsystem (bulb, battery, switch) can be systems in and of themselves.
Systems	4-5	SYSC	Systems have *inputs* and *outputs* . Changes in inputs may change the *outputs* of a *system* .	*Describe* what goes into a *system (input)* and what comes out of a *system (output)* (e.g., when making cookies, inputs include sugar, flour, and chocolate chips; *outputs* are finished cookies).	Lessons 3, 4, 5, 6, 7, 9, 11, 12, 13, 16	♦V	In the unit, in general, every time a complete circuit is created, it is a *system* .
Systems	4-5	SYSD	One defective part can cause a subsystem to malfunction, which in turn will affect the system as a whole.	*Predict* what might happen to a *system* if a part in one or more of its *subsystems* is missing, broken, worn out, mismatched, or misconnected (e.g., a broken toe will affect the skeletal *system* , which can greatly reduce a person's ability to walk).	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	The teacher needs to be intentional about discussing the complete circuit as the *system* which can function when all of the *subsystems* (bulb, switch, battery) are working properly. But if the *subsystems* are malfunctioning, the *system* does not function. Lesson 6 is especially strong in reinforcing this standard as students struggle to troubleshoot the circuit which includes the faulty bulb.
Systems	2-3	SYSA	A *system* is a group of interacting parts that form a whole.	Give examples of simple living and physical *systems* (e.g., a whole animal or plant, a car, a doll, a set of table and chairs). For each example, *explain how* different parts make up the whole.	Lessons 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 16	♦V	Every time students create a complete circuit, they are creating a *system* . The teacher needs to make sure to use the term *system* intentionally when discussing complete circuits.

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EALR	GB	Code	Content Standard	Performance Expectation	Lesson Number	AS	Comments/Evidence
Systems	2-3	SYSB	A whole object, plant, or animal may not continue to *function* the same way if some of its parts are missing.	*Predict* what may happen to an object, plant, or animal if one or more of its parts are removed (e.g., a tricycle cannot be ridden if its wheels are removed). Explain how the parts of a system depend on one another for the system to function.	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	Students are asked to make *predictions* throughout the unit. The teacher needs to be intentional about discussing what might happen to the *function* of the circuit *system* if a part is missing (e.g. bulb or battery).
Systems	2-3	SYSC	A whole object, plant, or animal can do things that none of its parts can do by themselves.	Contrast the *function* of a whole object, plant, or animal with the *function* of one of its parts (e.g., an airplane can fly, but wings and propeller alone cannot; plants can grow, but stems and flowers alone cannot).	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	Intentional use of the term *function* is needed when talking about a working complete circuit. A bulb by itself will not *function* (light) unless it is included in a complete circuit.
Systems	2-3	SYSD	Some objects need to have their parts connected in a certain way if they are to *function* as a whole.	*Explain* why the parts in a *system* need to be connected in a specific way for the *system* to *function* as a whole (e.g., batteries must be inserted correctly in a flashlight if it is to produce light).	Lessons 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16	♦V	Parts of a complete circuit (*system*) need to be connected in a specific way for the circuit to *function* as a whole.
Inquiry	4-5	INQF	A scientific *model* is a simplified representation of an object, event, *system*, or process created to understand some aspect of the *natural world*. When learning from a *model*, it is important to realize that the *model* is not exactly the same as the thing being modeled.	Create a simple *model* to represent an event, *system*, or process. Use the model to learn something about the event, system, or process. Explain how the model is similar to and different from the thing being modeled.	Lessons 8, 10, 12, 13, 15, 16	♦V	In making a filament in Lesson 8 or diagramming a circuit in Lessons 10, 12, 13, 15-16, students are creating and using models to build systems such as flashlights or wired houses.

Electric Circuits - STC

EALR	GB	Code	Content Standard	Performance Expectation	Lesson Number	AS	Comments/Evidence
Application	4-5	APPC	Problems of moderate complexity can be solved using the *technological design process*. This process begins by defining and researching the problem to be solved.	Define a problem (e.g., a new idea for an inexpensive toy) and list several criteria for a successful solution. Research the problem to better understand the need and to see how others have solved similar problems.	Lessons 12, 13, 15, 16	♦V ▲	Using the language of *technological design process* as students design and build a flashlight or wire a house should be intentional. Teachers should add the opportunity in Lesson 12 and 13 and Lessons 15 and 16 to define the problem and research solutions.
Application	4-5	APPD	Scientists and engineers often work in teams with other individuals to *generate* different *ideas* for solving a problem.	Work with other students to *generate* possible *solutions* to a problem, and agree on the most promising *solution* based on how well each different idea meets the *criteria* for a successful *solution.*	Lessons 6, 7, 8, 9, 13, 15, 16	♦	
Inquiry	2-3	INQE	*Models* are useful for understanding *systems* that are too big, too small, or too dangerous to study directly.	Use a simple *model* to study a *system*. *Explain how* the *model* can be used to better understand the system.	Lessons 8, 10, 12, 13, 15, 16	♦	In making a filament in Lesson 8 or diagramming a circuit in Lessons 10, 12, 13, 15-16, students are creating and using models to build systems such as flashlights or wired houses.
Application	4-5	APPF	*Solutions* to problems must be communicated, if the problem is to be solved.	Communicate the *solution*, results of any tests, and modifications persuasively, using oral, written, and/or pictorial representations of the process and product.	Lessons 7, 13, 15, 16	♦	

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Application	2-3	APPA	Simple problems can be solved through a *technological design process* that includes: defining the problem,*gathering information, exploring ideas, making a plan, testing possible *solutions* to see which is best, and communicating the results.	*Design* a *solution* to a simple problem (e.g., *design* a *tool* for removing an object from a jar when your hand doesn't fit), using a *technological design process* that includes: defining the problem,*a gathering information, exploring ideas, making a plan, testing possible *solutions* to see which is best, and communicating the results.	Lessons 13, 15, 16	♦	
Application	2-3	APPE	Successful *solutions* to problems often depend on selection of the best tools and materials and on previous experience.	Students can also *evaluate* how well it solved the problem and discuss what they might do differently the next time they have a similar problem.	Lessons 13, 15, 16	♦	
Physical Science	4-5	PS3B	Energy can be tr*ansferred* from one place to another.	Draw and label diagrams showing several ways that *energy can be transferred* from one place to another (e.g., sound energy passing through *air*, electrical energy through a wire, *heat* energy conducted through a frying pan, light energy through space).	Lessons 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16 STC Children's Book	▲ ♦R	Use of the terms *transfer of energy* must be intentional when describing how electrical energy is transferred through the complete circuit system (battery to wire, wire to switch, switch to wire, wire to bulb, and bulb to battery). STC Children's Book: ·Where Does Electricity Come From?

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STC Children's Book							
Application	4-5	APPA	*Technology* involves changing the *natural world* to meet human needs or wants.	*Describe* ways that people use *technology* to meet their needs and wants (e.g., text messages to communicate with friends; use bicycles or cars for transportation).	STC Children's Book	♦R	Many of the stories in the STC Children's book meet this standard.
Application	4-5	APPG	Science and technology have greatly improved food quality and quantity, transportation, health, sanitation, and communication.	Describe specific ways that science and technology have improved the quality of the students' lives.	STC Children's Book	♦R	STC Children's Book: · Electricity at Work
Application	4-5	APPH	People of all ages, interests, and abilities engage in a variety of scientific and technological work.	*Describe* several activities or careers that require people to *apply* their knowledge and abilities in *science*, *technology*, engineering, and mathematics.	STC Children's Book	♦R	Many of the stories in the STC Children's book meet this standard.
Application	2-3	APPB	Scientific ideas and discoveries can be applied to solving problems.	Give an example in which the application of scientific knowledge helps solve a problem (e.g., use electric lights to see at night).	STC Children's Book	♦R	Many of the stories in the STC Children's book meet this standard.

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