Grade 7 Science – Course 2
Unit # 3 – Physical Science
Topic 10 Information Technologies – 15 Days

Unit Overview - Students will explore Physical Science topics of waves, electricity and magnetism, and information technologies. Students will examine and model different wave properties and investigate ways that waves can react when they strike materials and the interaction between waves. Students will learn about electrical forces and magnetic forces by identifying evidence that electrical force is exerted by invisible fields. Students will be able to differentiate between static electricity and current. Students will then ascertain evidence that magnetic force is exerted by invisible fields and pinpoint evidence of a planetary magnetic field around Earth. Students then will distinguish between three components of electric circuits and describe relationships among voltage, current, and resistance. Finally, students will describe possible ways information signals can be sent and encoded.

Topic Essential Question: Why are digital signals a reliable way to produce, store, and transmit information?

Lessons

- Topic Launch/Quest Kickoff
- Lesson 1 Electric Circuits
- Lesson 2 Signals
- Lesson 3 Communication and Technology
- Topic Close – Assessment, Quest Findings

NYSSLS Performance Expectations

MS-PS3-6. Make observations to provide evidence that energy can be transferred by electric currents. [Clarification Statement: Emphasis should be on arrangements of circuit components in series and parallel circuits.] [Assessment Boundary: Assessment will be limited to qualitative analysis and reasoning.]

MS-PS4-3. Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals. [Clarification Statement: Emphasis is on a basic understanding that waves can be used for communication purposes. Examples could include using fiber optic cable to transmit light pulses, radio wave pulses in WIFI devices, and conversion of stored binary patterns to make sound or text on a computer screen.] [Assessment Boundary: Assessment does not include binary counting. Assessment does not include the specific mechanism of any given device.]

MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

Topic Opener **PE:** MS-PS4.3 **SEP:** Obtaining, Evaluating, and Communicating Information **DCI:** **PS 4.C-** Information Technologies and Instrumentation ● Digitized signals (sent as wave pulses) are a more reliable way to encode and transmit information. (MS-PS4-3) **CCC** – Structure and Function	**Savvas** **Highlighted labs are important to the understanding of the instructional concepts in this lesson and must be completed during Science instructional time.** ● Topic Readiness Test ● *u*Connect Lab – Continuous or Discrete? ● Quest Kickoff Video – What is the best way to record sound for my scenario?
Lesson 1 –Electric Circuits **PE:**MS-PS4-3; MS-PS3-6 **SEP:** Obtaining, Evaluating, and Communicating Information **DCI:** **PS3.B –** Conservation of Energy and Energy Transfer ● (NYSED) An electric circuit is a closed path in which an electric current can exist. (MS-PS3-6) **PS4.C –** Information Technologies and Instrumentation ● Digitized signals (sent as wave pulses) are a more reliable way to encode and transmit information. (MS-PS4-3) **CCC:** Structure and Function	**Savvas** **Guiding Objectives:** ● Students will use text evidence to identify the components of a circuit. ● Students will apply Ohm's law to describe and calculate how: Changes in resistance change current in a circuit; changes in voltage change current in a circuit. ● Students will develop models to compare and contrast series and parallel circuits. **Literacy Connection** ● Determine Central Ideas **Vocabulary** ● electrical current ● voltage ● resistance ● Ohm's Law ● series circuit ● parallel circuit **Academic Vocabulary** ● diameter **Connect -** TE/SB p.504 ● Connect It! ● Quest Connection ● Inquiry Warm-Up Lab: Do the Lights Keep Shining? **Investigate -** TE/SB pp.505-511 ● *u*Investigate Lab – Electric Current and Voltage* ● Video – Electric Circuits ● Interactivity – Pacemaker Engineering ● Interactivity – Electric Circuit ● Math Toolbox (p.508) ● Literacy Connection (p.506) ● Reading Checks (pp.507; 510; 511) **Synthesize -** TE/SB pp. 510-512 ● Interactivity – Light the Lights ● Quest Check-In Lab – Constructing a Microphone ● Quest Check-In **Demonstrate** – TE/SB p.512 ● Lesson 1 Check ● Lesson Quiz 1 *Denotes accompanying lab video

Lesson 2 – Signals

PE: MS-PS3-4

SEP: Obtaining, Evaluating, and Communicating Information

DCI:

PS4.C – Information Technologies and Instrumentation

- Digitized signals (sent as wave pulses) are a more reliable way to encode and transmit information. (MS-PS4-3)

CCC: Structure and Function

Savvas

Guiding Objectives:

- Students will use evidence from informational texts to compare and contrast electronic signals and electromagnetic signals.
- Students will use models to describe: Digital signals and analog signals; how analog signals can be converted to digital signals.
- Students will develop models to explain how information is encoded into signals, transmitted, and decoded.

Literacy Connection

- Summarize text

Vocabulary

- wave pulse
- electromagnetic signal
- analog signal
- electronic signal
- digital signal
- pixel

Academic Vocabulary

- transmission

Connect - TE/SB p. 514

- Connect It!
- Quest Connection
- Class Discussion: Clocks

Investigate - TE/SB pp. 515-520

- Video – Signals
- *ul*Investigate Lab – Constructing a Simple Computer Circuit*
- Interactivity – Analog and Digital Signals
- Model It! (p.516)
- Reading Check (pp.517; 520)
- Literacy Connection (p.518)
- Math Toolbox (p.520)

Synthesize - TE/SB pp. 521-523

- Interactivity – Digitized Images
- Interactivity – I've Got to Take This Call
- Quest Check-In Interactivity – Analog and Digital Recordings
- Reading Check (p.522)
- Quest Check-In

Demonstrate – TE/SB p. 523

- Lesson 2 Check
- Lesson 2 Quiz

*Denotes accompanying lab video

CLRI Connections:

- Article: "Can electricity reach the billion people who live without it?"

Globally, however, 1.3 billion people – four times the population of the U.S. – lack access to electricity. Simply scaling up the energy supply with conventional coal, diesel and gas plants would be really expensive. Can rooftop and backyard solar stations be the answer?

<table>
<tr>
<td><u>Lesson 3 – Communication and Technology</u>
PE: MS-PS4-3
SEP: Obtaining, Evaluating, and Communicating Information
DCI:
PS4.C – Information Technologies and Instrumentation
● Digitized signals (sent as wave pulses) are a more reliable way to encode and transmit information. (MS-PS4-3)
CCC: Structure and Function</td>
<td>Savvas
Guiding Objectives:
● Students will use evidence from informational texts on communications technologies to identify: Different kinds of technologies; the use of each kind of technology; benefits and drawbacks of the use of analog signals and digital signals in each technology.
● Students will develop models of the transmission of analog and digital signals in order to support the claim that digital signals are more reliable and efficient overall than analog signals.
Literacy Connection
● Cite Textual Evidence
Vocabulary
● information technology
● software
● noise
● bandwidth
Academic Vocabulary
● hardware
Connect - TE/SB p.526
● Connect It!
● Quest Connection
● Class Discussion – Communicating in Code
Investigate - TE/SB pp. 527-532
● uInvestigate Lab – Let the Music Play
● Video – Communication and Technology
● Interactivity – Cameras and Digital Cameras
● Interactivity – Technology and Communication
● Virtual Lab: Super Spy!
● Literacy Connection (p.528)
● Reading Check (pp.528; 533)
● Model It (p.532)
● Math Toolbox (p.529)
Synthesize - TE/SB pp. 533-534
● Interactivity – Signal Reliability
● Quest Check-In Interactivity – Evaluate Recording Technologies
● Quest Check-In
Demonstrate – TE/SB p.534
● Lesson 3 Check
● Lesson 3 Quiz</td>
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<tr>
<td><u>Topic Close</u>
● Topic 10 Assessment and Remediation TE/SB pp. 536-539
● Quest Finding and Reflection TE/SB p. 539</td>
<td><u>Topic 10 Enrichment</u>
Topic 10 - Lesson 1 Enrichment
● Enrichment – Electrical Energy Outages
● Engineering Design Notebook – Build a Soccer Practice Partner
Topic 10- Lesson 2 Enrichment
● Enrichment – Wireless Communication
● Case Study – Super Ultra High Definition!
Topic 10 - Lesson 3 Enrichment
● Enrichment – Bicycle Systems
● Extraordinary Science – Beam Me Up!</td>
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English Language Learners (ELL) Enhancements To access hyperlinked material, you must be logged into your BPS Google Drive	**Listening** ● **Cross- Linguistic Practices:** Gives students opportunities to make connections between what they hear and their home language (For example, allow students to listen to a passage and identify cognates). ● **Activating Prior Knowledge** Activating prior knowledge means both eliciting from students what they already know and building initial knowledge that they need in order to access upcoming content**.** ● **Visuals** - GIFs, pictures- will assist students in understanding what they are listening to. Use **visual thinking strategies** to set the lens for learning. ● Video to review or introduce a topic – use **closed captioning** to help students see the words and pronunciations while they listen to the content. ● **Word stretching / Vowel stretching** when instructing allows student to listen closely to the pronunciation of the word. ● **Performance Level Descriptors** this document provides teachers with a description of what output they can expect from students based on earned NYSESLAT levels in the modality of listening. Scroll for grade 7.
	Speaking ● **Sentence Stems/Frames** - to begin a sentence - such as *Evolution is…* or *I think that evolution is…* ● **Academic Conversation Starters:** Have a visual of a list of academic sentence starters that students can refer to in a discussion. ● **Choral Reading** - To build fluency, self-confidence and motivation with reading/speaking. ● Create **movement** to go with the word. Movement can be a motivating factor, as well as a kinesthetic tool for conceptualizing the rhythm and flow of fluent reading while triggering brain function for optimal learning. ● **Performance Level Descriptors** This document provides teachers with a description of what output they can expect from students based on earned NYSESLAT levels in the modality of speaking. Scroll for grade 7.
	Reading ● Supplementary Text to help reinforce concepts. ● **Visual Aids** - Pictures or models to support vocabulary words and concepts ● Video to review or introduce a topic - use **closed captioning** to help students read along while they listen to the content. ● **4 Square / Frayer models** to help students gain a deeper understanding of vocabulary. ● **Highlighting** important text to assist students in answering questions after the reading. ● **Chunking**-Break reading of text into chunks or paragraphs ● **Vocabulary Morphology**- Morphology relates to the segmenting of words into affixes (prefixes and suffixes) and roots or base words, and the origins of words. Understanding that words connected by meaning can be connected by spelling can be critical to expanding a student's vocabulary. ● **Performance Level Descriptors** this document provides teachers with a description of what output they can expect from students based on earned NYSESLAT levels in the modality of reading. Scroll for grade 7.
	Instructional Accommodations (depending on the student's needs) ● **Extended time** for tests in class, projects and assignments ● **Directions read.** Broken down as necessary ● **Model** how to complete the activity in the lesson ● **Oral simplification** of directions or questions ● **Translated version** of test when available. Student may have both version English and native language version ● Use of **approved bilingual glossaries** from NYS in each subject

<table>
<tr><td rowspan="3">Special Education Modifications

Special Education students must have accommodations as per Individual Educational Plan (IEP)</td><td><u>Instructional</u>
● Pre-teach vocabulary
● Use picture vocabulary
● Scaffold Depth of Knowledge questions
● Provide copy of notes/notes in “cloze” form
● Use of Think, Pair, and Share strategy to help process information
● Scaffold written assignments with the use of graphic organizers
● Allow for multiple ways to respond (verbal, written, response board)
● Provide model of performance task
● Modify informational text to fit the needs of the students
● Provide a digital or paper interactive notebook
● Present complex tasks in multiple ways
● Provide mnemonic strategies for scientific concepts</td></tr>
<tr><td><u>Technology:</u>
● Audio reading of text
● Text to type functions
● Videos to clarify/visualize science concepts
● Record class lecture/discussions and make accessible to student
● Nearpod- interactive presentations of notes</td></tr>
<tr><td><u>In Class Assessments</u>
● Provide multiple options for projects
● Use of timer in class
● Break all complex tasks into chunks</td></tr>
<tr><td>Step Up to Writing
Step Up to Writing Materials can be found in BPS Science K-12 Schoology Folder Grade 5 Resources Grade 5 SUTW materials</td><td>● Easy Two-Column Notes
● Breaking Down Definitions
● Paragraph Frame- What I Learned
● <u>Performance Level Descriptors</u> this document provides teachers with a description of what output they can expect from students based on earned NYSESLAT levels in the modality of writing. Scroll for grade 7.</td></tr>
<tr><td>Culturally and Linguistically Responsive Teaching (CLRT) in the Science Classroom</td><td>● Materials, resources, and/or discussions address diverse cultural backgrounds and real-world applications
● Artifacts (posters, charts, etc.) in the science classroom are representative of the cultures of the student population
● All students are given an opportunity to engage in science discourse
● Teacher demonstrates high expectations for all students</td></tr>
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