Course 2– Grade 7 Science
Unit # 3 Physical Science

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Topic 8 (20 days) – Waves and Electromagnetic Radiation
Topic 9 (18 days) – Electricity and Magnetism
Topic 10 (14 days) – Information Technologies

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 interaction between waves. Students will learn about electrical forces and magnetic forces by identifying evidence that electrical force is exerted by invisible fields, differentiate between static electricity and current. Students will then identify evidence that magnetic force is exerted by invisible fields and identity evidence of a planetary magnetic field around Earth. Students then will identify 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.

Unit 3 NYSSLS Performance Expectations (PE)

MS-PS4-1. Develop a model and use mathematical representations to describe waves that includes frequency, wavelength, and how the amplitude of a wave is related to the energy in a wave.
[Clarification Statement: Emphasis is on describing waves with both qualitative and quantitative thinking.] [Assessment Boundary: Assessment is limited to comparing standard repeating waves of only one type (transverse or longitudinal).]

MS-PS4-2. Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials. [Clarification Statement: Emphasis is on both light and mechanical waves. Examples of models could include drawings, ray diagrams, simulations, and written descriptions. Materials could include plane, convex, and concave mirrors and biconvex and biconcave lenses.] [Assessment Boundary: Assessment is limited to qualitative applications pertaining to light and mechanical waves.]

MS-PS2-3. Ask questions about data to determine the factors that affect the strength of electric and magnetic forces. [Clarification Statement: Examples of devices that use electric and magnetic forces could include electromagnets, electric motors, or generators. Examples of data could include the effect of the number of turns of wire on the strength of an electromagnet, or the effect of increasing the number or strength of magnets on the speed of an electric motor.] [Assessment Boundary: Assessment about questions that require quantitative answers is limited to proportional reasoning and algebraic thinking.]

MS-PS2-5. Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact. [Clarification Statement: Examples of this phenomenon could include the interactions of magnets, electrically-charged strips of tape, and electrically-charged pith balls. Examples of investigations could include first-hand experiences or simulations. Emphasis should be on using arrows to represent the directions of forces.] [Assessment Boundary: Assessment is limited to electric and magnetic fields, and is limited to qualitative evidence for the existence of fields.]

MS-PS3-2. Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system. [Clarification Statement:
Emphasis is on relative amounts of potential energy, not on calculations of potential energy. Examples of objects within systems interacting at varying distances could include: the Earth and either a roller coaster cart at varying positions on a hill or objects at varying heights on shelves, changing the direction/orientation of a magnet, and a balloon with static electrical charge being brought closer to a classmate’s hair. Examples of models could include representations, diagrams, pictures, and written descriptions of systems. [Assessment Boundary: Assessment is limited to two objects and electric, magnetic, and gravitational interactions.]

**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-ETS1-4. 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.**

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**Unit 3 NYSSLS Science and Engineering Practices (SEP)**
- Engaging in Argument from Evidence
- Constructing Explanations and Designing Solutions
- Developing and Using Models

**Unit 3 NYSSLS Disciplinary Core Ideas (DCI)**

**ESS3.A: Natural Resources**
- Humans depend on Earth’s land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes. (MS-ESS3-1)

**ESS3.C: Human Impacts on Earth Systems**
- Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise. (MSESS3-3),(MS-ESS3-4)

**ETS1.A: Defining and Delimiting Engineering Problems**
- The more precisely a design task’s criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that are likely to limit possible solutions. (MS-ETS1-1)

**ETS1.B: Developing Possible Solutions**
- A solution needs to be tested, and then modified on the basis of the test results, in order to improve it. (MS-ETS1-4)
- Models of all kinds are important for testing solutions. (MSETS1-4)

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**Unit 3 NYSSLS Cross Cutting Concepts (CCC)**
## Grade 7 Unit 3 Physical Science

- **Cause and Effect**

### Resources
- Pearson Elevate Science Book Chapters Topics 6-7
- PearsonRealize.com
- Pearson Lab materials
- http://ngss.nsta.org/Classroom-Resources.aspx
- http://newyorkscienceteacher.com/sci/

### Measurement of Student Learning
- Topic Readiness Test
- Lesson Checks
- Lesson Quiz
- Topic Review and Assessment
- Quest Rubrics
- Exam view Assessments

### Step Up to Writing
**SUTW Strategy**
**Connect, Case Studies**
Easy 2-Column Notes
- SUTW 4th Edition p. 31
- SUTW Tools S1-17a-c

**Content Vocabulary**
Breaking Down Definitions
- SUTW 4th Edition p. 212
- SUTW Tools S3-2a-b, S3-1a

**Investigate/Synthesize/Quest**
**IVF Summary Sentences**
- SUTW 4th Edition p. 43
- SUTW Tools S1-23b

**Investigate/Synthesize/Quest**
Four Step Summary Paragraph
- SUTW 4th Edition p. 44
- SUTW Tools S1-24a-b

**Investigate/Synthesize/Quest**
Color-Coding the Elements of Informative
- SUTW 4th Edition p. 2688
- SUTW Tools S4-1a-b

**Investigate/Synthesize/Quest**
Explanatory Writing Informal Outlines
- SUTW 4th Edition p. 272
- SUTW Tools S4-3a-b, S4-4a,b

### ELL Enhancements
**Pearson Elevate Science Supports**
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<td>Build Background Knowledge Audio</td>
<td>Sentence Frames Academic conversation Starters</td>
<td>Supplementary Texts Visual Aids Video Standards-based questions</td>
<td>Sentence Frames Graphic Organizers Standards-based sentence stems</td>
<td>Extended time Directions read 3x Oral interpretation Translated version of test (may have both English and other) Responses in home language</td>
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### Special Education Modifications

#### Pearson Elevate Science Supports

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<th><strong>Assessment:</strong></th>
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<td>Pre-teach vocabulary Use picture vocabulary Picture examples of safety measures posted Pictures for each category of science Scaffold Depth of Knowledge questions Provide copy of notes/notes in &quot;cloze&quot; form Peer partner Extended time for written tasks/verbal response Break long tasks over multiple days Allow for multiple ways to respond (verbal, written, response board, scribe) Provide mock/model of performance task Model use of graphic organizers (fade until mastery) Modify informational text to shorter passages Provide model of exemplar lab write-up Provide interactive notebook Present complex tasks in multiple ways Model steps to read, interpret, and construct graphs</td>
<td>Computer for lengthy writing tasks Audio textbook Videos to clarify concepts Recording device to record class lecture/discussions</td>
<td>Scaffold written assignments Individual criteria for success Provide with review packet Modify the number of questions Provide model of the task Provide multiple options for project Practice calculating density with sample problem before assessing student.</td>
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<th><strong>Other</strong></th>
<th><strong>Assessment:</strong></th>
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<tr>
<td>Arrange seating for maximum engagement and minimum distraction Accessible lab space (counter level)</td>
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Multiple opportunities to perform to repeat labs
Provide advance organizer of class tasks

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<tr>
<th>Culturally and Linguistically Responsive Teaching (CLRT) in the Science Classroom</th>
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**Pearson Elevate Science Supports**

**Pearson Elevate Science Resources**

- 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