5E Lesson Plan

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| **Teacher:**  |
| **Date:** |
| **Subject / grade level:** Science, Grade 8, Lesson #2 |
| **Topic:** WAVES |
| **Materials:**Computer, COSMOS Technology Toolkit, Science Textbook   |
| **Essential Question(s):** How has technology changed the way we communicate?   |
| **Standards (NGSS):** MS-PS4-1. Develop a model and use mathematical representations to describe waves that include frequency, wavelength, and how the amplitude of a wave is related to the energy in a wave.

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| **Science & Engineering Practices (SEPs)** | **Disciplinary Core Ideas (DCIs)** | **Crosscutting Concepts (CCs)** |
| **Developing and Using Models**Modeling in 6–8 builds on K–5 and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems. **Obtaining, Evaluating, and Communicating Information**Obtaining, evaluating, and communicating information in 6-8 builds on K-5 and progresses to evaluating the merit and validity of ideas and methods. | **PS4.A: Wave Properties**A simple wave has a repeating pattern with a specific wavelength, frequency, and amplitude. (MS-PS4-1) | **Patterns**Graphs and charts can be used toidentify patterns in data (MS-PS4-1) **Influence of Science, Engineering, and Technology on Society and the Natural World**Technologies extend the measurement, exploration, modeling, and computationalcapacity of scientific investigations (MS-PS4-3) **Science is a Human Endeavor**Advances in technology influence the progress of science and science has influenced advances in technology (MS-PS4-3) |

**Common Core State Standards (CCSS):****SL.8.5** Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. **RST.6-8.9** Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.  |
| **Lesson Topic:** Wave Transmission **Learning Target:** I will: * Use the COSMOS Technology Toolkit to transmit and receive a wave signal and visualize it on my computer
* I will determine the frequency and power of the transmitted wave signal
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| **Differentiation strategies to meet diverse learner needs:*** **Bodily kinesthetic learners** - Local and Express demonstration hands-on activity
* **Audio and Visual learners** – Slide show, Visual representation of activity using computer, transmitter and receiver, The observations/data collected throughout the activity
* **ELL/Low reader** - Guided notes printed for those who require them
* **Technology**- Utilizing COSMOS Technology Tool Kit
* **Extended time** for those who require it
* **Small groups** according to levels, behavioral needs, and activity requirements
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| **ENGAGEMENT** 1. Discussion Questions
* What devices do you know of that can transmit and receive information?
* Can all electronic devices transmit and receive information?
1. Teacher will use a short slide-show to explain about devices that can transmit and receive wave signals.
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| **EXPLORATION** 1. Materials & equipment are set up on student’s desks. Students are in small groups & will assign roles to each other for the activity, e.g. note taker, reader etc. One student will read out loud from the handout and the group will perform the activity.
2. Activity:
3. Teacher will transmit a wave signal from his computer using the ADALM-PLUTO Transceiver and the students will see if they can capture (receive) the signal and visualize it on their computer.
4. Students will then determine the frequency and power of the wave signal that was sent.
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| **EXPLANATION**After students complete their experiment there will be a discussion/share out with their observations and comments about their activities - facilitated by the teacher. Analyzing information collected on their handout and identifying any errors that may have been made and correct them. Explanation of devices that transmit and receive wave signals and vocabulary words: *transceiver, wavelength, frequency, amplitude,* are all clarified and strengthened.  |
| **ELABORATION**Students will extend their knowledge of waves & transmissions by discussing the following questions: * Are there limits to walkie-talkie transmissions?
* Are there limits to the types of transmissions and receptions your cell phone can make?
* Can an I-Pad transmit and receive wave signals?
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| **EVALUATION** 1. Teacher Observation
2. Correctly following procedures
3. Students complete the questions on their handouts
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| **HOMEWORK** Write 1 paragraph to explain the difference between electromagnetic waves and mechanical waves  |