

Waves

Virtual Instruction Lesson Plan

Episode 1: (0:00-13:27) bit.ly/steamcamp-waves-bridges

Explore how PBS KIDS programs travel to your television through waves with the help of Vegas PBS broadcast engineers.

#### Related Nevada Academic Content Standards/ Next Generation Science Standards:

**1-PS4-3.** Plan and conduct investigations to determine the effect of placing objects made with different materials in the path of a beam of light.

**2-PS1-1.** Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.

**2-PS1-2.** Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.

**4-PS3-2.** Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.

#### Materials

- Remote Control Waves Data Collection Chart (<u>bit.ly/remotecontrolwaves</u>)
- A remote control and television
- Materials to wrap around remote control, such as:
  - Bubble wrap
  - Foil
  - A towel
  - Plastic wrap/bag
  - Be creative and see what else you can use!

### Tip:

This lesson plan is easily adaptable for face-to-face instruction. Simply conduct the "Explore" portion of the lesson as a hands-on activity in the classroom.

## Engage:

Share the beginning of the program with students. After Zinnia asks, "How does PBS KIDS travel to your television?," pause the program and ask your students the same question. Write this essential question down and record student responses to reveal students' current knowledge, connections to the topic, and further questions they have.



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#### Explain:

Introduce the words: wave and transmitter.

- Have students guess their meaning and record their ideas.
- Ask students to listen for the words as they watch the video clip, featuring Vegas PBS engineers, Gary Clendenning and Joe Volpe (1:23 5:33).
- When they hear one of words, encourage students to make a gesture, such as wiggling their fingers.

**Pause** the video at key spots to ask questions that strengthen comprehension and help children make connections.

- Pause after Gary's segment (2:40). Ask students, "What type of wave does Vegas PBS send to Black Mountain?"
- Pause after Joe points to the Vegas PBS transmitter (3:00). What do students notice about the transmitter? Where else have they seen transmitters in the community?
- Pause after Joe discusses waves (3:48). Ask students, "What do all waves have in common? What types of energy do waves move?"
- Pause at the conclusion of Joe's segment (5:00) and ask students to recall why transmitters are built in high places.
- Watch the "What did we learn?" segment to reinforce the concepts.

**Reflect** on the new knowledge students have acquired.

- Revisit the essential question and have children answer it by incorporating the vocabulary words; ask children to share any new information they acquired or additional questions they have.
- Have students draw a picture of how electromagnetic waves travel from Vegas PBS, to Black Mountain, to their home.
  Rewatch the video to help students create their illustrations, as necessary. Label the waves and the transmitter.



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# Explore:

Use the at-home activity segment (5:33 – 9:10) to guide students through the scientific inquiry process:

**Observe and notice:** Share the video segment in which Jessica outlines directions for exploring waves at home using a television remote control. Pause the video before Zinnia and Luis test their remote controls and have students predict whether their TVs will turn off/on.

**Ask questions:** Why didn't the materials Zinna and Luis test block the waves? What materials do students have in their home that might block waves from their television remote? Brainstorm potential wave-blocking materials that students could test in their investigation (foil, plastic wrap, a towel, bubble wrap, etc).

**Plan and predict:** Have students gather materials available within their home to wrap around their remotes. As a group, use the **Remote Control Waves Data Collection Chart** 

(<u>bit.ly/remotecontrolwaves</u>) to list the materials and describe their properties. Predict which materials will block the waves.

**OBSERVE &** NOTICE ASK SHARE QUESTIONS IDEAS THE INQUIRY PLAN & DRAW PROCESS PREDICT CONCLUSIONS COLLECT INVESTIGATE DATA

**Investigate/collect data:** Have students conduct the experiment using their home remote control and report their results. Log the outcomes in the last column of the data collection chart.

**Draw conclusions/share ideas:** What patterns did students notice? Which materials were better at blocking waves? Why? Help students make connections between anything they learned in the video and this activity. What new questions do students have? Encourage students to share photos and videos of their at-home challenges with Vegas PBS at <u>bit.ly/steamcamp-share</u>.

# Extend:

View the book talk with Noel, a local Young People's Librarian (9:53 – 13:27). Encourage students to explore the other waves mentioned, including sound waves, by constructing homemade instruments.

Visit the PBS KIDS resources below to learn more about waves:

- Ready Jet Go! Sound Waves: Science Crafts for Kids <u>bit.ly/readyjetgo-soundwaves</u>
- Ready Jet Go!: How Do Satellites Work? <u>bit.ly/readyjetgo-satellites</u>