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4-PS4-1 Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.

- Indicates opportunities for integrated English language development (reading, writing, listening & speaking).

Lesson 1: Moving Objects with Waves

Engage

In-person or online activity:
Introduce Phenomenon
Ask students to describe in their own words what a wave looks like. After soliciting a few student responses, show them the following video.
Wave Video

After you watch the video, ask the students:

1. What do you notice?
2. What do you wonder?
3. Where have you seen waves?

Students can record what they notice and wonder on this Notice & Wonder poster prior to the discussion if desired.

Explore

In-person activity: *(see modification for virtual learning, below)*
Student Wave Stations- Students will rotate through the stations while recording about what they observe.

Station 1: Slinky Time - students will place a slinky on a yardstick. They need to hold one end and pull and release the slinky to make the waves. Record observations.

Station 2: Rockin Water - Students will drop a rock into a tub of water and record their observations.

Station 3:Jiggling Jump Rope - Students will work with partners to create waves with the jump rope

Station 4: Parachute - Have students get in a circle and take turns sending waves across the parachute (may need to

combine two groups depending on the size of the parachute. Any cloth could be substituted for the parachute. Have them record their observations.

Station 5: Simulator- Students will use Chromebooks to access the simple wave simulator. You could copy the link and put it on Google Classroom. Have students explore the simulator, changing the frequency, speed, amplitude. They can also change from show as rope to show as sound. Have them record their observations.
Wave Station Recording Sheet

Virtual Learning modifications (Station activity): For virtual learning a Google Slides version of the station activity is included below. Students can use the same recording sheet from above (assigned in Google Classroom) or a notebook to record observations.
Virtual Student Wave Stations - Google Slides

In-person or online activity option:
Mystery Science-Teacher can facilitate the lesson and students can complete the activity in-person or at home. Minimal supplies are required and can be provided for students to pick up. This activity can be completed along with or in lieu of the station activity.
4th grade, Waves of Sound, Lesson 1

Explain

In-person or online activities:
Show this Bill Nye Video. The video can also be posted in Google Classroom for students to rewatch as necessary. Have students take notes as the video plays. There are two versions of the notes, one has the question and then the answer portion with fill-in-the-blanks, and the second version has the questions and places to write.
Bill Nye Video
Bill Nye Video Notes Answer Key

Direct Instruction
Interactive notebook notes - Guide students through the following diagrams and have them take notes in their interactive notebook, if they have one.
Transverse waves
Longitudinal Waves
Frequency

This is another video that will help with the understanding of waves. This video can be posted in Google Classroom or used during a synchronous or in-person meeting, if desired.

Additional Resources:

BrainPOP- Students can watch the movie and complete the review or graded quiz as a check for understanding. There are additional activities and related readings that can be assigned as well.

Waves

Game-up: Wave Combinator

Game-up: Bird Song Hero

Zingy Learning-Students can complete the interactive lessons and quizzes as a check for understanding. There are additional questions that can be used in a Google Form or Doc as an outline for note taking during the lessons.

4th Grade, Unit 4, Lessons 1-3: Waves

Informational Text

Close Read- Sound Waves (PDF)

Sound Waves (Google Slides version)

Close Read- Two short paired texts (PDF) about sound waves

Paired texts - Google Slides version

Supplemental Reading - TCM Science Readers*

Earthquakes

**If you attended Science Saturday, these are the titles that are in your box that go with this standard. They can be used in addition or in place of material above. There is a digital PDF copy of this title at the link above.*

Achieve 3000-Teacher can facilitate the learning through the 5-step lesson or students can complete the lesson individually. Please be sure students read both pages of the article, if applicable.

A Tsunami, Where?

Elaborate

In-person activity:

Have students revisit the stations and try to use the vocabulary that they have learned. They can verbally identify the wavelength, amplitude, and talk about the frequency. They can also decide if the waves at each station (in-person or virtual) are transverse or longitudinal waves. After they do this section, you can add these notes into their interactive notebooks.

Examples of the two types of waves

In-person and/or online activity option:
Mystery Science-Teacher can facilitate the lesson and students can complete the activity in-person or at home. Minimal supplies are required and can be provided for students to pick up. This activity can be completed along with or in lieu of the station activity.
4th grade, Waves of Sound, Lesson 2

Evaluate

In-person or online activity options:
Allow students to access the online oscilloscope to freeze a sound wave. As they are whistling, have them click the box that says freeze live input. This will allow them to record what their sound wave looked like. They can do this for 3 or four different whistles or sounds of their choice.

Using Google Draw (or the new draw feature on Padlet), students will make a model of one of their waves and label the various parts. They must identify the crest, trough, amplitude, wavelength, and be able to explain if their wave would be a high frequency or a low frequency.

Mystery Science - There is a lesson that includes the same oscilloscope mentioned above along with an activity that can be used in place of or along with the wave drawing evaluation.This activity has been fully modified for virtual learning.
4th grade, Waves of Sound: Lesson 3