	Hearing Sound	Telephone cups	Making Waves (Compression & transverse)	Making Waves (Frequency & Wavelength)
Student Experience	Students are provided the opportunity to hear sound from an instrument (live or a recording) to develop a model to demonstrate how they hear sound.	Students create telephone cups to explore how sound is transferred via a string (medium).	Students will use a slinky/phone cord to develop explores types of waves.	Students will generate standing waves using a slinky/phone cord to explore the relationship between frequency and wavelength.
T4T Material	Teacher may use materials from T4T to create an instrument that can produce various sounds.	Small Plastic cups, Lids, string	Possible cord?	Possible cord
Big Idea	Students develop a model to describe the transmission of sound from the source to the receiver.	Sound can travel through a medium without the medium being transferred (net movement).	Oscillation and energy transmission occurs through compression or transverse waves.	Frequency and wavelength are related. Frequency and wavelength are inversely proportional. As one increases the other decreases.
Connection to Culminating Activity	Introduction to the phenomenon of sound, driving question, and the development of their initial model.	A medium is required to transfer sound. Solids, liquids and gasses act as mediums that transfer sound without a net movement in the medium.	Sound waves are transmitted through compression waves.	Waves differ in their wavelength and frequency. Sound can have various wavelengths and frequencies.
Next Generation Science Standards	• Developing and using models. • SL.4.5 (CCSS English)	• **1-PS4-1.** • **1-PS4-4.** • **Cause and Effect (CCC)** • Patterns (CCC) • Plan & Carry out investigations(SEP) • Constructing Explanations & Designing Solutions (SEP) • MP.5	• MP.4 (CCSS Math) • 4.G.A.1 (CCSS Math) • Patterns (CCC) • PS4.A Wave Properties	• Patterns (CCC) • PS4.A Wave Properties

	Making Waves (Amplitude)	Sounds On Strings	Sounds in Tubes	Air Cannon
Student Experience	Students investigate how the amount of energy affects the wave form.	Students investigate how to create different sounds on vibrating strings.	Students investigate how to create different sounds in columns of air.	Students observe a pulse of air moving objects
T4T Material	Cords	String, materials to use as mass(apply tension)	Straws	Cardboard drum, rubber bands Pee cup lids, plastic
Big Idea	The amount of energy affects the height (amplitude) of a wave.	Length and tension affect sound pitch. Pitch is caused by changing frequencies & wavelengths.	Vibrations in air can produce sound.	Sound carries energy that can move through a medium to cause objects to move.
Connection to Culminating Activity	Amount of energy affects the amplitude of a wave. Loudness is perceived through the change in amplitude of a wave.	Vibrating strings can produce sounds. The length of the string and tension are two factors that can affect the pitch.	Air passing through a column can produce sound.	Sound passes through a medium as energy (wave) and causes the ear drum to move allowing sound to be heard.
Next Generation Science Standards	• 4-PS4-1 • Developing and using Models • Scientific knowledge is based on empirical evidence(SEP) • Patterns(CCC)	• 1-PS4-1 • Cause & Effect (CCC) • Plan & carry out investigations (SEP) • W.1.7 • Patterns(CCC)	• 1-PS4-1 • Cause & Effect (CCC) • Plan & carry out investigations (SEP) • W.1.7 • Patterns(CCC)	• 4-PS3-2 • Energy & matter (CCC) • Planning and Carrying out investigations(SEP) • Patterns(CCC)

Culminating Activity - Instrument Design & Model Construction	
Student Experience	Students design and construct an instrument that plays different sounds. Students develop their final model to demonstrate an explanation on how sound is heard from their musical instrument by other people and themselves.
T4T Material	Everything
Big Idea	Students design and engineer an instrument to demonstrate properties of sound. Students use their instrument to help model the transmission of sound.
Next Generation Science Standards	See above in NGSS Performance Expectation for 4-PS4 Waves and their applications in technologies for information transfer