NYC Department of Environmental Protection: Sound and Noise Module Standards Connections

New York State K-12 Science Learning Standards

DEP Lesson	Standard*	Amplify Lesson(s)**
Distinguishing Between Sound and Noise	• 3-PS2-2: Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motions • 4-PS3-1: Use evidence to construct an explanation relating the speed of an object to the energy of that object • 4-PS3-2: Make observations to provide evidence that energy is conserved as it is transferred and/or converted from one form to another	• Waves, Energy, and Information 4.1.4: Exploring Sound Waves • Waves, Energy, and Information 4.2.2: Visualizing How Sound Travels • Waves, Energy, and Information 4.2.5: Modelling Energy Transfer • Waves, Energy, and Information 4.3.3: How Sounds Can Differ • Harnessing Human Energy 6.1.1: Welcome to the Energy Research Lab
	• MS-PS4-1: Develop a model and use mathematical representations to describe waves that include frequencies, wavelength, and how the amplitude of a wave is related to energy in a wave • MS-PS4-2: Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials • 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	
	• HS-PS4-1: Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling and transferring energy (amplitude, frequency) in various media • HS-PS4-5: Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy	
Demonstrating How the Ear Works	• 1-PS4-1: Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate • 4-PS4-2: Develop a model to describe that light reflecting from objects and entering the eye allow objects to be seen • 4-LS1-1: Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction	• Light and Sound 1.4.2: What Vibrates • Light and Sound 1.4.3: Explaining Vibration in Sound Sources • Waves, Energy, and Information 4.1.2: Exploring Waves • Evolutionary History 8.2.1: How Body Structure Differ • Evolutionary History 8.2.5: Reflecting on Differences in Body Structures
	• MS-LS1-3: Construct an explanation supported by evidence for how the body is composed of interacting systems consisting of cells, tissues, and organs working together to maintain homeostasis.	
	• HS-LS1-2: Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms	

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Reading Listen to the Raindrops	• K-ESS3-1: Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live • K-ESS3-3: Communicate solutions that will reduce the impact of humans on living organisms and non-living things in the local environment • 4-LS1-2: Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways • MS-LS2-5: Evaluate competing design solutions for maintaining biodiversity and ecosystem stability • HS-LS1-3: Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis	• Waves, Energy, and Information 4.3.4: Seeing Sound • Harnessing Human Energy 6.3.1: Reading about Energy Systems
Creating Sound and Noise Poetry	• K-ESS3-3: Communicate solutions that will reduce the impact of humans on living organisms and non-living things in the local environment • 4-PS4-3: Generate and compare multiple solutions that use patterns to transfer information • MS-PS4-2: Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials • HS-ESS3-6: Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity	• Waves, Energy, and Information 4.4.1: Human Communication • Waves, Energy, and Information 4.4.2: Patterns in Codes • Waves, Energy, and Information 4.4.3: Communicating with Codes • Harnessing Human Energy 6.1.1: Welcome to the Energy Research Lab
Hearing What Simon Says	• K-ESS3-3: Communicate solutions that will reduce the impact of humans on living organisms and non-living things in the local environment • 4-LS1-2: Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways • MS-LS1-8: Gather and synthesize information that sensory receptors respond to stimuli, resulting in immediate behavior and/or storage as memories • HS-LS1-3: Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis	• Light and Sound 1.4.4: Designing Sound Sources • Waves, Energy, and Information 4.1.5: Introducing Scientific Explanation • Harnessing Human Energy 6.1.1: Welcome to the Energy Research Lab
Understanding Noise Impacts on Concentration	• K-ESS3-1: Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live • 4-LS1-2: Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways • MS-LS1-8: Gather and synthesize information that sensory receptors respond to stimuli, resulting in immediate behavior and/or storage as memories	• Light and Sound 1.1.1: Students' Initial Explanations • Waves, Energy, and Information 4.2.1: Sound on the Move • Harnessing Human Energy 6.2.3: Writing Scientific Arguments

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	• HS-LS1-2: Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms	
Measuring Sound in Our Environment	• K-ESS3-1: Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live • MS-LS1-8: Gather and synthesize information that sensory receptors respond to stimuli, resulting in immediate behavior and/or storage as memories • HS-LS2-7: Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity	• Needs of Plants and Animals K.1.3: Observing a Place • Harnessing Human Energy 6.2.2: Evaluating Energy Sources
Understanding the Effectiveness of Different Sound Devices	• K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool • K-2-ETS1-3: Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs • MS-PS4-2: Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials • HS-PS4-5: Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy • HS-ETS1-3: Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts	• Energy Conversions 4.3.2: Converting Energy from Sources • Energy Conversions 4.4.4: System Improvement • Energy Conversions 4.4.5: Arguments for System Improvements • Harnessing Human Energy 6.1.4: Energy Inventions
Engineering a Speaker and Insulator	• K-2-ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem • 1-PS4-4: Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance • 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 • 3-5-ETS1-1: Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost	• Light and Sound 1.2.3: Investigating Blocking • Light and Sound 1.3.1: Investigating Materials That Do Not Block • Light and Sound 1.3.2: Let's Test! • Light and Sound 1.3.3: Making Sense of Full and Partial Transmission • Waves, Energy, and Information 4.1.4: Exploring Sound Waves • Harnessing Human Energy 6.1.4: Energy Inventions

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	• 3-5-ETS1-3: Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved • 5-PS1-3: Make observations and measurements to identify materials based on their properties	
	• MS-PS4-2: Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials	
	• HS-PS4-1: Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling and transferring energy (amplitude, frequency) in various media • HS-PS4-5: Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy • HS-ESS3-4: Evaluate or refine a technological solution that reduces impacts of human activities on natural systems	
Mapping Sound and Noise	• K-ESS3-3: Communicate solutions that will reduce the impact of humans on living organisms and non-living things in the local environment • 3-PS2-2: Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motions	• Needs of Plants and Animals K.1.2: Science Walk • Waves, Energy, and Information 4.2.6: Explaining How Sound Energy Travels • Waves, Energy, and Information 4.3.1: Investigating Amplitude • Waves, Energy, and Information 4.3.2: Investigating Wavelength • Harnessing Human Energy 6.1.1: Welcome to the Energy Research Lab • Harnessing Human Energy 6.2.1: Investigating Claims about How Objects Get Energy
	• MS-PS4-1: Develop a model and use mathematical representations to describe waves that include frequencies, wavelength, and how the amplitude of a wave is related to energy in a wave • MS-LS2-5: Evaluate competing design solutions for maintaining biodiversity and ecosystem stability	
	• HS-PS4-1: Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling and transferring energy (amplitude, frequency) in various media • HS-LS2-7: Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity	
Conducting a Case Study: Brooklyn Bridge Park	• K-2-ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem • 5-PS1-3: Make observations and measurements to identify materials based on their properties	• Needs of Plants and Animals K.1.2: Science Walk • Needs of Plants and Animals K.1.3: Observing a Place • Energy Conversions 4.3.1: Investigating Energy Sources • Harnessing Human Energy 6.2.3: Writing Scientific Arguments
	• MS-ESS3-3: Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment • 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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	• HS-ETS1-1: Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants	
Listening to Underground Sound in New York	• K-ESS2-2: Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs. • K-ESS3-1: Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live • 1-PS4-1: Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate	• Needs of Plants and Animals K.1.3: Observing a Place • Waves, Energy, and Information 4.2.6: Explaining How Sound Energy Travels • Waves, Energy, and Information 4.3.3: How Sounds Can Differ
	• MS-LS2-4: Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations • MS-ESS3-4: Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems	
	• HS-ESS3-6: Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity	
Analyzing Airplane Noise in New York City	• K-ESS3-3: Communicate solutions that will reduce the impact of humans on living organisms and non-living things in the local environment	• Waves, Energy, and Information 4.2.6: Explaining How Sound Energy Travels • Harnessing Human Energy 6.1.2: Investigating Energy Claims
	• 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	
	• HS-ETS1-4: Use a computer simulation to model that impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem	
Exploring New York City Noise in the News	• K-ESS3-1: Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live • K-ESS3-3: Communicate solutions that will reduce the impact of humans on living organisms and non-living things in the local environment	• Energy Conversions 4.1.2: Introducing Systems • Energy Conversions 4.1.3: Exploring Systems • Harnessing Human Energy 6.1.2: Investigating Energy Claims
	• MS-LS2-4: Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.	
	• HS-ESS3-4: Evaluate or refine a technological solution that reduces impacts of human activities on natural systems	

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Analyzing Noise Complaints	• K-ESS3-1: Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live • MS-ESS3-3: Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment • HS-ESS3-6: Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity	• Light and Sound 1.4.5: Sharing Light and Sound Solutions • Waves, Energy, and Information 4.3.3: How Sounds Can Differ • Harnessing Human Energy 6.1.2: Investigating Energy Claims
Applying the New York City Noise Code	• K-ESS3-1: Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live • 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-ETS1-3: Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success. • HS-ESS3-4: Evaluate or refine a technological solution that reduces impacts of human activities on natural systems • HS-ETS1-2: Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering • HS-ETS1-3: Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts	• Light and Sound 1.4.5: Sharing Light and Sound Solutions • Waves, Energy, and Information 4.4.1: Human Communication • Harnessing Human Energy 6.1.2: Investigating Energy Claims • Harnessing Human Energy 6.2.3: Writing Scientific Arguments
Determining How Noise Affects Other Species	• K-ESS3-1: Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live • MS-ESS3-3: Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment • HS-LS2-7: Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity • HS-LS4-6: Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity	• Waves, Energy, and Information 4.3.5: The Scientist Who Cracked the Dolphin Code • Waves, Energy, and Information 4.3.6: Discussing Dolphin Communication • Waves, Energy, and Information 4.3.7: Explaining How Dolphins Communicate • Harnessing Human Energy 6.1.2: Investigating Energy Claims
Advocating for Noise Reduction	• K-ESS3-1: Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live • K-ESS3-3: Communicate solutions that will reduce the impact of humans on living organisms and non-living things in the local environment	• Light and Sound 1.4.5: Sharing Light and Sound Solutions

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	• 3-5-ETS1-1: Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost 3-5-ETS1-2: Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem • 3-5-ETS1-3: Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved	• Harnessing Human Energy 6.3.2: Designing and Explaining Energy Systems
	• MS-ESS3-3: Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment	
	• HS-LS4-6: Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity	

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