Engage Lesson Group	Science Practices	Cross Cutting Concepts	Disciplinary Core Ideas & Performance Expectations
1. *EyeSpots*: Students experience, observe in, and write/draw about their own special outdoor area. 2. *Beach Surprise*: Students read about a true student-citizen-science story and consider and discuss the importance of data/information to community action. 3. *Citizen-Science Race*: Students play a physical game to review the key concepts of *biodiversity, citizen-science, data,* and *observations.* 4. *Silly Skits*: Students read and discuss safety and ethics for citizen-scientists. Then they create and perform their own "what NOT to do" comedy skits. **NOTE**: You may choose to do lessons 21-22 and introduce lesson 23 at this point if students see site-based biodiversity challenges and are eager to improve them and/or if you need more time allowed for students to complete a large or complex solution to the problems they see.	Obtaining, Evaluating, and Communicating Information Asking Questions and Defining Problems	Science Addresses Questions About the Natural and Material World Cause and Effect Influence of Science, Engineering, and Technology on Society and the Natural World	ESS3.C: Human Impacts on Earth Systems 5-ESS3-1: Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment. 3-LS4: (introduced) Biological Evolution: Unity and Diversity 4-LS1: (introduced) From Molecules to Organisms: Structures and Processes ELA: Reading Standards for Informational Text 3-5 3rd: 3.R1.1, 3.R1.2, 3.R1.3, 3.R1.4, 3.R1.6, 3.R1.7 4th: 4.R1.1, 4.R1.2, 4.R1.3, 4.R1.4, 4.R1.8 5th: 5.R1.1, 5.R1.2, 5.R1.3, 5.R1.4

Engage Lesson Group	Science Practices	Cross Cutting Concepts	Disciplinary Core Ideas & Performance Expectations
5. *SunPrints*: Students are confused as they create art and investigate a mysterious phenomenon of light. They isolate and test one variable, make observations, and form an evidence-supported explanation.	Asking Questions and Defining Problems Constructing Explanations and Designing Solutions Analyzing and Interpreting Data Obtaining, Evaluating, and Communicating Information	Cause and Effect Patterns	PS4.B: Electromagnetic Radiation 4-PS4-2: Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen. (Stage is set here for this in Lesson 15)
Engage Lesson Group	Science Practices	Cross Cutting Concepts	Disciplinary Core Ideas & Performance Expectations
6. *Math + Art = Frames!:* Students use math and measurement to solve the design problem of making a frame to showcase the SunPrints. 7. *Say Cheese:* Students get to be silly through trial and error as they learn the basics of taking and selecting functional biodiversity data photographs.	Asking Questions and Defining Problems Constructing Explanations and Designing Solutions Obtaining, Evaluating, and Communicating Information	Connections to Engineering, Technology, and Applications of Science	ETS1.A: Defining and Delimiting Engineering Problems ETS1.B: Developing Possible Solutions ETS1.C: Optimizing the Design Solution 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 & constraints of the problem. Common Core MATH Standards Connections: MP.2, MP.4, MP.5, 3.NBT, 3.NF, 3.MD.B.4, 4.G.A.1, 4.MD.A.1, 4.MD.A.2, 5.MD.A.1

Engage & Explore Lesson Group	Science Practices	Cross Cutting Concepts	Disciplinary Core Ideas & Performance Expectations
8. *Journal Wonderings*: Students use writing and drawing as they observe an organism in the wild and develop researchable questions about how some of its traits and behaviors help it survive there. 9. *Photography in the Weeds:* Students use digital photography to collect citizen-science biodiversity data on wild organisms. 10. *Wonderings Researched & Shared:* Students research their questions from lesson 8, then develop and present an argument with supporting evidence for how particular traits and behaviors help a particular organism survive there.	Engaging in Argument from Evidence Obtaining, Evaluating, and Communicating Information	Cause and Effect Systems and System Models Connections to Engineering, Technology, and Applications of Science	LS1.A: Structure and Function 4-LS1-1: Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. LS4.C: Adaptation 3-LS4-3: Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive. 3-LS4-2 (students may also) Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. 5-LS1-1 (students may also) Support an argument that plants get the materials they need for growth chiefly from air and water. 5-LS2: (touches on) Ecosystems: Interactions, Energy and Dynamics 5-ESS3: (may touch on) Earth and Human Activity

Engage & Explore Lesson Group	Science Practices	Cross Cutting Concepts	Disciplinary Core Ideas & Performance Expectations
11. *Dealing with Data:* Students select and organize their own citizen-science data photographs, and communicate with other young citizen-scientists around the world. 12. *Survival Game:* Students read a true story of survival and assume the role of a local plant or animal while playing a game to recognize how changes in the local environment can affect a population's survival there. 13. *Sharing Photo Data:* Students upload at least one in-focus data photo to the on-line citizen-science database and write at least one fact-based description of the observation.	Obtaining, Evaluating, and Communicating Information Developing and Using Models	Connections to Engineering, Technology, and Applications of Science Science Addresses Questions About the Natural and Material World Cause and Effect Systems and System Models	ESS3.C: Human Impacts on Earth Systems 5-ESS3-1: Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment LS4.C: Adaptation 3-LS4-3: Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all. LS2.C: Ecosystem Dynamics, Functioning, and Resilience LS4.D: Biodiversity and Humans 4-LS1-1: Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. Students may also touch on: LS3.A: Inheritance of Traits LS3.B: Variation of Traits LS4.B: Natural Selection LS4.C: Adaption ELA: Reading Standards for Informational Text 3-5 3rd: 3.R1.1, 3.R1.2, 3.R1.3, 3.R1.4, 3.R1.6, 3.R1.7 4th: 4.R1.1, 4.R1.2, 4.R1.3, 4.R1.4, 4.R1.8 5th: 5.R1.1, 5.R1.2, 5.R1.3, 5.R1.4

Explore & Explain Lesson Group	Science Practices	Cross Cutting Concepts	Disciplinary Core Ideas & Performance Expectations
14. *In a Dark, Dark Room:* Students investigate to solve a seemingly ghostly property of light and learn the importance of isolating a variable. 15. *Tinkering:* Students apply what they learned in the prior lesson by using the iterative process to design and engineer their own handheld cameras obscura as a model of the human eye.	Developing And Using Models Planning and Carrying Out Investigations Constructing Explanations and Designing Solutions Asking Questions and Defining Problems Obtaining, Evaluating, and Communicating Information	Cause and Effect Patterns Connections to Engineering, Technology, and Applications of Science	PS4.B: Electromagnetic Radiation 4-PS4-2: Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen. ETS1.A: Defining and Delimiting Engineering Problems 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-ETS1-3: 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. ETS1.B: Developing Possible Solutions 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. ETS1-C: Optimizing the Design Solution Common Core MATH Standards Connections: MP.2, MP.4, MP.5, 3.NBT, 3.NF, 3.MD.B.4, 4.G.A.1, 4.MD.A.1, 4.MD.A.2, 5.MD.A.1

Explore & Explain Lesson Group	Science Practices	Cross Cutting Concepts	Disciplinary Core Ideas & Performance Expectations
16. *Your EyeSpot Environment:* Students write and draw in their nature journals as they observe and consider what aspects of their outdoor environment support and which challenge local biodiversity.	Constructing Explanations and Designing Solutions Engaging in Argument from Evidence	Cause and Effect Energy and Matter	(some or all of the following) LS3.A: Inheritance of Traits LS3.B: Variation of Traits 3-LS3-2: Use evidence to support the explanation that traits can be influenced by the environment. LS4.C: Adaptation 3-LS4-3: Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all. LS2.C: Ecosystem Dynamics, Functioning, and Resilience 3-LS4-2: Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing LS4.D: Biodiversity and Humans 4-LS1-1: Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. ESS2.A: Earth Materials and Systems 4-ESS2-1: Make observations to provide evidence of the effects of weathering or erosion by water, ice, wind, or vegetation. LS1.C: Organization for Matter and Energy Flow in Organisms 5-LS1-1: Support an argument that plants get the materials they need for growth chiefly from air and water. LS2.A: Interdependent Relationships in Ecosystems

Explore & Explain Lesson Group	Science Practices	Cross Cutting Concepts	Disciplinary Core Ideas & Performance Expectations
17. *Can You See It My Way?* Students apply their knowledge about how organisms are supported and challenged by their environment as they write an empathetic and creative short story from the perspective of a local life form very different from themselves. 18. *Art and Data Critique:* Students look objectively at and evaluate their photography for its success as informative scientific data as well as interesting or moving artwork.	Engaging in Argument from Evidence Obtaining, Evaluating, and Communicating Information	Cause and Effect Energy and Matter Systems and System Models Influence of Engineering, Technology, and Science on Society and the Natural World	LS2.C: Ecosystem Dynamics, Functioning, and Resilience LS4.D: Biodiversity and Humans 4-LS1-1: Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. ESS2.A: Earth Materials and Systems LS1.A: Structure and Function 4-LS1-1: Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction 5-LS1-1 (students may also) Support an argument that plants get the materials they need for growth chiefly from air and water. 5-ESS3.C: Human Impacts on Earth Systems 5-ESS3-1: Obtain and combine information about ways individual communities use science ideas to protect Earth's resources and environment.

Engage & Explore Lesson Group	Science Practices	Cross Cutting Concepts	Disciplinary Core Ideas & Performance Expectations
19. *Adventure Matters:* Students write and illustrate their own wildly imaginative adventure story that follows a tiny bit of matter around, starting in their own lungs and traveling as far as another planet. 20. *Matter Maps:* Students visually model the multi-directional flow of matter around their own local, outdoor, wild space and discover the interconnectedness of all life.	Developing and Using Models Connections to Nature of Science	Energy and Matter Systems and System Models Patterns Cause and Effect	LS1.C: Organization for Matter and Energy Flow in Organisms LS2.A: Interdependent Relationships in Ecosystems LS2.B: Cycles of Matter and Energy Transfer in Ecosystems 5-LS2-1: Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment. (touches on) LS1.B: Growth and Development of Organisms 3-LS1-1: Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death. 3-ESS2: Earth's Systems 4-PS3: Energy 4-ESS3: Earth and Human Activity

Engage & Explore Lesson Group	Science Practices	Cross Cutting Concepts	Disciplinary Core Ideas & Performance Expectations
21. *BioGRAPHing! :* Students interpret, graph, and recognize the importance of data through a true story of a young girl trying to protect her local, wild, suburban biodiversity. 22. *Biodiversity Assessment:* Students count and graph the variety and abundance of their own nearby biodiversity.	Analyzing and Interpreting Data Engaging in Argument from Evidence	Patterns Cause and Effect Science Addresses Questions About the Natural and Material World Influence of Engineering, Technology, and Science on Society and the Natural World	LS4-C: Adaptation 3-LS4-3: Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive. LS2.C: Ecosystem Dynamics, Functioning, and Resilience LS3.B: Variation of Traits LS4.D: Biodiversity and Humans 3-LS4-4: (Introduced) Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change. LS2.A: Interdependent Relationships in Ecosystems ETS1.B: (Introduced) Developing Possible Solutions 5-ESS3: Earth and Human Activity Common Core Reading and Math: RI.3.7 and MP.2, 3.MD.B.3, 3.MD.B.4, MP.4, MP.5

Explain & Elaborate Lesson Group	Science Practices	Cross Cutting Concepts	Disciplinary Core Ideas & Performance Expectations
23. *Class Challenge: A Biodiversity Project:* Students use the data they collected in their *Biodiversity Assessment* to assess their site's biodiversity and then develop a feasible plan and act on it to improve and/or protect their site's biodiversity. **NOTE**: You may choose do lessons 21-22 and introduce 23 very early in the curriculum (as early as after Lesson 4 *Silly Skits)* if students see site-based biodiversity challenges and are eager to improve them and/or if you need more time allowed for students to complete a large or complex solution to the problems they see.	Engaging in Argument from Evidence Obtaining, Evaluating, and Communicating Information Analyzing and Interpreting Data Developing and Using Models Connections to Nature of Science Asking Questions and Defining Problems Constructing Explanations and Designing Solutions Planning and Carrying Out Investigations	Patterns Cause and Effect Science Addresses Questions About the Natural and Material World Energy and Matter Systems and System Models Connections to Engineering, Technology, and Applications of Science Influence of Engineering, Technology, and Science on Society and the Natural World	ETS1.A: Defining and Delimiting Engineering Problems 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 prototype that can be improved. ETS1-C: Optimizing the Design Solution LS2.A: Interdependent Relationships in Ecosystems LS1-C: Organization for Matter and Energy Flow in Organisms LS2.B: Cycles of Matter and Energy Transfer in Ecosystems ESS3.C: Human Impacts on Earth Systems Common Core Reading and Math: RI.3.3, SL.3.4, 3.LS4-4, 3-LS4-1, 3-LS4-4, W.3.1, W.3.2, 4-PS4-3, MP.2, MP.4, MP.5

Explain & Elaborate Lesson Group	Science Practices	Cross Cutting Concepts	Disciplinary Core Ideas & Performance Expectations
24. *Patterns in Nature & Art:* Students extend their knowledge of patterns in data to finding patterns in nature and applying them in their own art and design. 25. *Faux Antique Frames* Students use math to create functional frames that meet specified criteria and with reflecting designs based on patterns they observed in nature.	Obtaining, Evaluating, and Communicating Information Constructing Explanations and Designing Solutions	Patterns Cause and Effect Connections to Engineering, Technology, and Applications of Science	LS1.A: (observed) Structure and Function LS3.B: (observed) Variation of Traits ETS1.A: Defining and Delimiting Engineering Problems 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. ETS1.C: Optimizing the Design Solution Common Core Math: MP.2, MP.4, MP.5, 3.NBT, 3.NF, 3.MD.B.4, 4.G.A.1, 4.MD.A.1, 4.MD.A.2, 5.MD.A.1
Engage & Evaluate			
Your Biodiversity PEEK STEAM Exhibition! (can stand alone or be part of a larger school-wide showcase event)			