Cedar Grove School District

Cedar Grove, NJ

2019 | Grade 1

Science

Revisions Approved by the Cedar Grove Board of Education
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Science – Grade 1

The Grade 1 science program supports the philosophy of the *New Jersey Student Learning Standards for Science*. Our students will develop an understanding of the disciplinary core ideas relative to physical sciences, life sciences, earth and space sciences, and life science through experiential learning and engineering and technology, and through exposure to rich non-fiction text.

This curriculum was written in accordance to the

NEW JERSEY STUDENT LEARNING STANDARDS for SCIENCE.

These standards can be viewed at https://www.nj.gov/education/aps/cccs/science/

with additional curricular connections to the

NEW JERSEY STUDENT LEARNING STANDARDS for **MATHEMATICS, LANGUAGE ARTS, and 21st CENTURY LIFE AND CAREERS**

These standards can be viewed at https://www.nj.gov/education/cccs/

Science – Grade 1

Unit 1: Light and Sound | Instructional Time: 4 weeks

***Inspire Science* Alignment: "Sound Energy" & "Light Energy"**

Unit Summary

In this unit of study, students develop an understanding of the relationship between sound and vibrating materials as well as between the availability of light and the ability to see objects. The idea that light travels from place to place can be understood by students at this level by placing objects made with different materials in the path of a beam of light and determining the effect of the different materials.

The crosscutting concept of *cause* and *effect* is called out as an organizing concept for the disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in *planning and carrying out investigations, constructing explanations,* and *designing solutions.* Students are also expected to use these practices to demonstrate understanding of the core ideas.

New Jersey Student Learning Standards for Science/ NGSS

Student Learning Objectives

1-PS4-1	Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.
1-PS4-2	Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated.
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.
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

Career Ready Practices

CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and with reason.
CRP5. Consider the environmental, social and economic impacts of decisions.
CRP6. Demonstrate creativity and innovation.
CRP7. Employ valid and reliable research strategies.
CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
CRP10. Plan education and career paths aligned to personal goals.
CRP11. Use technology to enhance productivity.

Unit Sequence

Part A: *How can you prove that you can only see something when someone shines a light on it or if the object gives off its own light?*

Concepts	Formative Assessment
• Simple tests can be designed to gather evidence to support or refute student ideas about causes. • Objects can be seen if light is available to illuminate them or if the give off their own light.	*Students who understand the concepts can:* • Design simple tests to gather evidence to support or refute ideas about cause and effect relationships. • Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. • Make observations (e.g., in a completely dark room, using a pinhole box, using a video of a cave explorer with a flashlight) to construct an evidence-based account that objects can be seen only illuminated (from an external light source or by an object giving off its own light).

Unit Sequence

Part B: *How do instruments (band) make sound?*

Concepts	Formative Assessment

• Sound can make matter vibrate, and vibrating matter can make sound. • Simple tests can be designed to gather evidence to support or refute student ideas about causes.	*Students who understand the concepts can:* • Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. • Examples of vibrating materials that make sound could include tuning forks and plucking a stretched string. • Examples of how sound can make matter vibrate could include holding a piece of paper near a speaker making sound and holding an object near a vibrating tuning fork.

What It Looks Like in the Classroom

In this unit of study, students plan and conduct investigations and make observations as they explore sound and light energy. Students describe the relationships between sound and vibrating materials and the availability of light and the ability to see objects. They also investigate the effect on a beam of light when objects made of different materials are placed in its path. Throughout the unit, students will use their observations and data as evidence to determine cause-and-effect relationships in the natural world.

Students begin this unit by observing objects with and without available light. They need opportunities to observe a variety of objects in both illuminated and non-illuminated settings. For example, observations could be made in a completely dark room, or students can use a pinhole box to observe objects. Students can also watch videos of cave explorers deep in the earth, using light from a single flashlight. With experiences such as these, they will come to understand that objects can be seen only when illuminated, either from an external light source or by when they give off their own light.

Next, students plan and conduct simple investigations to determine what happens to a beam of light when objects made of various materials are placed in its path. Students need the opportunity to explore the interaction of light with a variety of materials, and they should record what they observe with each one. When selecting materials to use, teachers should choose some that allow all light to pass through (transparent), some that allow only a portion of the light to pass through (translucent), some that do not allow any light to pass through (opaque), and some that redirect the beam of light (reflective). Examples could include clear plastic, glass, wax paper, thin cloth, cardboard, construction paper, shiny metal spoons, and mirrors.

As students observe the interaction between light and various materials, they should notice that when some or all of the light is blocked, a shadow is created beyond the object. If only a portion of light is blocked (translucent materials), a dim shadow will form and some light will pass through the object. If the light is blocked (opaque materials), students will see only a dark shadow beyond the object. They will observe that shiny materials reflect light, redirecting the beam of light in a different direction. Students should use their observations as evidence to support their explanations of how light interacts with various objects.

After investigating light energy, students continue to plan and conduct investigations to develop an understanding of some basic properties of sound. Students can use a variety of objects and materials to observe that vibrating materials can make sound and that sound can make materials vibrate. Students need multiple opportunities to experiment with a variety of objects that will make sound. Some opportunities could include:

- Gently tapping various sizes of tuning forks on a hard surface.
- Plucking string or rubber bands stretched across an open box.
- Cutting and stretching a balloon over an open can to make a drum that can be tapped.
- Holding the end of a ruler on the edge of a table, leaving the opposite end of the ruler hanging over the edge, and then plucking the hanging end of the ruler.
- Touching a vibrating tuning fork to the surface of water in a bowl.
- Placing dry rice grains on a drum's surface and then touching the drum with a vibrating tuning fork or placing the drum near the speaker of a portable sound system.
- Holding a piece of paper near the speaker of a portable sound system.

As students conduct these simple investigations, they will notice that when objects vibrate (tuning forks that have been taped and string, rubber bands, and rulers that have been plucked), sound is created. They will also notice that sound will cause objects to vibrate (sound from a speaker causes rice grains to vibrate on the surface of a drum, the vibrating

tuning fork causes ripples on the surface of water, and sound from the speaker also causes paper to move). Students should use these types of observations as evidence when explaining the cause and effect relationship between sound and vibrating materials.

Performance Expectations

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Planning and Carrying Out Investigations • Plan and conduct investigations collaboratively to produce evidence to answer a question, (**1-PS4-1**), (**1-PS4-3**) **Constructing Explanations and Designing Solutions** • Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (**1-PS4-2**) • Use tools and materials provided to design a device that solves a specific problem. (**1-PS4-4**) ***Connections to Nature of Science*** **Scientific Investigations Use a Variety of Methods** • Science investigations begin with a question. (**1-PS4-1**) • Scientists use different ways to study the world. (**1-PS4-1**)	**PS4.A: Wave Properties** • Sound can make matter vibrate, and vibrating matter can make sound. (**1-PS4-1**) **PS4.B: Electromagnetic Radiation** • Objects can be seen if light is available to illuminate them or if they give off their own light. (**1-PS4-2**) • Some materials allow light to pass through them, others allow only some light through and others block all the light and create a dark shadow on any surface beyond them, where the light cannot reach. Mirrors can be used to redirect a light beam. (Boundary: The idea that light travels from place to place is developed through experiences with light sources, mirrors, and shadows, but no attempt is made to discuss the speed of light.) (**1-PS4-3**) **PS4.C: Information Technologies and Instrumentation** • People also use a variety of devices to communicate (send and receive information) over long distances. (**1-PS4-4**)	**Cause and Effect** • Simple tests can be designed to gather evidence to support of refute student ideas about causes. (**1-PS4-1**), (**1-PS4-2**), (**1-PS4-3**) **Connections to Engineering, Technology, and Applications of Science** **Influence of Engineering, Technology, and Science, on Society and the Natural World** • People depend on various technologies in their lives; human life would be very different without technology. (**1-PS4-4**)

Connecting with English Language Arts/Literacy and Mathematics

English Language Arts/Literacy

To integrate the CCSS for English Language Arts into this unit, students need opportunities to read informational texts in order to gather information about light sound. With adult guidance, they identify the main topic and retell key details from texts and ask and answer questions about key details. Students should also participate in shared research and writing projects. They can gather information from a variety of preselected, grade-level appropriate texts and resources, and use that information to answer questions about light and sound. In pairs or small groups, students can use pictures and words to create simple books about vibration (sound) and illumination (light). The students' writing should include facts about the topic and have a sense of closure. Throughout the unit of study, students need multiple opportunities to share their experiences with light and sound in collaborative conversations with adults and peers, in small and large group settings.

Mathematics

N/A

English/Language Arts Standards	Mathematics Standards
• Write informative/explanatory texts in which they name a topic, supply some facts about the topic, and provide some sense of closure. (1-PS4-2) **W.1.2** • Participate in shared research and writing projects (e.g.,	

explore a number of “how-to” books on a given topic and use them to write a sequence of instructions). (1-PS4-1), (1-PS4-2), (1-PS4-3) **W.1.7** • With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-PS4-1), (1-PS4-2), (1-PS4-3) **W.1.8** • Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups. (1-PS4-1), (1-PS4-2), (1-PS4-3) **SL.1.1**	**N/A**

Differentiation and Accommodations Strategies

Special Education Students
https://docs.google.com/document/d/1xgcmJZiX1yyZPUYae_IuAwcdWuQM_Pz4JK2vO0d27BQ/edit?usp=sharing

Gifted and Talented Students
https://docs.google.com/document/d/1rKgSC8LGRdmJXG9MAeBMXqKZISgruuqj7zbXeJXUJOQ/edit?usp=sharing

ESL-ELL Students
https://docs.google.com/document/d/1HDnAEyeCoZt3MHoHPpDVjfIIeUjeptsb4JITe8egvhA/edit?usp=sharing

At-Risk Students
https://docs.google.com/document/d/1YdPAzxs2Bkz1xkT3YQ1CRsr5ANEM_jwQWPIPx61lLBI/edit?usp=sharing

Students with 504 Plans
https://docs.google.com/document/d/1aW8cuacIzNTlK2RRsvA47KYnwn5iaZmAzB6djTIs-IM/edit?usp=sharing

Science – Grade 1

Unit 2: Communicating with Light and Sound | Instructional Time: 5 weeks

***Inspire Science* Alignment: Use Energy to Communicate (Lesson 1)**

How would we communicate over a distance without the use of any devices that people currently use?

In this unit of study, students continue to develop their understanding of the relationship between sound and vibrating materials as well as between the availability of light and the ability to see objects. Students apply their knowledge of light and sound to engage in engineering design to solve a simple problem involving communication with light and sound. The crosscutting concepts of *structure and function and influence of engineering, technology, and science on society and the natural world* are called out as organizing concepts for the disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in *constructing explanations and designing solutions, asking questions and defining problems, and developing and using models.* Students are also expected to use these practices to demonstrate understanding of the core ideas.

New Jersey Student Learning Standards for Science/ NGSS

Student Learning Objectives

1-PS4-1	Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.
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.
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.
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-ETS1-2	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.
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.

Career Ready Practices

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and with reason.
CRP5. Consider the environmental, social and economic impacts of decisions.
CRP6. Demonstrate creativity and innovation.
CRP7. Employ valid and reliable research strategies.
CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
CRP10. Plan education and career paths aligned to personal goals.
CRP11. Use technology to enhance productivity.
CRP12. Work productively in teams while using cultural global competence.

Unit Sequence

Part A: *How can light or sound be used to communicate over a distance?*

Concepts	Formative Assessment
• The shape and stability of structures of natural and designed objects are related to their function(s). • People depend on various technologies in their lives; human life would be very different without technology. • People use a variety of devices to communicate (send and receive information) over long distances. • A situation that people want to change or create can be approached as a problem to be solved through engineering. • Asking questions, making observations, and gathering	*Students who understand the concepts can:* • Describe how the shape and stability of structures are related to their function. • Ask questions based on observations to find more information about the natural and/or designed world. • Define a simple problem that can be solved through the development of a new or improved object or tool. • Ask questions, make observations, and gather

information are helpful in thinking about problems. • Before beginning to design a solution, it is important to clearly understand the problem. • Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.	information about a situation people want to change in order to define a simple problem that can be solved through the development of a new or improved object or tool. • Develop a simple model based on evidence to represent a proposed object or tool. • 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. • Use tools and materials provided to design a device that solves a specific problem. • Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance. Examples of device could include: ✓ A light source to send signals ✓ Paper cup and string telephones ✓ A pattern of drum beats

What It Looks Like in the Classroom

Students continue to develop their understanding of the relationship between sound and vibrating materials as well as between the availability of light and the availability to see objects. Students apply their knowledge of light and sound to solve a simple problem involving communication with light and sound.

During this unit, students learn that people depend on various technologies in their lives, and that life would be very different without technology. Technology plays an important role in the development of devices that allow us to communicate (send and receive information) over long distances. Engineers design and build many kinds of devices, such as those used for communication. Like engineers, students engage in the engineering design process in order to design and build a device that uses light or sound to communicate over a distance.
This process should include the following steps:

- ✓ Students brainstorm a list of ways that people communicate over a distance. Some examples include telephones, cellular phones, email and video conferencing (by computer).
- ✓ Ask students, "How would we communicate over a distance without the use of any of the devices that people currently use?"
- ✓ Use that question to guide the class to define the problem: Design and build a device that allows us to communicate over a distance.
- ✓ As a class, determine the criteria that will be used to evaluate the design solutions. One criterion MUST be that the devices uses either light or sound.
- ✓ Also as a class, determine possible constraints, such as available material and amount of time allotted for designing and building the device.
- ✓ Small groups conduct research, looking for examples of devices that use light or sound to communicate over a distance.
- ✓ Small groups can then use tools and materials to design and build their devices. Examples could include a light source that sends a signal, paper cup and string telephones, or a pattern of drumbeats.
- ✓ Groups should prepare a sketch or drawing of their device. They should label the components and describe, in writing, how each component relates to the function of the device.
- ✓ Groups should present their devices to the class, demonstrating how they work.
- ✓ Students then determine which devices work as intended based on the criteria, using data as evidence to support their thinking.

Students should ask questions, make observations, gather information, and communicate with peers throughout the design process. Guidance and support from the teacher is also a critical part of the design process.

Performance Expectations

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts

Planning and Carrying Out Investigations

- Plan and conduct investigations collaboratively to produce evidence to answer a question, (**1-PS4-1**), (**1-PS4-3**)

Constructing Explanations and Designing Solutions

- Use tools and materials provided to design a device that solves a specific problem. (**1-PS4-4**)

Asking Questions and Defining Problems

- Ask questions based on observations to find more information about the natural and/or designed world(s). (**K-2-ETS1-1**)
- Define a simple problem that can be solved through the development of a new or improved object or tool. (**K-2-ETS1-1**)

Developing and Using Models

- Develop a simple model based on evidence to represent a proposed object or tool. (**K-2-ETS1-2**)
- Analyze data from different test designed to solve the same problem and compare how each performs. (**K-2-ETS1-3**)

PS4.C: Information Technologies and Instrumentation

- People also use a variety of devices to communicate (send and receive information) over long distances. (**1-PS4-4**)

ETS1.A: Defining and Delimiting Engineering Problems

- A situation that people want to change or create can be approached as a problem to be solved through engineering. (**K-2-ETS1-1**)
- Asking questions, making observations, and gathering information are helpful in thinking about problems. (**K-2-ETS1-1**)
- Before beginning to design a solution, it is important to clearly understand the problem. (**K-2-ETS1-1**)
- Before beginning to design a solution, it is important to clearly understand the problem. (**K-2-ETS1-1**)

ETS1.B: Developing Possible Solutions

- Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (**K-2-ETS1-2**)

Structure and Function

- The shape and stability of structures of natural and designed objects are related to their function(s). (**K-2-ETS1-2**)

Connections to Engineering, Technology, and Applications of Science

Influence of Engineering, Technology, and Science, on Society and the Natural World

- People depend on various technologies in their lives; human life would be very different without technology. (**1-PS4-4**)

Connecting with English Language Arts/Literacy and Mathematics

English Language Arts/Literacy

Students will participate in shared research and writing projects as they engage in engineering design. Students can use text and media resources to first gather information about devices that use light or sound to communicate over a distance. They can demonstrate understanding of key details in a text by asking and answering questions during class and small-group discussions. In addition, students recall information from experiences or gather information from provided sources to support their thinking as they design and build their device. As students complete their devices, they prepare a sketch or drawing of their device, label the components, and describe, in writing, how each component relates to the function of the device and how their communication device works. Students can also write a "how-to" book describing how to use tools and materials to build their design. Students can also use drawings or other visual displays to accompany their writing in order to describe their thought process and clarify their ideas. Adult support should be provided throughout the process.

Mathematics

Students need opportunities to use tools for a variety of purposes as they design and build devices for communicating with light or sound. They can use objects such as interlocking cubes or paper clips to measure length in nonstandard units, expressing their measurements as whole numbers. Students can also use indirect measurement (i.e., compare the lengths of two objects indirectly by using a third object) to order three objects by length. For example, they might compare the lengths of string used to paper-cup telephones and observe and describe the relative effectiveness of each length of string.

Students can also use graphs to organize data, such as the number of drumbeats, and then analyze the data to find a

pattern. Students will reason abstractly and quantitatively as they organize data into graphs, analyze the data, and use it to solve simple put-together, take-apart, and compare problems.

English/Language Arts Standards	Mathematics Standards
• Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions). (1-PS4-4) **W.1.7** • Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text. (K-2-ETS1-1) **RI.1.1** • With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers. (K-2-ETS1-1) **W.1.6** • Recall information from experiences or gather information from provided sources to answer a question. (K-2-ETS101) **W.1.8** • Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. (K-2-ETS1-2) **SL.1.5**	• Reason abstractly and quantitatively. (K-2-ETS1-1) **MP.2** • Model with mathematics. (K-2-ETS1-1) **MP.4** • Use appropriate tools strategically. (1-PS4-4), (K-2-ETS1-1) **MP.5** • Order three objects by length; compare the lengths of two objects indirectly by using a third object. (1-PS4-4) **1.MD.A.1** • Express the length of an object as a whole number of length units, by layering multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. Limit to contexts where the object being measured is spanned by a whole umber of length units with no gaps or overlaps. (1-PS4-4) **1.MD.A.2** • Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. (K-2-ETS1-1) **1.MD.D.10**

Differentiation and Accommodations Strategies

Special Education Students
https://docs.google.com/document/d/1xgcmJZiX1yyZPUYae_IuAwcdWuQM_Pz4JK2vO0d27BQ/edit?usp=sharing

Gifted and Talented Students
https://docs.google.com/document/d/1rKgSC8LGRdmJXG9MAeBMXqKZISgruuqj7zbXeJXUJOQ/edit?usp=sharing

ESL-ELL Students
https://docs.google.com/document/d/1HDnAEyeCoZt3MHoHPpDVjfIIeUjeptsb4JITe8egvhA/edit?usp=sharing

At-Risk Students
https://docs.google.com/document/d/1YdPAzxs2Bkz1xkT3YQ1CRsr5ANEM_jwQWPIPx61lLBI/edit?usp=sharing

Students with 504 Plans
https://docs.google.com/document/d/1aW8cuaclzNTlK2RRsvA47KYnwn5iaZmAzB6djTIs-IM/edit?usp=sharing

Science – Grade 1

Unit 3: Characteristics of Living Things | Instructional Time: 5 weeks

Inspire Science Alignment: Plants and Animals (Lessons 1, 2, 3)

In this unit of study, students develop an understanding of how plants and animals use their external parts to help them survive, grow, and meet their needs, as well as how the behaviors of parents and offspring help offspring survive. The understanding that young plants and animals are like, but not exactly the same as, their parents is developed. The crosscutting concept of *patterns* is called out as an organizing concept for the disciplinary core ideas. Student are expected to demonstrate grade-appropriate proficiency in *obtaining, evaluating, and communicating information* and *constructing explanations.* Students are also expected to use these practices to demonstrate understanding of the core ideas.

New Jersey Student Learning Standards for Science/ NGSS

Student Learning Objectives

1-LS3-1	Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.
1-LS1-2	Read texts and use media to determine patterns in behavior of parents and offspring that help offspring to survive.
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.

Career Ready Practices

CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and with reason.
CRP5. Consider the environmental, social and economic impacts of decisions.
CRP6. Demonstrate creativity and innovation.
CRP7. Employ valid and reliable research strategies.
CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
CRP10. Plan education and career paths aligned to personal goals.
CRP11. Use technology to enhance productivity.

Unit Sequence

Part A: *How are young plants and animals alike and different from their parents?*

Concepts	Formative Assessment
• Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. • Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways. • Young animals are very much, but not exactly, like their parents. Plants also are very much, but not exactly, like their parents.	*Students who understand the concepts can:* • Observe and use patterns in the natural world as evidence and to describe phenomena. • Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. • Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents. ✓ Examples of patterns could include features plants or animals share. ✓ Examples of observations could include that leaves from the same kind of plant are the same shape but can differ in size and that a particular breed of puppy looks like its parents but is not exactly the same. [Note: Assessment does not include inheritance or animals that undergo metamorphosis or hybrids.]

Unit Sequence

Part B: *What types (patterns) of behavior can be observed among parents that help offspring survive?*

Concepts	Formative Assessment
• Scientists look for patterns and order when making observations about the world. • Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. • Adult plants and animals can have young. • In many kinds of animals, parents and the offspring themselves engage in behaviors that help the offspring survive.	*Students who understand the concepts can:* • Observe and use patterns in the natural world as evidence and to describe phenomena. • Read grade-appropriate texts and use media to obtain scientific information to determine patterns in the natural world. • Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive. Examples of patterns of behaviors could include: ✓ The signals that offspring make, such as crying, cheeping, and other vocalizations. ✓ The responses of the parents, such as feeding, comforting, and protecting the offspring.

What It Looks Like in the Classroom

In this unit of study, students observe organisms in order to recognize that many types of young plants and animals are like, but not exactly the same as, their parents. Students also observe how organisms use their external parts to help them survive, grow, and meet their needs, and how the behaviors of parents and offspring help offspring survive. Throughout the unit, students will look for patterns; obtain, evaluate, and communicate information; and construct explanations.

People look for patterns in the natural world and use these patterns as evidence to describe phenomena. Students begin this unit by observing and comparing external features of organisms, looking for patterns in what they observe. They will need opportunities to observe a variety of plants and animals in order to look for similarities and differences in their features. For example, when comparing the shape, size, color, or number of leaves on plants, students begin to notice that plants of the same kind have leaves that are the same shape and color, but the leaves of one plant may differ from another in size or number. When comparing body coverings; number, size and type of external features (legs, tail, eyes, mouth parts); body size, body coloring, or eye color of animals, students learn that animals of the same kind have the same type of body covering and the same number and types of external features, but the size of the body, the size of external features, body color, and/or eye color of individuals might differ. Making observations like these helps students recognize that young plants and animals look very much, but not exactly, like their parents, and that even though individuals of the same kind of plant or animal or recognizable as similar, they can also vary in many ways.

In addition to observing and documenting similarities and differences in the external features of organisms, students also need opportunities to make direct observations, read texts, or use multimedia resources to determine patterns in the behaviors of parents and offspring that help offspring survive. While both plants and animals can have young, it is the parents of young animals who might engage in behaviors that help their young survive. Some examples of these patterns of behaviors could include the signals that offspring make, such as crying, cheeping, and other vocalizations, and the responses of parents, such as feeding, comforting and protecting their young.

Performance Expectations

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Analyzing and Interpreting Data • Analyze and interpret data to make sense of phenomena using logical reasoning, (**1-LS3-1**) • Analyze data from different test designed to solve the same problem and compare how each performs. (**K-2-ETS1-3**) **Obtaining, Evaluating, and Communicating Information** • Read grade-appropriate texts and	**LS3.A:Inheritance of Traits** • Many characteristics of organisms are inherited from their parents. (**1-LS3-1**) **LS1.B: Growth and Development of Organisms** • Adult plants and animals can have young. In many kinds of animals, parents and the offspring themselves engage in behaviors that help the offspring to survive. (**1-LS1-2**)	**Patterns** • Similarities and differences in patterns can be used to sort and classify natural phenomena, (**1-LS3-1**) • Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence, (**1-LS1-2**) **Connections to Nature of Science**

use media to obtain scientific information to determine patterns in the natural world. (**1-LS1-2**)		**Scientific Knowledge is Based on Empirical Evidence** • Scientists look for patterns and order when making observations about the world. (**1-LS1-2**)

Connecting with English Language Arts/Literacy and Mathematics

English Language Arts/Literacy

To integrate the CCSS for English Language Arts into this unit, students need opportunities to read informational texts in order to gather information about traits and behaviors of organisms. With adult guidance, they identify the main topic, retell key details from texts and ask and answer questions about key details. Students should also participate in shared research and writing projects. They can gather information from a variety of preselected, grade-level-appropriate texts and resources and used that information to answer questions about traits and behaviors of organisms. In pairs or small groups, students can use pictures and words to create simple books that describe feature that parents and offspring share or behaviors that parents and offspring exhibit that help offspring survive.

Mathematics

To integrate mathematics into this unit, students reason abstractly and quantitatively and use appropriate tools strategically as they collect and organize data, and use it to solve problems. For example, when students gather information about the shape, size, color, and number of leaves on plants, they can:

- ✓ Use grade-level-appropriate tools and strategies to measure, compare, and order leaves by length.
- ✓ Organize data (e.g., number of leaves) into simple graphs or tables, and then use strategies based on place value, properties of operations, and/or the relationship between addition and subtraction to make comparisons.
- ✓ Use drawings and equations as they solve problems (e.g., more or less, total amount, how many in each).

English/Language Arts Standards	Mathematics Standards
• Ask and answer questions about key details in a text. (1-LS3-1) **RI.1.1** • Identify the main topic and retell key details of a text. (1-LS3-1) **RI.1.2** • Describe the connection between two individuals, events, ideas, or pieces of information in a text. (1-LS3-1) **RI.1.3** • Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions). (1-LS1-1) **W.1.7** • Write informative/explanatory texts in which they name a topic, supply some facts about the topic, and provide some sense of closure. (1-LS3-1) **W.1.2**	• Reason abstractly and quantitatively. (1-LS3-1) **MP.2** • Model with mathematic. (1-LS3-1) **MP.4** • Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. *Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps*. (1-LS3-1) **1.MD.A.2**

Differentiation and Accommodations Strategies

Special Education Students
https://docs.google.com/document/d/1xgcmJZiX1yyZPUYae_IuAwcdWuQM_Pz4JK2vO0d27BQ/edit?usp=sharing

Gifted and Talented Students
https://docs.google.com/document/d/1rKgSC8LGRdmJXG9MAeBMXqKZlSgruuqj7zbXeJXUJOQ/edit?usp=sharing

ESL-ELL Students
https://docs.google.com/document/d/1HDnAEyeCoZt3MHoHPpDVjfIIeUjeptsb4JITe8egvhA/edit?usp=sharing

At-Risk Students
https://docs.google.com/document/d/1YdPAzxs2Bkz1xkT3YQ1CRsr5ANEM_jwQWPIPx61lLBI/edit?usp=sharing

Students with 504 Plans
https://docs.google.com/document/d/1aW8cuacIzNTlK2RRsvA47KYnwn5iaZmAzB6djTIs-IM/edit?usp=sharing

Science – Grade 1

Unit 4: Mimicking Organisms to Solve Problems | Instructional Time: 5 weeks

***Inspire Science* Alignment: Plants and Animals (Lesson 4)**

In this unit of study, students develop an understanding of how plants and animals use their parts to help them survive, grow, and meet their needs. Students also need opportunities to develop possible solutions. As students develop possible solutions, one challenge will be to keep them from immediately implementing the first solution they think of and to instead think through the problem carefully before acting. Having students sketch their ideas or make a physical model is a good way to engage them in shaping their ideas to meet the requirements of the problem. The crosscutting concept of structure and function is called out as an organizing concept for the disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in *constructing explanations, designing solutions,* and in *developing and using models.* Students are expected to use these practices to demonstrate understanding of the core ideas.

New Jersey Student Learning Standards for Science/ NGSS

Student Learning Objectives

1-LS1-1	Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs
1-LS1-2	Read texts and use media to determine patterns in behavior of parents and offspring that help offspring to survive.
1-LS3-1	Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.
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.

Career Ready Practices

CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and with reason.
CRP5. Consider the environmental, social and economic impacts of decisions.
CRP6. Demonstrate creativity and innovation.
CRP7. Employ valid and reliable research strategies.
CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
CRP10. Plan education and career paths aligned to personal goals.
CRP11. Use technology to enhance productivity.

Unit Sequence

Part A: *How can humans mimic how plants and animals use their external parts to help them survive and grow?*

Concepts	Formative Assessment
• Every human-made product is designed by applying some knowledge of the natural world and is built using materials derived from the natural world. • The shape and stability of structures of natural and designed objects are related to their function(s). • All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water, and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. • Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals responded to these inputs with behaviors that help them survive. Plants also respond to some external inputs. • Designs can be conveyed through sketches, drawings,	*Students who understand the concepts can:* • Observe and describe how the shape and stability of structures of natural and designed objects are related to their functions. • Use materials to design a device that solves a specific problem or [design] a solution to a specific problem. • Use materials to design a solution to a human problem that mimics how plants and/or animals use their external parts to help them survive, grow, and meet their needs: Examples of human problems that can be solved by mimicking plant or animal solutions could include: ✓ Designing clothing or equipment to protect bicyclists by mimicking turtle shells, acorn shells, and animal scales. ✓ Stabilizing structures by mimicking animal

or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.	tails and roots on plants. ✓ Keeping out intruders by mimicking thorns on branches and animal quills. ✓ Detecting intruders by mimicking eyes and ears. • Develop a simple model based on evidence to represent a proposed object or tool. • 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.

What It Looks Like in the Classroom

In this unit of study, students investigate how plants and animals use their external structures to help them survive, grow, and meet their needs. Then students are challenged to apply their learning to design a solution to a human problem that mimics how plants and/or animals use their external parts to help them survive, grow, and meet their needs.

In order to recognize ways in which animals and plants use their external structures, students need opportunities to observe and describe how the shape and stability of organisms' structures are related to their functions. Students can make direct observations and use media resources to find relevant examples for both plants and animals. They should observe that different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water, and air. In addition, animals have body parts that capture and convey different kinds of information from the environment, enabling them to respond to these inputs in ways that aid in survival. Plants, like animals, have different parts (roots, stems, leaves, flowers, fruits) that each serve specific functions in survival and growth, and plants also respond to external inputs. For each structure that students observe, they should describe how the shape and stability of the function is related to its function.

The next step in this unit is to engage in engineering design. Students need opportunities to use materials to design a device that solves a specific human problem. Designs should mimic how plants and/or animals use their external parts to help them survive and grow. The engineering design process students engage in should include the following steps:

- As a class or in small groups, students participate in shared research to find examples of human-made products that have been designed and built by applying knowledge of the natural world. For each example, students identify the human problem(s) that the product solves and how that solution was designed using an understanding of the natural world.
- Students brainstorm possible human problems that can be solved by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs. Examples could include:
  - ✓ Designing clothing or equipment to protect bicyclists that mimics turtle shells, acorn shells, and animal scales.
  - ✓ Stabilizing structures that mimic animal tails and plant roots.
  - ✓ Keeping out intruders by mimicking thorns on branches and animal quills.
  - ✓ Detecting intruders by mimicking eyes and ears.
- In small groups, students use sketches, drawings, or physical models to convey a design that solves a problem by mimicking one or more external structures of plants and/or animals.
- Use materials to create the design solution.
- Share the design solution with others in the class.

Performance Expectations

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Analyzing and Interpreting Data • Analyze and interpret data to make sense of phenomena using logical reasoning. (**1-LS3-1**) **Constructing Explanations and Designing Solutions** • Use tools and materials provided	**LS1.A: Structure and Function** • All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water, and air. Plants also have different	**Patterns** • Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence. (**1-LS1-2**) **Structure and Function** • The shape and stability of

to design a device that solves a specific problem. (**1-LS1-1**) **Developing and Using Models** • Develop a simple model based on evidence to represent a proposed object or tool. (**K-2-ETS1-2**)	parts (roots, stems, leaves flowers, fruits) that help them survive and grow. (**1-LS1-1**) **LS1.B: Growth and Development of Organisms** • Adult plants and animals can have young. In many kinds of animals, parents and the offspring themselves engage in behaviors that help the offspring to survive. (**1-LS1-2**) **LS1.D: Information Processing** • Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs. (**1-LS1-1**) **ETS1.B:Developing Possible Solutions** • Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (**K-2-ETS1-2**)	structures of natural and designed objects are related to their function(s). (**1-LS1-1**) • The shape and stability of structures of natural and designed objects are related to their function(s). (**K-2-ETS1-2**) **Connections to Engineering, Technology, and Applications of Science** **Influence of Science, Engineering and Technology on Society and the Natural World** • Every human-made product is designed by applying some knowledge of the natural world and is built using materials derived from the natural world. (**1-LS1-1**)

Connecting with English Language Arts/Literacy and Mathematics

English Language Arts/Literacy

Students participate in shared research and writing projects. Engaging in engineering design provides a perfect opportunity for students to conduct shared research and complete writing projects. Students can use text and media resources to gather information about how the shape and stability of external structures of organisms are related to their functions. In addition, student can conduct simple research to find examples of how humans solve problems using an understanding of the natural world. Examples of writing projects could include creating a book that includes examples of how humans mimic the characteristics of organisms to design solutions to human problems Students can also use drawings or other visual displays to accompany their design solutions. Students will need support from teachers to conduct shared research and complete writing projects.

Mathematics

N/A

English/Language Arts Standards	Mathematics Standards
• Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions). (1-LS1-1) **W.1.7** • Add drawings or other visual displays to descriptions when appropriate to clarify ideas, thoughts, and feelings. (K-2-ETS1-2) **SL.1.5**	**N/A**

Differentiation and Accommodations Strategies

Special Education Students

https://docs.google.com/document/d/1xgcmJZiX1yyZPUYae_IuAwcdWuQM_Pz4JK2vO0d27BQ/edit?usp=sharing

Gifted and Talented Students
https://docs.google.com/document/d/1rKgSC8LGRdmJXG9MAeBMXqKZISgruuqj7zbXeJXUJOQ/edit?usp=sharing

ESL-ELL Students
https://docs.google.com/document/d/1HDnAEyeCoZt3MHoHPpDVjfIIeUjeptsb4JITe8egvhA/edit?usp=sharing

At-Risk Students
https://docs.google.com/document/d/1YdPAzxs2Bkz1xkT3YQ1CRsr5ANEM_jwQWPIPx61lLBI/edit?usp=sharing

Students with 504 Plans
https://docs.google.com/document/d/1aW8cuacIzNTlK2RRsvA47KYnwn5iaZmAzB6djTIs-IM/edit?usp=sharing

Science – Grade 1

Unit 5: Patterns of Change in the Night Sky | Instructional Time: 5 weeks

***Inspire Science* Alignment: Earth and Space**

In this unit of study, students observe, describe, and predict some patterns in the movement of objects in the sky. The crosscutting concept of *patterns* is called out as an organizing concept for the disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in *planning and carrying out investigations and analyzing and interpreting data.* Students are also expected to use these practices to demonstrate understanding of the core ideas.

New Jersey Student Learning Standards for Science/ NGSS

Student Learning Objectives

1-ESS1-1	Use observations of the sun, moon, and stars to describe patterns that can be predicted
1-ESS1-2	Make observations at different times of year to relate the amount of daylight to the time of year.
1-PS4-1	Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.
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.

Career Ready Practices

CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and with reason.
CRP5. Consider the environmental, social and economic impacts of decisions.
CRP6. Demonstrate creativity and innovation.
CRP7. Employ valid and reliable research strategies.
CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
CRP10. Plan education and career paths aligned to personal goals.
CRP11. Use technology to enhance productivity.

Unit Sequence

Part A: *What patterns of change can be predicted when observing the sun, moon, and stars?*

Concepts	Formative Assessment
• Science assumes that natural events happen today as they happened in the past. • Many events are repeated. • Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. • Patterns in the motion of the sun, moon, and stars in the sky can be observed, described, and predicted.	*Students who understand the concepts can:* • Observe and use patterns in the world as evidence and to describe natural phenomena. • Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. • Use observations of the sun, moon, and stars to describe patterns that can be predicted. Examples of patterns could include: ✓ The sun and moon appear to rise in one part of the sky, move across the sky, and set. ✓ Stars other than our sun are visible at night but not during the day. *(Assessment of star patterns is limited to stars being seen at night and not during the day.)*

Unit Sequence

Part B: *What is the relationship between the amount of daylight and the time of year?*

Concepts	Formative Assessment
• Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. • Seasonal patterns on sunrise and sunset can be observed, described, and predicted.	*Students who understand the concepts can:* • Observe and use patterns in the natural world as evidence and to describe phenomena. • Make observations (firsthand or from media) to collect data that can be used to make comparisons. • Make observations at different times of the year to

	relate the amount of daylight to the time of year. *(Note: The emphasis is on relative comparisons of amount of daylight in the winter to the amount in the spring or fall; assessment is limited to relative amounts of daylight, not to quantifying the hours or time of daylight.)*

What It Looks Like in the Classroom

In this unit of study, students observe, describe, and predict some patterns of the movement of objects in the sky. Throughout the unit students look for patterns as they plan and carry out investigations and analyze and interpret data.

In this unit's progression of learning, students develop the understanding that natural events happen today as they happened in the past, and that many events are repeated. In addition, they observe and use patterns in the natural world as evidence and to describe phenomena. First graders ask questions and use observations of the sun, moon, and stars to describe apparent patterns of change in each. These patterns are then used to answer questions and make predictions. Some examples of patterns include:

- ✓ The sun and moon appear to rise in one part of the sky, move across the sky, and set.
- ✓ The shape of the moon appears to change over a period of time in a predictable pattern.
- ✓ Stars, other than our sun, are visible at night, but not during the day.

After students observe and document these types of patterns over a period of time, they need opportunities to describe the patterns and to make predictions about the changes that occur in the objects in the sky. It is important that they use observed patterns as evidence to support predictions they might make about the sun, moon, and stars.

In this unit, students also learn that seasonal patterns of sunrise and sunset can be observed, described, and predicted. They relate the amount of daylight to the time of year by making observations at different times of the year. Over time, they collect and use data in order to identify the relationship between the amount of sunlight and the season. Grade 1 students are expected to make relative comparisons of the amount of daylight from one season to the next, and assessment should be limited to relative amounts of daylight, not quantifying the hours of time of daylight.

Performance Expectations

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Planning and Carrying Out Investigations • Plan and conduct investigations collaboratively to produce evidence to answer a question, (**1-PS4-1**), (**1-PS4-3**) • Make observations (firsthand or from media) to collect data that can be used to make comparisons. (**1-ESS1-2**) **Analyzing and Interpreting Data** • Use observations (firsthand or from media) to describe patterns in the natural world in order to answer specific questions. (**1-ESS1-1**)	**ESS1.A: The Universe and its Stars** • Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. (**1-ESS1-1**) **ESS1.B: Earth and the Solar System** • Seasonal patterns of sunrise and sunset can be observed, described, and predicted. (**1-ESS1-2**)	**Patterns** • Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (**1-ESS1-1**), (**1-ESS1-2**) **Connections to Nature of Science Scientific Knowledge Assumes an order and Consistency in Natural Systems** • Science assumes natural events happen today as they happened in the past. (**1-ESS1-1**) • Many events are repeated. (**1-ESS1-1**)

Connecting with English Language Arts/Literacy and Mathematics

English Language Arts/Literacy

In this unit of study, students need opportunities to participate in shared research and writing projects about patterns of change in the sky. For example, students can use online resources or books to research the patterns of change that are visible over time when we observe the objects in the sky. With guidance from adults, students could create books that describe and illustrate the different patterns of change observed in objects in the sky. They could also describe and illustrate the relative amount of daylight in relation to the season using a sequenced set of journal entries or in a sequence-of-events foldable.

Mathematics

Students need opportunities to represent and interpret data and to use addition and subtraction. The following examples from NGSS Appendix L could provide guidance for instruction and should be done with teacher support:

- ✓ Science example 1: There were 16 hours of daylight yesterday. On December 21, there were 8 hours of daylight. How many more hours of daylight were there yesterday than on December 21?
- ✓ Science example 2: Based on the data collected and posted on the bulletin board so far, which day has been the longest of the year so far? Which day has been the shortest?

English/Language Arts Standards	Mathematics Standards
• Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions). (1-ESS1-1), (1-ESS1-2) **W.1.7** • With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-ESS1-1), (1-ESS1-2) **W.1.8**	• Reason abstractly and quantitatively. (1-ESS1-2) **MP.2** • Model with mathematics. (1-ESS1-2) **MP.4** • Use appropriate tools strategically. (1-ESS1-2) **MP.5** • Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, equations to represent the problem. (1-ESS1-2) **1.OA.A.1** • Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another. (1-ESS1-2) **1.MD.C.4**

Differentiation and Accommodations Strategies

Special Education Students
https://docs.google.com/document/d/1xgcmJZiX1yyZPUYae_IuAwcdWuQM_Pz4JK2vO0d27BQ/edit?usp=sharing

Gifted and Talented Students
https://docs.google.com/document/d/1rKgSC8LGRdmJXG9MAeBMXqKZISgruuqj7zbXeJXUJOQ/edit?usp=sharing

ESL-ELL Students
https://docs.google.com/document/d/1HDnAEyeCoZt3MHoHPpDVjfIIeUjeptsb4JITe8egvhA/edit?usp=sharing

At-Risk Students
https://docs.google.com/document/d/1YdPAzxs2Bkz1xkT3YQ1CRsr5ANEM_jwQWPIPx61lLBI/edit?usp=sharing

Students with 504 Plans
https://docs.google.com/document/d/1aW8cuacIzNTlK2RRsvA47KYnwn5iaZmAzB6djTIs-IM/edit?usp=sharing