About this document: This is a scope and sequence, including lesson outlines, experiment ideas, and video links, for every first grade next generation science standard. Each lesson is also linked to a common core standard.

*I believe that learning should be fun, especially science. I have strived to make these lessons both meaningful and engaging.

*This document is intended to outline lesson ideas rather than provide strict explicit lesson plans. Please email me if you have any further questions.

*In this document, everything inside the brackets is what the teacher should do or understand or explain. Everything outside the brackets is a specific thing that teacher should say.

Time estimate for lessons: Many elementary school are not doing a lot of science. I want these lesson plans to integrate smoothly into an existing schedule. Therefore, I have tried to keep these science lessons short—with about twenty minutes for most lessons. I figured that most schools have about 9 weeks per quarter. Most teachers can find at least two twenty minute slots each week to teach science. That is why I planned 18 lessons for each quarter.

Contact information: Need additional Science lessons? Need something clarified? Feel free to email me at: smittybaxter86@yahoo.com if you have anything at all that I can help with. Please let me know if you find that any of the included links have become invalid so that I can fix it for you and other customers.

About the author: I am a first grade teacher in Wyoming with a wonderful wife and two adorable kids. The reasons I feel qualified to compose this document are at least threefold: Firstly, I graduated with honors from one of the nation's top-ranking elementary education programs, found at Utah State University. Next, my expertise increased by earning a master's degree in science education from Western Governor's University. Furthermore, my proficiency is enhanced daily through the demands, rigor, and excitement of teaching first grade!

NGSS Assessments: In the future I may create assessments to go with these lessons, but for the current time I suggest keeping a checklist of your students handy. That way, during the lessons you can quickly give your students a rating between 1 and 4 on how well they can do each skill that the standard states they should be able to do.

Abbreviations and Terms:
NGSS=Next Generation Science Standard(s)
CC=Common Core Standard
Anticipatory set=a lesson or part of a lesson that is not perfectly aligned to a standard. Instead, its purpose is to excite students about the upcoming lesson or lessons as well as to excite them about learning in general.

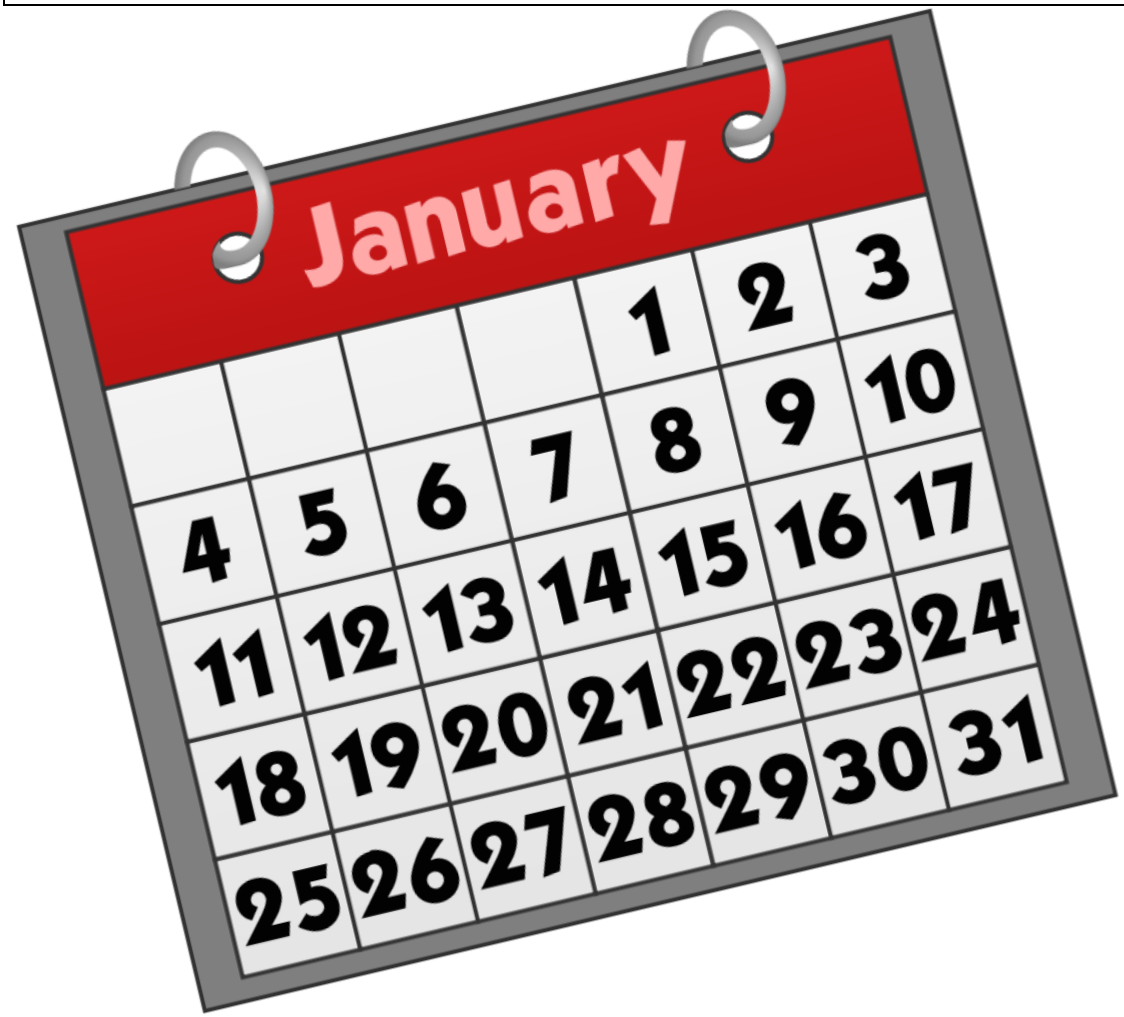
About NGSS: The next generation science standards were developed as an effort to get the whole U.S. on the same page when it comes to standards for science education. They were also developed to align science education from kindergarten through high school. Much more information is available at: http://www.nextgenscience.org/

About the NGSS engineering standards: The ETS (engineering) section of the NGSS standards define skills that are to be integrated throughout the content topics that are learned. These K-2 ETS standards are to be mastered by the end of second grade. Although these are generally integrated throughout the year, I have also chosen to address them specifically in the first quarter of the year to make sure that they are being taught.

It's okay to explore more: Feel free to explore further beyond what these lessons and the next generation science standards outline. NGSS specifically states that they do not prohibit teachers from going beyond their standards. NGSS developers view these standards as the essential standards. If time allows, teachers are encouraged to delve deeper into a concept and/or teach additional concepts.

Scope and Sequence/Overview of the Year:

Quarter 1: Scientific method, NGSS engineering standards
Quarter 2: NGSS LS (life science) standards
Quarter 3: NGSS ESS (earth and space science) and PS (physical science) 4.1 standards,
Quarter 4: NGSS PS(physical science) standards



Quarter 1: Scientific method, engineering standards

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.

READ ME: Many of my lessons use videos from youtube. The problem I've run into is that frequently these video links become inactive for one reason or another. To remedy this, I've created the following website, which will be ready by January 2015: http://ngssvids.blogspot.com/ Visit this site when you come across a link that says something like "video no longer exists". Up to date video links or alternative video links will be listed at this website. Links will be checked every few months and updated if needed. (All links will be checked and updated each quarter of the school year—around the following times—end of August, end of October, beginning of January, mid march).

Day 1:

Topic: The Scientific Method Overview

Materials:

- free scientific method poster from my store at: http://www.teacherspayteachers.com/Store/Engaging-Lessons-By-Frank
- A way to project the video found at the link below for the class to watch (For free instructions on how to save a youtube video to your computer, visit my store at: http://www.teacherspayteachers.com/Store/Engaging-Lessons-By-Frank .)

Lesson Idea: Tell the kids the following: science is learning about the world around us (plants, how something works, etc.) We need to learn to "think like a scientist" this year so we can learn to solve problems in the world around us and learn more about the world around us. Scientists do not all think the exact same way, but there is a pattern to how they think. [Explain the simplified version of the scientific method using the poster. Tell students you want them to have a reminder of how to think like a scientist along with more information about what science is and watch this video: http://www.youtube.com/watch?v=MyFi6BQfDik Finally, have students tell a partner what science is.]

NGSS: (related to and leading up to K-2 engineering standards)

CC Link: Speaking and Listening 1 Participate in collaborative conversations with diverse partners about *grade 1 topics and texts* with peers and adults in small and larger groups.

Day 2:

Topic: Asking questions

Materials:

- A way to project the video found at the link below for the class to watch (For free instructions on how to save a youtube video to your computer, visit my store at: http://www.teacherspayteachers.com/Store/Engaging-Lessons-By-Frank .)

Lesson Idea: [Remind students what you taught previously about thinking like a scientist. Also remind them what science is.] Tell the class the following: Today we are going to practice question asking because that will help us think like a scientist to discover more about the world around us. Sometimes scientists have a question that they want to discover the answer to. Other times scientists have a problem and asking questions helps them explain the problem clearly to come up with a good solution. For example, a gardener who is thinking like a

scientist might ask "Why isn't my plant growing? Is the dirt too rocky? Is the dirt too wet? Is it too dry? Does my plant look too small? Does my plant look too floppy? By asking lots of questions, the gardener will discover clues about what the problem is in order to try and fix it. [Note for teacher: Asking questions to be able to define a problem is what the NGSS standard wants students to learn to do—hence the previous sentences.] [After explaining all of that, watch this song about question asking: https://www.youtube.com/watch?v=tL0DG02d_Gw Next have students practice asking questions. Have each student think of one question for their classmates about their summer break, and then let each student tell the class their question. As time allows, call on a few kids to give their answers to the question. As students use statements, help them turn their statement into a question. As it comes up in the natural flow of your class, continue to work on asking questions throughout the coming weeks.]
NGSS: Leading up to the following: **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.
CC Link: language 1j Produce and expand complete simple and compound declarative, interrogative, imperative, and exclamatory sentences in response to prompts.

Day 3:
Topic: Practice asking questions
Materials: none
Lesson Idea: [Remind students what you taught previously about what science is, how to think like a scientist, and how to ask questions.] Tell the class the following: Today we will be practicing asking questions. [Ask a few students what color of eyes they have. Lead students in brainstorming questions about eye color (What causes different eye colors? How many eye colors are there? How many blue-eyed kids are in the class?. . .) Then, if time allows, make and discuss a graph showing how many students of each eye color you have.]
NGSS: (related to and leading up to K-2 engineering standards)
CC Link: language 1j Produce and expand complete simple and compound declarative, interrogative, imperative, and exclamatory sentences in response to prompts. **Measurement and data 4** 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.

Day 4:
Topic: Practice Asking questions
Materials: none
Lesson Idea: [Have a 5 minute exploration time outside. Have students look for living things (and explain what that means). If you want to, allow students to catch a grasshopper or bug. Have students choose one living thing they discovered outside and think of a question they have about it. (Such as "Why is the grass green?") Have a class discussion with the remaining time. Call on students to tell about their experience. Be sure to make them say the science question that they come up with. Then give the class a chance to ask each speaker questions about what he/she said.]
NGSS: (related to and leading up to K-2 engineering standards)
CC Link: language 1j Produce and expand complete simple and compound declarative, interrogative, imperative, and exclamatory sentences in response to prompts. **Speaking and Listening 3**
Ask and answer questions about what a speaker says in order to gather additional information or clarify something that is not understood.

Day 5:
Topic: Asking questions to define a problem

- This lesson is based on a problem that my first graders encounter; you may find a much more applicable problem that you can apply this topic to in your classroom.

Materials:

- A problem applicable to your class; this lesson uses a problem that is applicable to mine

Background information for this lesson to make sense: In my school, this is students' first year of having their own desks because they use tables in Kindergarten. The desks in my school are the ones where you store things inside, and to access the inside you lift up the top of the desk, which is like a lid on a hinge. For the first few months of school, students will have papers, crayons, or books on their desks and lift up the top causing everything to tumble off.
Lesson Idea: [Remind students what you taught previously about thinking like a scientist.] Tell them the following: Now you should be pretty good at asking questions, and one reason we need to ask questions is to understand a problem so we can fix it. I have noticed that there's a problem in our class that we can understand better and maybe even fix using science. [Then demonstrate the problem—which is explained more clearly above—by placing some items on a desk and

lifting it up the "lid" of the desk to see them all fall off. Guide the class in questioning further to define the problem clearly. (Note: It is okay if the students cannot really ask these questions yet, so you as the teacher are doing most of it. They don't need to be able to fully do this until the end of second grade because it is a K-2 standard.) Examples of questions might include: Why does everything fall off? Does it matter how hard you open it? Is it any better if the crayons are up and down instead of sideways? Find out the answers to these questions. Next, explain that now that we have all of this information we want to use it to name the problem so that we can tell other scientists exactly what the problem is. Come up with a simple, clear explanation of the problem that the class can agree on—such as "We cannot keep things on top of our desks because they fall off whenever we lift them up." Tell the class that today we aren't going to create anything to fix this problem; we only wanted to practice how we can learn everything about a problem and describe it for other scientists. Even though we aren't creating anything today, have them discuss in groups how they could design some tool to fix this problem. Require each group to draw a picture of what their solution would be. Give guidance to the groups as needed. Examples of student solutions include: a paper catcher that is like a ruler sticking off of the edge of the desk to catch things, a paper holder that is like a giant homemade envelope taped to the desk, a new desk that has the cubby portion of it designed differently, a special playdough that can be used to stick stuff to so it doesn't fly off. There are no wrong answers here—especially since we are not taking the time to try any of them out. This is just helping students to get on the track of solving problems like a scientist.]

NGSS: 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.

CC Link: Speaking and Listening 1 Participate in collaborative conversations with diverse partners about *grade 1 topics and texts* with peers and adults in small and larger groups.

Day 6:

Topic: Forming a hypothesis

Materials:

- A packet of Mentos candy
- A diet coke

Lesson Idea: [Remind students what you taught previously about thinking like a scientist.] Tell the class the following: Today we are going to practice the next step in thinking like a scientist. Scientists ask

good questions, and then they use all the information and clues they have to make a guess about the answer to the question. A hypothesis is what we think the answer to a science question is. In other words, it's an idea that we can test out. It's okay to be wrong. We're just using all the clues we have to predict the answer; we're just coming up with an idea we can test out. Then we find out the real answer. [Tell them that we will explore this science question today: What will happen if we drop this Mentos candy into this bottle of Diet Coke? Have students hypothesize about what will happen. Then try it. (It fizzes and can even shoot up—much like vinegar and baking soda.) Then give them some pointers on describing things clearly and have them pretend they are telling their parents about today's science lesson as they describe the experience to a partner. (By doing this in partners they will practice explaining the experience clearly as the common core standard states.)]
NGSS: (related to and leading up to K-2 engineering standards)
CC Link: Speaking and Listening 4 Describe people, places, things, and events with relevant details, expressing ideas and feelings clearly

Day 7:
Topic: Forming a hypothesis
Materials:

- A way to project the videos found at the links below for the class to watch (For free instructions on how to save a youtube video to your computer, visit my store at: http://www.teacherspayteachers.com/Store/Engaging-Lessons-By-Frank .)

Lesson Idea:[Remind students what you taught previously about thinking like a scientist. Tell them that today we are going to practice making a hypothesis. Review the term hypothesis by watching the 30 second video clip found at this link: http://www.youtube.com/watch?v=r0CGhy6cNJE (Most of them will have seen this show—*Dinosaur Train*—before, so this clip will help them make a meaningful connection that they can remember.) Next play about ten seconds of the video found at this link: http://www.youtube.com/watch?v=Xckhg7Ns8so Pause it and have each student make a hypothesis about what will happen when she tries to walk on the eggs. If time permits, repeat the same process with the following video http://www.youtube.com/watch?v=MzsORE0ae10 by having students hypothesize about whether each type of pop will sink or float. Next, model writing a narrative. Tell students you are going to write about our experience today. Make it clear to them that they will have to do this exact same type of writing all by themselves by the end

of the year. In the writing, be sure to use words like "first…next…then…" as the standard requires.]
NGSS: (related to and leading up to K-2 engineering standards)
CC Link: Writing 3 Write narratives in which they recount two or more appropriately sequenced events, include some details regarding what happened, use temporal words to signal event order, and provide some sense of closure.

Day 8:
Topic: Forming a hypothesis
Materials:

- A picture of stilts (see below) and a way to project the picture for your class to see

Lesson Idea:[Remind students what you taught previously about thinking like a scientist. Tell them that today we are going to practice making a hypothesis again. Remind them what the word hypothesis means.] Tell the class the following: Today our hypothesis will be about how an object's shape helps it solve a problem. [Next, tell students about Gascony, France. Several hundred years ago the sheep kept getting scattered because the shepherds could not keep them gathered up very well since they were in a marshy and bushy area and therefore could not travel easily or see easily. Have students design solutions (hypotheses about what will work) to solve this problem. Be sure to help them explain their solutions using complete sentences. Then explain the real solution, which was stilts. As a class, look pictures of stilts. (For example, do an internet search on "stilts Gascony France" ahead of time and choose a picture to display.) On the board, draw a simple sketch of a stilt. Tell the students to draw this same sketch with partners and hypothesize about why the people who invented the stilts chose to make it this shape. Be sure to help students figure out how the shape of the object helps it solve the problem as the standard specifies. If you have time, you can even create student stilts out of buckets and string by following these directions:
http://frugalliving.about.com/od/frugalfun/ht/Can_Stilts.htm]
NGSS: 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.
CC Link: Speaking and Listening 6 Produce complete sentences when appropriate to task and situation

Day 9:
Topic: Discovery
Materials:

- Thinking like a scientist poster, which can be downloaded for free from my store at: http://www.teacherspayteachers.com/Store/Engaging-Lessons-By-Frank
- A way to project the video found at the link below for the class to watch (For free instructions on how to save a youtube video to your computer, visit my store at: http://www.teacherspayteachers.com/Store/Engaging-Lessons-By-Frank .)

Lesson Idea: [Remind students what you taught previously about thinking like a scientist. Using the poster, review each step they've learned so far.] Explain the following: Today we are going to practice the next step. On the poster it is called "experiment" but for today we are going to call it "discovery". Explain that after scientists have a science question, they make a hypothesis. After making a hypothesis, they find a way to discover the answer to their science question. There are many ways that they can discover the answer, which we will learn about today. [Ask students these science questions: How is a pencil made? What is it made of? First have students hypothesize about the answer. Then guide them in brainstorming about how we can discover the answer. (We can research to find the answer on the internet. We can experiment; break a pencil apart and see what the inside looks like. We can observe at a pencil factory.) If time permits, break a pencil apart to see what you can observe about the inside and how the pencil is put together. Be sure students understand that this is for today for science only; they are not to go around breaking pencils all the time. Then discover the answer to how pencils are made by watching this video: http://www.youtube.com/watch?v=W2XthN8traQ Finally, model how to use today's research to write a three or four sentence paragraph about how a pencil is made. Tell the class that they need to be able to do this all by themselves by the end of the year. Wrap up the lesson by reviewing how to think like a scientist: First, we have a science question. Next we hypothesize. Then we discover the answer through researching, observing, or experimenting.]

NGSS: (related to and leading up to K-2 engineering standards)

CC Link: Writing 7 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).

Day 10:

Topic: Experimenting and designing solutions Part 1 of 3 (Introduce "problem" and design solution); The following video will clarify the lesson's "problem" for you, but do not show this video to students

because it will prevent them from using their own thinking skills: http://www.physics.org/interact/physics-to-go/balloon-kebabs/

Materials:

- A balloon blown up
- A wooden skewer

Lesson Idea: [Remind students what you taught previously about thinking like a scientist.] Tell them the following: Today we are going to work more on step three: experimenting and discovering the answer to our science questions. I want to create a magic trick. [Hold up the balloon and skewer and explain that you want to be able to push the skewer all the way through the balloon without popping it.] I think that science can help make this magic trick possible. [First, have students hypothesize about how this might be possible. Next, help them design ideas about ways we might be able to make this work. (Questions for prompting could include: Will it matter where on the balloon we stick the skewer? Would it help to make the skewer more slippery? Does the type of balloon or brand of skewer matter? Finally, draw a student's name and have him/her be your helper. Explain to the class what opinion means. Tell them that by the end of the year, they need to be able to do opinion writing all by themselves, but today you will show them how to do it. Have the helper that you drew out tell you his/her opinion about whether or not this will work and one reason that they believe this. Use that to write the opinion piece on the board in the format that the standard suggests.]

NGSS: (related to and leading up to K-2 engineering standards)

CC Link: Writing 1 Write opinion pieces in which they introduce the topic or name the book they are writing about, state an opinion, supply a reason for the opinion, and provide some sense of closure.

<u>Day 11:</u>

Topic: Experimenting and designing solutions part 2 of 3 (Trying it out)

Materials:

- Balloons (they'll need blown up during the lesson or prior to the lesson)
- Skewers
- Possibly vegetable oil (depending on the brands of skewers and balloons, this may be needed to help the skewer slide through the balloon without catching)

Lesson Idea: [Tell students that we are continuing yesterday's lesson about discovering the answer to science questions like real scientists do. Remind them that we started planning about how we can make this

magic trick work.] Tell them the following: Today it's time to actually give it a try and see what we can do. [First, take a balloon and skewer and try to poke it straight through the side of the balloon, intentionally popping it.] That didn't work, so scientists, use their brains to hypothesize about what else they can try and experiment again until they discover a solution. [Call on a student to give you an idea (their plan from yesterday) and try it again using his/her method. Repeat this over and over and ask guiding question to the class until you are actually able to poke the skewer through the balloon without popping the balloon. (You must poke the skewer through the thick parts of the balloon—right next to the knot and at the very top. It can also help to dip the skewer in vegetable oil so it slides through easily.) Then, as a whole class, write instructions about how to poke a skewer through a balloon.]
NGSS: (related to and leading up to K-2 engineering standards)
CC Link: Writing 7 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).

Day 12:
Topic: Experimenting and designing solutions part 3 of 3 (Importance of the shape—see NGSS standard)
Materials:

- Drawing materials

Lesson Idea: [Tell students that we are continuing with the balloon/skewer lesson. Remind them all that has happened so far—particularly that we've asked a question, hypothesized, designed a solution, and experimented. Explain that in a way the skewer was the tool we used to make this magic trick possible. Then explain that you want them to tell you how the shape of the skewer helped it go through the balloon without popping it to perform our magic trick. (For example, guide them into realizing that the skewer worked well because it is long and also pointy on one end.) Have each student or group of students present to the class—or have each student present to their group—about how the shape of the skewer was important. Have them use a drawing to clarify their thoughts as they present.]
NGSS: 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
CC Link: Speaking and Listening 5 Add drawings or other visual displays to descriptions when appropriate to clarify ideas, thoughts, and feelings.

Day 13:
Topic: Forming conclusions
Materials:

- water
- cup
- vegetable oil

Lesson Idea: [Remind students what you taught previously about thinking like a scientist. Review briefly question asking, hypothesizing, and discover—through research and observation and experimentation.] Tell them the following: Today we are learning the next part of thinking like a scientist: forming conclusions. A conclusion is what you figured out by thinking like a scientist. Today we will do an experiment. At the end we will form a conclusion—figure out what we can learn from the experiment! [Ask this science question: what will happen if I pour vegetable oil and water together? Have them hypothesize about the answer. Pour oil on top of a cup of water. The oil should more or less float on the water. Then guide students to conclude that oil floats on water. Model how to write a conclusion, using the word "because" to signal a simple relationship as the standard suggests. For example: The oil didn't mix because oil floats on water.]
NGSS: (related to and leading up to K-2 engineering standards)
CC Link: Language 6 Use words and phrases acquired through conversations, reading and being read to, and responding to texts, including using frequently occurring conjunctions to signal simple relationships (e.g., *because*).

Day 14:
Topic: Forming conclusions
Materials:

- A way to project the videos found at the links below for the class to watch (For free instructions on how to save a youtube video to your computer, visit my store at: http://www.teacherspayteachers.com/Store/Engaging-Lessons-By-Frank .)

Lesson Idea: [Remind students what it means to form conlcusions (a conclusion is what we figured out by thinking like a scientist). Then remind them everything you taught previously about thinking like a scientist by watching the scientific method video found at this link

http://www.youtube.com/watch?v=wlb7tLJy5AI Prior to watching the video, explain that "scientific method" is another name for "thinking like a scientist". Then ask this science question: does the position of a horses' ear (whether they point them forward or backward) show how friendly they are? Have students hypothesize. Then explain that we are going to watch a video about kid scientists who go study horses—particularly the way they hold their ears. Remind students to watch for the kids' conclusion in the video because you will be asking your class for their conclusion at the end of the video. Remind them once again what the word conclusion means and then watch the following video: http://www.youtube.com/watch?v=YOdW4mgK5UA&list=PLzw2TXO3hoK2cS2BJIRpw8b-WeDiuA0Wm At the end, see if they determined the conclusion that the kids in the video came to.]
NGSS: (related to and leading up to K-2 engineering standards)
CC Link: Speaking and Listening 2 Ask and answer questions about key details in a text read aloud or information presented orally or through other media.

Day 15:
Topic: Forming conclusions
Materials:

- scratch paper

Lesson Idea: [Remind students everything taught previously about thinking like a scientist. Tell them that today we are going to continue to practice forming conclusions. Explain what a Chinese fan is and pose this question: what is the best way to fold a Chinese fan to get the most air when you fan yourself? Have students hypothesize. Then put them in groups and have them create and test homemade Chinese fans using scratch paper. Help them test various designs and come to a conclusion about the best way to fold a Chinese fan. Then have each group share their conclusion with the class.]
NGSS: (related to and leading up to K-2 engineering standards)
CC Link: Speaking and Listening 1 Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups.

Day 16:
Topic: Forming conclusions
Materials:

- A tablecloth or butcher paper
- plastic dishes

- thinking like a scientist poster (available free from my store at: http://www.teacherspayteachers.com/Store/Engaging-Lessons-By-Frank)

Lesson Idea: [Using the poster, review all the steps of thinking like a scientist, and remind the class what each step means. Tell the class that we will continue to practice making conclusions. Set a small table with a tablecloth or butcher paper beneath some plastic dishes. Tell the class today's science question: what will happen if I pull the tablecloth out from under the dishes? Have them each make a hypothesis. Then experiment and try it out. (If you pull straight down and quickly on the tablecloth, the dishes should remain on the table while the tablecloth is moved from underneath them.) Have a student pull the tablecloth out from under the dishes, even if he/she messes up and pulls the dishes off, too. Have students continue to experiment, and help guide them to the conclusion that the dishes will only stay on if you pull down and fast. Then have each student state his/her conclusion in a complete sentence.]

NGSS: (related to and leading up to K-2 engineering standards)

CC Link: Speaking and Listening 6 Produce complete sentences when appropriate to task and situation.

<u>Day 17:</u>

Topic: Forming conclusions: comparing strengths and weaknesses

Materials:

- marble
- makeshift ramp
- masking tape
- clear tape

Lesson Idea: Pose this question to the class: Is masking tape or clear tape more sticky? [Have the students hypothesize about the answer. Then discover the answer as a class. One way to do this is to roll a marble down a little ramp and onto the tape to see which tape makes the marble stop soonest. Next, record and analyze the data as a class, including discusses the strengths and weaknesses of each type of tape. (For example, use unifix cubes to measure the distance. Talk about when it might be good to use stickier tape and when it might be more of a pain to use stickier tape. If one roll of tape was wider than the other, you could also discuss the pros and cons of that.) Then help students write a simple conclusion sentence.

NGSS: 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.
CC Link: Writing 8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.

Day 18:
Topic: Forming conclusions: comparing strengths and weaknesses
Materials:

- A way to project the video found at the link below for the class to watch (For free instructions on how to save a youtube video to your computer, visit my store at: http://www.teacherspayteachers.com/Store/Engaging-Lessons-By-Frank .)

Lesson Idea: [Review all the steps of thinking like a scientist, and remind the class what each step means. Tell them that today we will be working even more on forming conclusions. Watch the *video at this link: http://www.youtube.com/watch?v=FV4HEDvPXls Pause the video at about 5:53 (when they are showing the graph). Split students into groups and have them discuss which of the methods would be the best way to play volleyball (or whether they are all the same). Help them to analyze the graph and compare strengths and weaknesses as the standard suggests. Then finish the video and see how their conclusions line up with the conclusions of the girls in the video.]

*There are many other great videos for this concept of analyzing data and comparing strengths and weaknesses. If you think that a volleyball video would not be engaging to your students, many similar videos with different topics can easily be found by going to youtube.com and searching "dragonfly tv science".

NGSS: 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.
CC Link: Speaking and Listening 1 Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups.

Quarter 2: Life science standards

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.* [Clarification Statement: 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 tails and roots on plants; keeping out intruders by mimicking thorns on branches and animal quills; and, detecting intruders by mimicking eyes and ears.]

1-LS1-2. Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive. [Clarification Statement: Examples of patterns of behaviors could include the signals that offspring make (such as crying, cheeping, and other vocalizations) and the responses of the parents (such as feeding, comforting, and protecting the offspring).]

1-LS3-1. Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents. [Clarification Statement: Examples of patterns could include features plants or animals share. Examples of observations could include leaves from the same kind of plant are the same shape but can differ in size; and, a particular breed of dog looks like its parents but is not exactly the same.] [*Assessment Boundary: Assessment does not include inheritance or animals that undergo metamorphosis or hybrids.*]

<u>Day 1:</u>

Topic: Anticipatory Set: fascinating animal features

Materials:

- A way to project the website described below for the class to see
- A way to project the video found at the link below for the class to watch (For free instructions on how to save a youtube video to your computer, visit my store at: http://www.teacherspayteachers.com/Store/Engaging-Lessons-By-Frank .)

Lesson Idea: [Remind students what you taught previously about thinking like a scientist. Then remind them that word science means "learning about the world around us".] Tell them the following: we will

be thinking like a scientist all year as we learn more about the world around us. Today we are going to learn interesting facts about animals. [Start off by watching this video showing fun pictures of animals: http://www.youtube.com/watch?v=qus5mtddAOY Next, learn about more animals from the national geographic kids website by following these directions: before the class arrives, do the following internet search "national geographic creature features". (The first link will probably be the right one.) Call on a student to choose an animal. Spend a few minutes looking at the pictures, videos, sounds, and facts about that animal. Then call on a student to choose a new animal. Repeat as time allows. Point out the fascinating facts about these animals and try to get students excited about thinking like a scientist while learning about animals in the coming lessons. Then have students tell a partner at least one fact they learned using a complete sentence.]
NGSS: Leading up to the following: 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.* [Clarification Statement: 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 tails and roots on plants; keeping out intruders by mimicking thorns on branches and animal quills; and, detecting intruders by mimicking eyes and ears.]
CC Link: Speaking and Listening 6 Produce complete sentences when appropriate to task and situation.

Day 2:
Topic: Hypothesizing about how animals' features meet their needs
Materials:

- A way to project the videos found at the links below for the class to watch (For free instructions on how to save a youtube video to your computer, visit my store at: http://www.teacherspayteachers.com/Store/Engaging-Lessons-By-Frank .)

Lesson Idea: [Remind students that we are learning about animals. Then remind them what you taught previously about thinking like a scientist. Tell them that today we are going to practice making a hypothesis about why animals look the way they do. Start out by giving them a few examples: Why do polar bears have thick fur?...to keep them warm. Why are giraffes so tall?...to eat the leaves that are high up in the

trees. Watch these videos:
http://www.youtube.com/watch?v=_uFGJ0LiOF8
http://www.youtube.com/watch?v=dBYBbWx3ZR8 Explain that as we watch, we are going to ask questions and hypothesize about why animals look the way they do. I recommend letting the class watch the video once just for fun. Then the second time, pause it every five or ten seconds and have the class ask questions such as the following: Why does _____ have a long neck? Why does _____ have sharp teeth? Why does _____ have thick fur? After each question, have students hypothesize about the answer to the question (I think…). It doesn't matter whether their hypotheses are right or wrong, they should just use all the clues they have to guess at the answer to a particular animal question. Be sure that students realize when they are making statements and when they are asking questions to help them meet the common core standard.]
NGSS: Leading up to the following: 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.* [Clarification Statement: 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 tails and roots on plants; keeping out intruders by mimicking thorns on branches and animal quills; and, detecting intruders by mimicking eyes and ears.]
CC Link: language 1j Produce and expand complete simple and compound declarative, interrogative, imperative, and exclamatory sentences in response to prompts.

Day 3:
Topic: how animals' features meet their needs
Materials:

- A way to project the videos found at the linsk below for the class to watch (For free instructions on how to save a youtube video to your computer, visit my store at: http://www.teacherspayteachers.com/Store/Engaging-Lessons-By-Frank .)

Lesson Idea: [Remind students what you have you covered so far about animals as well as thinking like a scientist.] Explain the following: Last time we hypothesized about why animals look the way they do. Today we are going to find out the real reasons why some of them look the way they do. We will start by watching a video explaining how animals in the arctic—where it is super cold—stay warm. [Watch this video:

http://www.youtube.com/watch?v=uD-jsDXTtE8 Tell the class that we will now watch a video clip about how animals find food. Tell them to watch closely because at the end they will have to list things that were the same, and things that were different in the two videos. Next watch this video: http://www.youtube.com/watch?v=ciu9xFTvELQ Afterward, discuss a few of the features mentioned in the videos and how they help that animal meet their needs. Lastly, compare things that are the same in the two videos and things that are different.]
NGSS: Leading up to the following: 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.* [Clarification Statement: 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 tails and roots on plants; keeping out intruders by mimicking thorns on branches and animal quills; and, detecting intruders by mimicking eyes and ears.]
CC Link: Reading Informational Text 9: Identify basic similarities in and differences between two texts on the same topic (e.g., in illustrations, descriptions, or procedures).

Day 4:
Topic: how animals' features meet their needs
Materials:

- A way to project the video found at the link below for the class to watch (For free instructions on how to save a youtube video to your computer, visit my store at: http://www.teacherspayteachers.com/Store/Engaging-Lessons-By-Frank .)
- A little bit more time than many of the other lessons

Lesson Idea: [Remind students what you have you covered so far about animals as well as thinking like a scientist.] Explain the following: Last time we learned about why some animals look the way they do. Today we are going to learn even more about why some animals and plants look the way they do. [Watch the following 25 minute Magic School Bus video: https://www.youtube.com/watch?v=LeA58Rl2pnU Afterward, discuss how the animals and plants in the desert are able to survive in the desert. Lastly, list ten animals and see if students can decide which ones are "desert animals" and which ones are "other animals" to practice sorting words as the common core standard suggests.]
NGSS: Leading up to the following: 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.* [Clarification Statement: 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 tails and roots on plants; keeping out intruders by mimicking thorns on branches and animal quills; and, detecting intruders by mimicking eyes and ears.]
CC Link: Language 5a Sort words into categories (e.g., colors, clothing) to gain a sense of the concepts the categories represent.

Day 5:
Topic: How we apply animals' features to solve our problems
Materials:

- A way to display pictures from found at the internet links below

Lesson Idea: [Remind students what you taught previously about how the animals' features meet their needs. Explain that today we will learn about how people can apply what animals do to help us. Show the following picture: http://upload.wikimedia.org/wikipedia/commons/2/20/Ursus_maritimus_us_fish.jpg Ask how polar bears stay warm. Next ask students how Native Americans stayed warm hundreds of years ago. Then show students the following buffalo robe picture that demonstrates how they stayed warm by applying the principle of animals having fur coats to stay warm: http://www.primitiveways.com/images/buffalo_oldman.jpg Next show the following picture and ask the class how turtles keep from being trampled to pieces: http://www.nature-watch.com/images/products/large/808d.jpg Guide the class to understand that the turtles' shells protect them. Connect that to bicyclists wearing helmets to protect them as this pictures shows: https://www.mindware.com/blog/wp-content/uploads/2011/05/bike-helmet-child.jpg Next show the class a picture of rose thorns: http://1.bp.blogspot.com/-fSS5Itm_o-A/T-wD8l6G_vI/AAAAAAAABx8/uFzMu4-1jmY/s1600/rose_thorn.JPG Explain that roses keep from being trampled on or eaten because of their thorns. Next explain how humans applied this principle to barbwire fences to keep animals out of the wrong fields, and look at this picture: http://www.moyne.vic.gov.au/page/Images/IGFenceBarbwire.jpg Guide students to the following conclusion: animals and plants have their features to help them survive; as humans, we think like scientists to use the ways that animals survive as ideas to solve our problems. Then explain that we are going to write this down so that someone else

can figure this out without having to look at all the pictures that we did. Explain how we write in paragraphs that make sense with a clear beginning and end. Also explain that by the end of first grade they each need to be able to write a paragraph. Today you will show them how to write a simpe paragraph. Using the outline in the common core standard, model how to write about humans applying animals' features to solve problems].
NGSS: 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.* [Clarification Statement: 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 tails and roots on plants; keeping out intruders by mimicking thorns on branches and animal quills; and, detecting intruders by mimicking eyes and ears.]
CC Link: Writing 2 Write informative/explanatory texts in which they name a topic, supply some facts about the topic, and provide some sense of closure.

Day 6:
Topic: Design a solution to a problem based on animals' features
Materials:

- A way to project the video found at the link below for the class to watch (For free instructions on how to save a youtube video to your computer, visit my store at: http://www.teacherspayteachers.com/Store/Engaging-Lessons-By-Frank .)
- Straws
- Apple juice (or another classroom-friendly drink)
- paper cups

Lesson Idea: [Remind students what you taught previously about how animals' features help them survive, as well as how we apply their features in helping us survive. Tell them that today they will practice doing this.] Tell the class the following: First we will learn about how hummingbirds drink. In the wild, hummingbirds drink the nectar, which a sweet juice, from inside the flowers. To do this, they have to have a way to reach down to the inside of the flower. [Watch all or part of the following video to see how they do it. Then watch all or part of the second and third videos to see how they drink from a hummingbird feeder. http://www.youtube.com/watch?v=uJzOj89RMOU
http://www.youtube.com/watch?v=glFCBp5bcCI
http://www.youtube.com/watch?v=J8lh2xT8SN0

Next explain to the class that you have a problem. You want them to have a taste of punch, but today there is a special rule. Their lips have to stay at least one fist length away from the edge of the cup. How are we going to get a drink? Guide them to the conclusion that we can apply the features of a hummingbird to ourselves by using a straw. Then pass out the juice and let everbody have a little bit of it. Then have students pretend that a partner is his or her parent. Have them explain what we did for science today clearly to their pretend parent. Only give them about 10 seconds to explain. (I've found that this forces them to use only relevant details as the common core standard suggests.)]
NGSS: 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.* [Clarification Statement: 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 tails and roots on plants; keeping out intruders by mimicking thorns on branches and animal quills; and, detecting intruders by mimicking eyes and ears.]
CC Link: Speaking and Listening 4 Describe people, places, things, and events with relevant details, expressing ideas and feelings clearly

Day 7:
Topic: Design a solution to a problem based on animals' features
Materials:

- A way to project the pictures found at the links below
- Drawing paper

Lesson Idea: [Remind students what you taught previously about how animals' features help them survive, as well as how we apply their features in helping us survive. Tell them that today they will practice doing this.] Explain the following: First we will learn about animals that fish. Then we will design our own fishing poles. [Look at all or part of the following pictures of animals catching fish:

1. http://i1.ytimg.com/vi/mqGKX7Eofy4/hqdefault.jpg
2. http://1.bp.blogspot.com/_X1IWXuEbgXI/S9PFjTAz8XI/AAAAAAAACdM/RscQj41GwfY/s640/eagle+catching+a+fish.jpg
3. http://www.worldofstock.com/slides/NAN6537.jpg
4. http://3.bp.blogspot.com/-PChLUa5EWgc/UXZPsm2-NFI/AAAAAAAAAS0/zG0Ui3--TPI/s640/eagle.jpg
5. http://www.imgion.com/images/01/bear-catching-fish-from-waterfall.jpg
6. http://www.corbisimages.com/content/collections_portfolio/images/terra/working-wild/hero-2.jpg

7. http://i.dailymail.co.uk/i/pix/2009/10/29/article-0-07013793000005DC-924_634x528.jpg
8. http://2.bp.blogspot.com/_kIWY2DV0KnE/R4GOZbS935I/AAAAAAAAAC4/9bo2yMh0_zE/s400/Wolf+fishing+2.jpg
9. http://www.skinnymoose.com/bbb/files/2008/03/wolf6.jpg
10. http://www.funiacs.com/poze/mare/la_pescuit_1226955416.jpg
11. http://cache.desktopnexus.com/thumbnails/281535-bigthumbnail.jpg
12. http://farm4.staticflickr.com/3398/3344516852_8d797b650f_o.jpg

Next, discuss some of the things that students saw in common among the various animals that catch fish (sharp body parts—claws/teeth—is the one that comes to my mind).] Now we will pretend you are the first person to ever invent a way to fish. Use what you know about animals that catch fish to design your very own way to catch fish. Draw a picture of this fishing invention so that you can explain it to a neighbor. [At the end of the class, explain how Native Americans used to catch fish by applying what animals that catch fish do (being in the water with a sharp object ready to jab the fish). To help you explain, show the following picture: http://media.web.britannica.com/eb-media/51/108351-004-31225AC9.jpg]

NGSS: 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.* [Clarification Statement: 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 tails and roots on plants; keeping out intruders by mimicking thorns on branches and animal quills; and, detecting intruders by mimicking eyes and ears.]

CC Link: Speaking and Listening 5 Add drawings or other visual displays to descriptions when appropriate to clarify ideas, thoughts, and feelings.

Day 8:

Topic: Anticipatory set: Baby animal pictures and text

Materials:

- A way to project the videos found at the links below for the class to watch (For free instructions on how to save a youtube video to your computer, visit my store at: http://www.teacherspayteachers.com/Store/Engaging-Lessons-By-Frank .)

Lesson Idea: Tell the class the following: Now we've learned about how animals look the way they do to help them survive. We have even learned how to apply the ways that they survive as tools to help us. Next, we are going to see how baby animals survive in the coming lessons. We will look at how parents and babies behave to see if we can figure out what happens between parent animals and baby animals to help the babies survive. First, we are going to look at some pictures of baby animals. [Watch the following video: http://www.youtube.com/watch?v=u7RUz5MiqGs] Baby animals are really cool to look at and very cute! Now we will "read" a baby animals book by watching a video of someone reading a baby animals book [Watch the following video: http://www.youtube.com/watch?v=NTvnLB2IOSE . . .Obviously you could read a real book instead if you have a book about baby animals.] Now we will ask and answer questions that you have about baby animals. [Rewind the video and use the text from the video to answer their questions as much as possible. When that is not possible, answer their questions from your own knowledge or tell them that you don't know the answer, so we will have to research it later and find out.]
NGSS: This lesson is leading up to the following standard: **1-LS1-2.**Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive. [Clarification Statement: Examples of patterns of behaviors could include the signals that offspring make (such as crying, cheeping, and other vocalizations) and the responses of the parents (such as feeding, comforting, and protecting the offspring).]
CC Link: Reading Informational Text 1: Ask and answer questions about key details in a text.

Day 9:
Topic: Hypothesize about what baby and mommy robins do to help the babies survive
Materials:

- A way to project the video and picture found at the links below for the class to see (For free instructions on how to save a youtube video to your computer, visit my store at: http://www.teacherspayteachers.com/Store/Engaging-Lessons-By-Frank .)

Lesson Idea: Tell the class the following: Remember that we are learning how to think like a scientist in first grade. Today we will be practicing making a hypothesis. Remember that a hypothesis is our best guess at the answer to a science question. It is an idea that we can test out. Also, remember that we are going to see how baby animals survive in the coming lessons. We will look at how parents and babies behave

to see if we can figure out what happens between parent animals and baby animals to help the babies survive. First today we are going to look at a picture [Look at the following picture: http://kathyskritters.com/tales/robins/images/baby_robins_5-17.jpg] This bird is called a robin. These are baby robins. How do you think these baby robins get food? Turn to your neighbor and tell them your hypothesis. . .Now that we have made hypotheses, we are going to observe some baby robins to find out. [Watch all or part of the following video: http://www.youtube.com/watch?v=-bt11Kl7Mtg Then lead the students to understand that baby robins make cheeping noises to tell the mommy robin that they need food. Then the mommy robin gets food for them. Then watch the following video: http://www.youtube.com/watch?v=0y_9dKpK2Os Be sure to explain that the mommy robin is protecting the baby robins from the man.] If time allows, have students write an answer to this question: how do mommy robins help baby robins?

NGSS: 1-LS1-2. Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive. [Clarification Statement: Examples of patterns of behaviors could include the signals that offspring make (such as crying, cheeping, and other vocalizations) and the responses of the parents (such as feeding, comforting, and protecting the offspring).]

CC Link: Writing 8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.

Day 10:

Topic: Hypothesize about what grown up elephants do to help baby elephants survive

Materials:

- A way to project the videos found at the links below for the class to watch (For free instructions on how to save a youtube video to your computer, visit my store at: http://www.teacherspayteachers.com/Store/Engaging-Lessons-By-Frank .)

Lesson Idea: Tell the class the following: Remember that we are learning how to think like a scientist in first grade. Today we will be practicing making a hypothesis again. Remember that a hypothesis is our best guess at the answer to a science question. It is an idea that we can test out. Also, remember that to make a hypothesis we use all the clues that we already know about something in making our guess. Turn to your neighbor and tell them your hypothesis for this question: how do grown up elephants help babies survive? Remember to use what we

learned in our last science lesson as a clue. . .Now that we have made hypotheses, we are going to observe some elephants to find out. [Watch all or part of the following videos:
http://www.youtube.com/watch?v=7v2hZAq0lbQ and
http://www.youtube.com/watch?v=qKE3592u5ps and
http://www.youtube.com/watch?v=eVhGXZQx-t8 Then lead the students to understand that grown up elephants help baby elephants by doing the following (and possibly more): comforting, protecting, feeding. . .Also be sure to point out that the baby cried for help from its parents just like the baby robin did. Lastly, create a sentence as a class and have the students copy it. Then expand the class sentence as suggested in the common core standard. (Rather than Mommy elephants help babies, try "Mommy elephants help babies by comforting and protecting.)]

NGSS: 1-LS1-2. Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive. [Clarification Statement: Examples of patterns of behaviors could include the signals that offspring make (such as crying, cheeping, and other vocalizations) and the responses of the parents (such as feeding, comforting, and protecting the offspring).]

CC Link: language 1j Produce and expand complete simple and compound declarative, interrogative, imperative, and exclamatory sentences in response to prompts.

Day 11:

Topic: Class conclusion about general parent/baby patterns of behavior

Materials:

- A way to project the video found at the link below for the class to watch (For free instructions on how to save a youtube video to your computer, visit my store at: http://www.teacherspayteachers.com/Store/Engaging-Lessons-By-Frank .)
- Thinking Like a Scientist poster, which can be downloaded free from my store at: http://www.teacherspayteachers.com/Store/Engaging-Lessons-By-Frank

Lesson Idea: Tell the class the following: Now we have learned about how mommy robins help their babies, and we have learned about how mommy elephants help their babies. Today we will put together what we learned to form a conclusion. [Review how to think like a scientist using the poster. Focus particularly on the word "conclusion".] What did baby elephants do that was the same as the baby robins? What did the grown up elephants do that was the same as the grown up robins?

[Read a book about mommies by watching the following video: http://www.youtube.com/watch?v=LC1aSpmmL-U]. Then help students form a conclusion about baby and parent patterns as stated in the NGSS standard. Afterward, help them describe the connection between the different animals in the text as the common core standard states.
NGSS: 1-LS1-2. Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive. [Clarification Statement: Examples of patterns of behaviors could include the signals that offspring make (such as crying, cheeping, and other vocalizations) and the responses of the parents (such as feeding, comforting, and protecting the offspring).]
CC Link: Reading Information Text 3 Describe the connection between two individuals, events, ideas, or pieces of information in a text.

Day 12:
Topic: Anticipatory set: Parent and baby animals media comparison
Materials:

- A way to project the videos found at the links below for the class to watch (For free instructions on how to save a youtube video to your computer, visit my store at: http://www.teacherspayteachers.com/Store/Engaging-Lessons-By-Frank .)

Lesson Idea: [Remind the class of all that has been learned so far about animals.] Then say the following: For the coming lessons we are going to practice comparing baby animals to their parents. Lets watch this video to start out: [Watch the following videos: http://www.youtube.com/watch?v=uQcsfc3H1T4 and http://www.youtube.com/watch?v=UvwiBFV3Xqo Then choose a favorite picture from the videos you saw and model for the class how to write an opinion piece using the pattern in the common core standard.]
NGSS: 1-LS3-1. Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents. [Clarification Statement: Examples of patterns could include features plants or animals share. Examples of observations could include leaves from the same kind of plant are the same shape but can differ in size; and, a particular breed of dog looks like its parents but is not exactly the same.] [*Assessment Boundary: Assessment does not include inheritance or animals that undergo metamorphosis or hybrids.*]
CC Link: Writing 1 Write opinion pieces in which they introduce the topic or name the book they are writing about, state an opinion, supply a reason for the opinion, and provide some sense of closure.

Day 13:

Topic: Learn about the Venn diagram

Materials:

- 2 hula hoops
- Index cards, strips of paper, or post it notes with the name of a student on each one
- blank index cards, strips of paper, or post it notes

Lesson Idea: [Remind students that last time we watched the videos of baby animal pictures. Then remind them that we are learning to think like scientists this year] Tell the class the following: Today we are going to learn about a tool that will help us think like scientists to compare things. This will help us when we try to compare baby animals and their parents. [Lay out the two hula hoops with the middles overlapping. Explain that in a Venn diagram, one hoop tells us about one thing, one hoop tells us about another thing, and where they overlap in the middle tells us things that both have. Practice using the Venn diagram with student traits. First do a boys compared to girls diagram; put all the girls in one hoop and all the boys in another. Next choose two students and do a _____ vs. _____ diagram. Have one student stand above one hoop and another student stand above the other hoop. Start listing their likes on slips of paper. If it's something they both like, put it in the middle. If it's something only one of them like, put it on his/her side. Lastly, use the Venn diagram to compare two characters from a story that you have read as a class recently.]

NGSS: Leading up to the following: 1-LS3-1. Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents. [Clarification Statement: Examples of patterns could include features plants or animals share. Examples of observations could include leaves from the same kind of plant are the same shape but can differ in size; and, a particular breed of dog looks like its parents but is not exactly the same.] [*Assessment Boundary: Assessment does not include inheritance or animals that undergo metamorphosis or hybrids.*]

CC Link: Reading Literature 9 Compare and contrast the adventures and experiences of characters in stories.

Day 14:

Topic: Use Venn diagram with parents vs. students

Materials:

- Enough Venn diagrams for the entire class. (You can print them from the following website:

http://www.studenthandouts.com/Assortment-01/Graphic-Organizers/Blank-Venn-Diagrams-Instructions.html)

Lesson Idea: [Remind students that recently we watched the videos of baby animal pictures. Then remind them that we learned about the Venn diagram tool to help us as we compare animals.] Tell the class the following: Today we are going to practice using our new tool to compare you to your parents. First we are going to review how to use the Venn diagram. [Using the hula hoops and strips of paper, review the Venn diagram by comparing characters from two stories that you have read as a class recently. Next explain to the class that we can actually use two circles instead of two hula hoops. Then guide them in creating a Venn diagram about them vs. a parent. Make sure they include physical features and size since those are some of the main points that will be included when they do this with animals.]

NGSS: 1-LS3-1. Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents. [Clarification Statement: Examples of patterns could include features plants or animals share. Examples of observations could include leaves from the same kind of plant are the same shape but can differ in size; and, a particular breed of dog looks like its parents but is not exactly the same.] [*Assessment Boundary: Assessment does not include inheritance or animals that undergo metamorphosis or hybrids.*]

CC Link: Reading Literature 9 Compare and contrast the adventures and experiences of characters in stories.

Day 15:

Topic: Use Venn diagram with parents vs. baby animals

Materials:

- A way to project the video found at the link below for the class to watch (For free instructions on how to save a youtube video to your computer, visit my store at: http://www.teacherspayteachers.com/Store/Engaging-Lessons-By-Frank .)

Lesson Idea: [Remind students that recently we watched the videos of baby animal pictures. Then remind them that we learned about the Venn diagram tool to help us as we compare animals.] Tell the class the following: Today we are going to practice using our new tool to compare a baby panda to its mommy. [Explain that since we can't go to the zoo, we will watch some videos and pretend we're at the zoo. Watch the following videos: http://www.youtube.com/watch?v=vhr-SRgYxuw and http://www.youtube.com/watch?v=bGizjaMieyE Then create a Venn diagram as a class to compare the adult panda to the baby. Lastly, have

the students explain at least one thing that they learned today using a complete sentence.]
NGSS: 1-LS3-1. Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents. [Clarification Statement: Examples of patterns could include features plants or animals share. Examples of observations could include leaves from the same kind of plant are the same shape but can differ in size; and, a particular breed of dog looks like its parents but is not exactly the same.] [*Assessment Boundary: Assessment does not include inheritance or animals that undergo metamorphosis or hybrids.*]
CC Link: Speaking and Listening 6 Produce complete sentences when appropriate to task and situation.

Day 16:
Topic: Use Venn diagram with parents vs. baby animals
Materials:

- A way to project the videos found at the links below for the class to watch (For free instructions on how to save a youtube video to your computer, visit my store at: http://www.teacherspayteachers.com/Store/Engaging-Lessons-By-Frank .)

Lesson Idea: [Remind students that recently we watched the videos of baby animal pictures. Then remind them that we learned about the Venn diagram tool to help us as we compare animals.] Tell the class the following: Today we are going to practice using our new tool to compare a baby gorilla to its mommy. [Explain that since we can't go to the zoo, we will watch some videos and pretend we're at the zoo. Watch the following videos: http://www.youtube.com/watch?v=SiXG2SWZO6c and http://www.youtube.com/watch?v=V_zEiVNyZSE and http://www.youtube.com/watch?v=ZEEOpBgsqCE Then create a Venn diagram as a class to compare the adult gorillas to the baby. Next explain to the class that you are curious and want to research even more about gorillas so you can write a paragraph to teach someone else about them. Watch the following video: http://www.youtube.com/watch?v=E8vZx3u48Z4 Lastly, write a paragraph about baby gorillas as a class.]
NGSS: 1-LS3-1. Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents. [Clarification Statement: Examples of patterns could include features plants or animals share. Examples of observations could include leaves from the same kind of plant are the same shape but can differ in size; and, a particular breed of dog looks like its parents but is

not exactly the same.] [*Assessment Boundary: Assessment does not include inheritance or animals that undergo metamorphosis or hybrids.*]
CC Link: Writing 7 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).

Day 17:
Topic: Use Venn diagram with parent vs. baby plants
Materials:

- A way to project the pictures below for the class

Lesson Idea: [Remind how we've been using Venn diagrams to compare baby animals to adult animals.] Tell the class the following: Today we are going to practice doing the same thing with plants! [Open and discuss the following pictures, which are in order (baby, adult of the same type, baby, adult of the same type, etc.):

1. http://2.bp.blogspot.com/-H5pV4FBZISc/TsJDMeEFS6I/AAAAAAAAEXk/T6NOhEW4PsE/s400/Rose+Seedling+1
2. http://gallery.biorust.com/files/3/6/2/4/4/rosebush-med.jpg
3. http://img402.imageshack.us/img402/6866/31627627744921226718710.jpg
4. http://www.nybg.org/images/press_room/images/exhibition_images/darwins_garden_an_evolutionary_adventure/evolutionary_tour/19VenusFlytrap23.jpg
5. http://web.cortland.edu/broyles/rock%20fern.jpg
6. http://blogs.providencejournal.com/arts-entertainment/lifestyles/gardening/5-19-fern-in-bright-light.jpg
7. http://4.bp.blogspot.com/-LjhlH2g0HKI/ToaSX3ujHEI/AAAAAAAAEzY/Jvk-9Q5sxtU/s480/baby-carrot-plant.JPG
8. http://0.tqn.com/d/gardening/1/0/b/z/Carrot.jpg
9. http://extras.mnginteractive.com/live/media/site234/2013/0422/20130422_081114_nmij0423redwood01_500.jpg
10. http://1.bp.blogspot.com/_isTORzYrrU8/THRqPrssQFI/AAAAAAAAAK4/1yYqk6W0NxA/s1600/100_0664.JPG

After the pictures, create a Venn diagram about baby plants compared to grown plants. Lastly, have students describe the difference between adult and baby plants.]
NGSS: 1-LS3-1. Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents. [Clarification Statement: Examples of patterns could include features plants or animals share. Examples of observations could

include leaves from the same kind of plant are the same shape but can differ in size; and, a particular breed of dog looks like its parents but is not exactly the same.] [*Assessment Boundary: Assessment does not include inheritance or animals that undergo metamorphosis or hybrids.*]
CC Link: Speaking and Listening 4 Describe people, places, things, and events with relevant details, expressing ideas and feelings clearly.

Day 18:
Topic: Venn diagram with parents vs. babies in general, Conclusion about parents vs. babies
Materials:

- Whiteboard or chalkboard.

Lesson Idea: [Remind students about all of the ways we have used a Venn diagram. Make a list on the board about how panda mommies and babies were the same but also different. Make a list on the board about how gorilla parents and babies were the same but also different. Make a list on the board about how plant adults and babies were the same but also different. Lead the class to conclude that babies look like their parents without looking exactly the same as explained in the NGSS standard. Then have students practice describing this concept clearly so they can explain it to their parents tonight. Lastly, explain that we will wrap up our learning about animals by watching a video to remind us about the names of baby animals: http://www.youtube.com/watch?v=fk7cQUFVyTk Remind them to look for ways that the babies and adults in the video are alike but also different.]
NGSS: 1-LS3-1. Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents. [Clarification Statement: Examples of patterns could include features plants or animals share. Examples of observations could include leaves from the same kind of plant are the same shape but can differ in size; and, a particular breed of dog looks like its parents but is not exactly the same.] [*Assessment Boundary: Assessment does not include inheritance or animals that undergo metamorphosis or hybrids.*]compound declarative, interrogative, imperative, and exclamatory sentences in response to prompts.
CC link: Speaking and Listening 4 Describe people, places, things, and events with relevant details, expressing ideas and feelings clearly.

Quarter 3: Earth and space science standards and physical science standard one

1-ESS1-1. Use observations of the sun, moon, and stars to describe patterns that can be predicted. [Clarification Statement: Examples of patterns could include that the sun and moon appear to rise in one part of the sky, move across the sky, and set; and stars other than our sun are visible at night but not during the day.] [*Assessment Boundary: Assessment of star patterns is limited to stars being seen at night and not during the day.*]

1-ESS1-2. Make observations at different times of year to relate the amount of daylight to the time of year. [Clarification Statement: Emphasis is on relative comparisons of the amount of daylight in the winter to the amount in the spring or fall.] [*Assessment Boundary: Assessment is limited to relative amounts of daylight, not quantifying the hours or time of daylight.*]

1-PS4-1. Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. [Clarification Statement: 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.]

<u>Day 1:</u>

Topic: review thinking like a scientist, particularly observation

Materials:

- Thinking like a scientist poster (available to be downloaded free from my store at: http://www.teacherspayteachers.com/Store/Engaging-Lessons-By-Frank)
- enough marshmallows for each student to have one
- A way to project the website and videos linked below

Lesson Idea: [Remind students what you taught previously about thinking like a scientist. Focus particularly on what observation means.] Tell the students: Today we will be practicing observation. Observation is when we take time to stop and notice things so that it can help us figure things out. Us people have something called our "five senses" to help us observe. For our first grade science, we will mostly be using one—which is our sight. We'll practice that a lot, but I also want you to know about and be able to use your other senses. First, let's start with sight. What do you notice with your eyes? Look around the room and

tell me what you see—what you observe. [Take time to discuss.] Now let's learn about our other senses. We can observe what we see, smell, taste, hear, or feel. [Give everyone a marshmallow, but tell them not to eat it yet. Ask them how it looks, hears, feels, smells, and tastes. Then explain that using our five senses not only helps us make good observations; it also helps us be good writers. Model for the students how to write one (or more) sentences that describe a marshmallow to someone who has never seen a marshmallow before. Then have them write.] If there is time remaining (or for a short brain break later in the day or later in the week), I recommend three follow up activities on observation:

1. Observe animals live at the San Diego Zoo for a few minutes. Visit the following website, scroll down to where it says "Live Cams", and choose an animal. http://zoo.sandiegozoo.org/
2. Watch the following video to remember that observation means seeing what we can notice by using our five senses: http://www.youtube.com/watch?v=GmgjQAroNLo
3. Watch the following video to review the five senses that we use to observe: http://www.youtube.com/watch?v=OWW5IaDCj1g

NGSS: Leading up to earth and space science standards
CC Link: Speaking and Listening 4 Describe people, places, things, and events with relevant details, expressing ideas and feelings clearly.

Day 2:
Topic: Anticipatory set: Observing the sky for fun
Materials:

- The free Stellarium program for your computer, which can be downloaded here: http://www.stellarium.org/
- Practice with using the Stellarium program so you can be familiar with it for the lesson
- A way to project what is on your computer for the class to see

Lesson Idea: [Remind students what you practiced last time—observation. Remind them that observing means noticing the world around us. Remind them about the five senses that we can use to observe.] Tell the students the following: Today we will practice observing even more by observing the stars and planets in space, along with what they will look like tonight while we are sleeping. [Open up the Stellarium program. Find your city and fast forward to the middle of the night tonight. As mentioned above, I highly recommend familiarizing yourself with this program prior to the lesson. Explain that the sky can be very confusing, and you want students to practice asking questions to clear up things they are confused about—as the

common core standard states. Give students time to explore the sky. Call on one student at a time to tell you where to move the screen to next. Explain the planets, constellations, etc. as you come across them. You can also make explanations, constellation pictures, and other features show up to help you explain these things to the class.]
NGSS: This lesson leads up to the following standard: **1-ESS1-1.**Use observations of the sun, moon, and stars to describe patterns that can be predicted. [Clarification Statement: Examples of patterns could include that the sun and moon appear to rise in one part of the sky, move across the sky, and set; and stars other than our sun are visible at night but not during the day.] [*Assessment Boundary: Assessment of star patterns is limited to stars being seen at night and not during the day.*]
CC Link: Speaking and Listening 1c Ask questions to clear up any confusion about the topics and texts under discussion.

Day 3:
Topic: Patterns and how we can use them to predict
Materials:

- A way to project the video from the link below for the class to see (for free instructions on how to save a youtube video to your computer, visit my store at: http://www.teacherspayteachers.com/Store/Engaging-Lessons-By-Frank)

Lesson Idea: [Remind students what has been learned recently about observation. Remind them about observing the planets and stars.] Tell the class the following: we want to find patterns in the sky to tell us something that is going to happen next. To do this, we first need to remember everything we know about patterns, so today we will learn about patterns. A pattern is something that repeats. [Draw a few simple patterns on the board to show students the concept if they are not already familiar with it.] We can use the repeat that we observe to predict what will come next. [Practice predicting what will come next with some simple patterns on the board.] Patterns are all around us as we see in this video. [Watch the following video once through: http://www.youtube.com/watch?v=7HIn3X14inI Then watch it a second time. This time pause it on each picture to discuss the pattern that is seen.] Now that we all remember what patterns are, let's practice seeing how patterns help us predict. Who can tell me what day of the week tomorrow is? [Point out how the days of the week are a pattern that repeats every seventh day so that we can predict what day is coming next to help us schedule the events in our lives.] Who can tell me what will probably happen if there are dark gray clouds covering the sky? [Point out how that's a pattern that can help you predict the

weather: dark clouds, then rain…dark clouds, then rain…] Who can tell me what will happen at 10:00 (or whatever time you have recess)? [Point out that your daily schedule is a pattern to allow you to predict what will happen each day.] Who can finish this for me, "Jingle bells, Jingle _____"? [Point out that songs have patterns, which can allow us to easily predict the words at times.] Who can predict one thing about what the sky will look like tonight? (i.e. It will be dark except for the moon and stars shining.)…Great job. Now we will be ready to practice observing the sky for patterns during our next lesson. [Lastly, have students write an answer to this question: What is a pattern?]
NGSS: This lesson leads up to the following standard: **1-ESS1-1.**Use observations of the sun, moon, and stars to describe patterns that can be predicted. [Clarification Statement: Examples of patterns could include that the sun and moon appear to rise in one part of the sky, move across the sky, and set; and stars other than our sun are visible at night but not during the day.] [*Assessment Boundary: Assessment of star patterns is limited to stars being seen at night and not during the day.*]
CC Link: Writing 8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.

<u>Day 4:</u>
Topic: Observing the sky for simple patterns and conclusions
Materials:

- The free Stellarium program for your computer, which can be downloaded here: http://www.stellarium.org/
- Practice with using the Stellarium program so you can be familiar with it for the lesson
- A way to project what is on your computer for the class to see

Lesson Idea: [Remind students all that has been taught this quarter, including observing, finding patterns, and looking at the sky.] Tell the class the following: Today we will be looking in the sky for patterns. [Go to the Stellarium program. Click on the fast forward button four or five times. The program will start right now and fast forward to show the students what the sky will look like tonight, tomorrow, tomorrow night, the next day, the next night, etc. Review the term conclusion (what we figured out) and guide the class to the conclusion that one pattern we can find in the sky and use to predict what will happen is this: the sun rises on the left of the screen—in the East. Then it moves across the sky and sets on the right side of the screen—in the West…and it repeats each day. Guide them to find other patterns, such as stars being visible at nighttime but not during the day. Finally, model how to write about

patterns in the sky by introducing the topic, stating some facts, and providing some closure as the common core standard states. Explain to students that they will follow these writing steps to write their own "patterns in the sky" paragraph for our next science lesson.]
NGSS: 1-ESS1-1. Use observations of the sun, moon, and stars to describe patterns that can be predicted. [Clarification Statement: Examples of patterns could include that the sun and moon appear to rise in one part of the sky, move across the sky, and set; and stars other than our sun are visible at night but not during the day.] [*Assessment Boundary: Assessment of star patterns is limited to stars being seen at night and not during the day.*]
CC Link: Writing 2 Write informative/explanatory texts in which they name a topic, supply some facts about the topic, and provide some sense of closure.

Day 5:
Topic: Observing the moon for patterns and conclusions
Materials:

- A way to project the video from the link below for the class to see (for free instructions on how to save a youtube video to your computer, visit my store at: http://www.teacherspayteachers.com/Store/Engaging-Lessons-By-Frank)

Lesson Idea: [Remind students all that has been taught this quarter, including observing, finding patterns, looking at the sky, and forming conclusions about patterns in the sky.] Tell the class the following: Today we will be looking at (observing) the moon for patterns. We will get to see how the moon looks for a whole year! [Watch the following video and explain how this is what the moon looks like for a whole year, only it has been sped up so that we can see it in two minutes: http://www.youtube.com/watch?v=7JqVqvIlrwA Review the term conclusion (what we figured out) and guide the class to the conclusion that one pattern we can find from watching the moon is what we call the phases of the moon, meaning we can see ¼ of it, then ½ of it, then ¾ of it, then all of it, then ¾ of it, then ½ of it, then ¼ of it, then none of it, and then it starts all over. Show this picture to help you explain this: https://fretzreview.wikispaces.com/file/view/Moon-Phases-3x3-lbl.jpg/30704576/Moon-Phases-3x3-lbl.jpg Remind the class how you wrote about patterns in the sky yesterday by introducing the topic, stating some facts, and providing some closure—as the common core standard states. Explain to students that they will follow these writing steps to write their own "patterns of the moon" paragraph.]

NGSS: 1-ESS1-1. Use observations of the sun, moon, and stars to describe patterns that can be predicted. [Clarification Statement: Examples of patterns could include that the sun and moon appear to rise in one part of the sky, move across the sky, and set; and stars other than our sun are visible at night but not during the day.] [*Assessment Boundary: Assessment of star patterns is limited to stars being seen at night and not during the day.*]
CC Link: Writing 2 Write informative/explanatory texts in which they name a topic, supply some facts about the topic, and provide some sense of closure.

Day 6:
Topic: Anticipatory set and review of seasons

Materials:

- A way to project the video from the link below for the class to see (for free instructions on how to save a youtube video to your computer, visit my store at: http://www.teacherspayteachers.com/Store/Engaging-Lessons-By-Frank)

Lesson Idea: [Remind the class that science means learning about the world around us. Explain that for the coming lessons we will need to know about the seasons (which are a big part of the world around us), so today we are going to review what all the seasons are and see some fun pictures of each season.] We will start by watching a video that has some neat pictures of each season. [Watch the following video: http://www.youtube.com/watch?v=106VN97TGfc] Now I want to make sure you know the difference between each of the seasons. [Watch the following videos: http://www.youtube.com/watch?v=NavWWM2iTEw and http://www.youtube.com/watch?v=00S7tBOmTL4 After the videos, define winter, spring, summer, and fall more clearly so that the class understands these terms.] Lastly, have students write about which season is their favorite by following the pattern outlined in the common core standard.
NGSS: Leading up to the following: **1-ESS1-2.** Make observations at different times of year to relate the amount of daylight to the time of year. [Clarification Statement: Emphasis is on relative comparisons of the amount of daylight in the winter to the amount in the spring or fall.] [*Assessment Boundary: Assessment is limited to relative amounts of daylight, not quantifying the hours or time of daylight.*]

CC Link: Writing 1 Write opinion pieces in which they introduce the topic or name the book they are writing about, state an opinion, supply a reason for the opinion, and provide some sense of closure.

Day 7:

Topic: Accessing prior knowledge about the amount of daylight at different times of year

Materials:

- A way to project the video from the link below for the class to see (for free instructions on how to save a youtube video to your computer, visit my store at: http://www.teacherspayteachers.com/Store/Engaging-Lessons-By-Frank)

Lesson Idea: [Explain that today we will be trying to remember what we do during each season so that we can start to learn about which seasons have the most hours of sunlight. Watch the following book to remind students about what happens in the various seasons: http://www.youtube.com/watch?v=WhDJDIviAOg Then give students time to share connections in groups. Ask everyone to tell their group one thing they like to do in the summer. Then repeat for the other three seasons. Lastly, ask students to remember summertime for a moment. Ask questions such as the following to access their background about the amount of daylight at different times of the year: During the summertime, was it light when you woke up? How about at dinnertime? Then repeat for all of the seasons. Depending on where you live at, hopefully students will notice that in the summer, they were waking up and eating dinner in the light and in the winter they wake up and eat dinner at dark—thus, there are more hours of light during the summer than there are during the winter.]

NGSS: 1-ESS1-2. Make observations at different times of year to relate the amount of daylight to the time of year. [Clarification Statement: Emphasis is on relative comparisons of the amount of daylight in the winter to the amount in the spring or fall.] [*Assessment Boundary: Assessment is limited to relative amounts of daylight, not quantifying the hours or time of daylight.*]

CC Link: Speaking and Listening 1a Follow agreed upon rules for discussions (e.g., listening to others with care. speaking one at a time about the topics and texts under discussion).

Day 8:

Topic: Observing daylight at different times of the year

Materials:

- The free Stellarium program for your computer, which can be downloaded here: http://www.stellarium.org/
- Practice with using the Stellarium program so you can be familiar with it for the lesson
- A way to project what is on your computer for the class to see

Lesson Idea: Tell the class the following: today we will be observing the amount of daylight at different times of the year. Daylight is what we call the light that we get from the sun during the day. [Open up the Stellarium program. Open up the date and time window in the program. If done correctly, a box should appear in the middle of the screen that will allow you to change the date so that you can view the sky as it should appear on a particular date. Take the date and time window to 6:30 A.M. (or another time which you have determined will work better with the sunrise schedule and/or culture where you live…You'll know it's A.M. because P.M. is in 24 hour "military" format, which means that 6:30 P.M. would be 18:30.) Explain that this is when many of the students wake up. Ask the students whether it is dark or light when they wake up. Then tell them that we are going to keep the time the same—6:30, which is about when they wake up—but we are going to change the season. Let's see if it is dark when you wake up at Halloween. Let's see if it's dark at Valentine's day. Let's see if it's dark at Christmas. Let's see if it's dark during the summertime when we don't have school. Note how it is dark at 6:30 during the winter but light during the summer. Repeat with different times near daylight and dusk to help students see that in winter there is less daylight than in summer. Just for fun, you may want to repeat the exercise with a very different location—such as another country. Finally, remind students that good scientists are always asking questions. As suggested by the common core standard, have everyone come up with one question they have about daylight at different times of the year. (Questions can be as simple as "What time does the sun set at Christmas?" or "Is it light at 6:30 on my birthday?")]

NGSS: 1-ESS1-2. Make observations at different times of year to relate the amount of daylight to the time of year. [Clarification Statement: Emphasis is on relative comparisons of the amount of daylight in the winter to the amount in the spring or fall.] [*Assessment Boundary: Assessment is limited to relative amounts of daylight, not quantifying the hours or time of daylight.*]

CC Link: Speaking and Listening 1c Ask questions to clear up any confusion about the topics and texts under discussion.

Day 9:

Topic: Conclusion about daylight at different times of the year

Materials:

- A way to project the video from the link below for the class to see (for my free instructions on how to save a youtube video to your computer, visit http://www.teacherspayteachers.com/Product/5-Ways-to-Download-Save-a-Youtube-Video-988028store)
- My thinking like a scientist poster, which can be downloaded for free from: http://www.teacherspayteachers.com/Product/Scientific-Method-Poster-for-Kids-Thinking-Like-a-Scientist-988698

Lesson Idea: [Review what has been taught recently about seasons and daylight at various times of the year. Use the thinking like a scientist poster to review what has been taught previously about thinking like a scientist. Explain that today we will focus on forming a conclusion about daylight at different times of the year. In other words, we will figure out what we have learned about the amount of daylight at different times of the year. Guide students to the conclusion that there is not very much daylight in the winter when compared to the other seasons. Then have them state the conclusion using one complete sentence. Lastly, explain that in first grade we need to know our seasons; we need to know that winter has less daylight than summer, but we do not need to fully understand why. Still, a curious first grade scientist will want to know why! The following video explains what makes us have seasons:
http://www.youtube.com/watch?v=Pgq0LThW7QA

NGSS: 1-ESS1-2. Make observations at different times of year to relate the amount of daylight to the time of year. [Clarification Statement: Emphasis is on relative comparisons of the amount of daylight in the winter to the amount in the spring or fall.] [*Assessment Boundary: Assessment is limited to relative amounts of daylight, not quantifying the hours or time of daylight.*]

CC Link: Speaking and Listening 6 Produce complete sentences when appropriate to task and situation.

Day 10:

Topic: Hypotheses about how sound gets to your ear

Materials:

- A way to project the video from the link below for the class to see (for my free instructions on how to save a youtube video to your computer, visit http://www.teacherspayteachers.com/Product/5-Ways-to-Download-Save-a-Youtube-Video-988028store)

- My thinking like a scientist poster, which can be downloaded for free from: http://www.teacherspayteachers.com/Product/Scientific-Method-Poster-for-Kids-Thinking-Like-a-Scientist-988698

Lesson Idea: Tell the class the following: It has been fun to learn about seasons and the amount of light during each season. Now we get learn about sound in the coming lessons. How does sound get to our ears? [Give students time to ponder this question. Act like a curious scientist that really wants to know the answer to this and other questions about the world around us.] Today each of you will make a hypothesis about how sound gets to our ear so we can hear it.[Remind students what you taught previously about thinking like a scientist, focusing particularly on what hypothesis means. Then watch all or part of the following videos. Prior to watching the videos, explain to the class that these videos are full of all sorts of sounds. Tell them to think about today's science question as we watch these videos: http://www.youtube.com/watch?v=17V-bP1XEao and http://www.youtube.com/watch?v=Kdsxho2Cnog Explain that it is time to make a hypothesis. Have students share their hypotheses in groups. Then have them write their hypotheses.]

NGSS: Leading up to the following: **1-PS4-1.** Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. [Clarification Statement: 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.]

CC Link: Writing 8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.

Day 11:

Topic: How sound travels: prove it—day 1 begin planning

Materials:

- Not applicable

Lesson Idea: [Remind students what was done previously when they made a hypothesis about how sound travels. Then explain how sound really travels.] Tell the class the following: When something makes sound, it makes a wave. It's just like a wave in the ocean or in a lake, except that since it is in air we can't see it. This wave makes the air and other things around it vibrate. Vibrate means to move very very fast [demonstrate

vibrating by moving your hand really fast]. Those waves travel through the air to our ears. That's how the science books say that sound travels. But I don't believe them. There is no such thing as imaginary waves! Now that you know how the science books say that sound travels, I want you to design an experiment to prove to me that sound really does travel through vibrations in the air—which scientists call waves. You get to be the ones to prove it to me! This is what we will be working on for the next several lessons. We are going to have thirty seconds of silence, and I want you to think to yourself "How can I prove that sound makes vibrations?" [Split the students into groups and have them discuss how they can prove this to you. Have each group design an experiment to show that sound creates vibrations and things that vibrate create sound. Note: It is perfectly fine if students do not come up with any real experiment ideas today. It is good for them to attempt to think like a scientist without a lot of teacher intervention. You will help guide each group's experiment during the next lesson. For more background on experiments that meet the criteria of this lesson, please take a look at Day 12 below.]

NGSS: 1-PS4-1. Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. [Clarification Statement: 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.]

CC Link: Speaking and Listening 1b Build on others' talk in conversations by responding to the comments of others through multiple exchanges.

Day 12:

Topic: How sound travels: prove it—day 2 planning guidance

Materials:

- A way to project the video from the link below for the class to see (for my free instructions on how to save a youtube video to your computer, visit http://www.teacherspayteachers.com/Product/5-Ways-to-Download-Save-a-Youtube-Video-988028store)

Background Information: For this lesson, it will be helpful for the teacher to already be familiar with several experiments related the NGSS standard below. Here are some initial ideas:

- Make a tuning fork vibrate, followed by dipping the tuning fork in water and observing the ripple
- Stretching out a rubber band and hearing the noise followed by feeling the vibration against your cheek
- Holding a piece of paper near a speaker as it plays music to see the paper vibrate.

- Making a loud stomping noise with your feet and having a neighbor feel the ground with their hands to see if they can feel a vibration
- Putting rice on a drum and watching the rice vibrate and "jump" as the drum is played
- Using your hand, feel the vibrations from a speaker as music is being played
- Pluck a guitar string and then pinch the string to notice that as soon as you stop the vibrations with your pinching, the sound stops.
- Ring a bell and (depending on the type of bell) dip it in water to see the ripples created.
- More information and materials are available at: http://www.pbslearningmedia.org/resource/phy03.sci.phys.howmove.lp_sound/sound-vibrations/ and http://www.exploresound.org/home/teachers-parents/good-vibrations/

Lesson Idea: [Explain that you want a chance to meet with each group to help them plan their experiments, so you are going to play a Magic School Bus video about sound for the rest of the class to watch while you call back each group individually. Watch the following video: http://www.youtube.com/watch?v=k57ONGWihz4 During the video, meet with each group and help them make a realistic plan for their experiment. Please see the above list of experiments for your own reference information.]

NGSS: 1-PS4-1. Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. [Clarification Statement: 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.]

CC Link: Speaking and Listening 1b Build on others' talk in conversations by responding to the comments of others through multiple exchanges.

Day 13:

Topic: How sound travels: prove it—day 3 finish planning

Materials:

- A sheet of paper for each group

Lesson Idea: [Remind students that yesterday you met with them each individually to help them with their experiment plan. Explain that today they will meet with their groups again to finish making their plan. Explain that you want them to make a "materials list" of all things that they need for their experiment. Then they will turn in their lists, so you can be sure to have everything they need on experiment day. Be sure to have them read

you their lists when they turn them in, so you can make a note of what the materials are when it is difficult to understand their writing.]
NGSS: 1-PS4-1. Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. [Clarification Statement: 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.]
CC Link: Speaking and Listening 1b Build on others' talk in conversations by responding to the comments of others through multiple exchanges.

Day 14:
Topic: How sound travels: prove it—day 4 experiments
Materials:

- Materials for student experiments (see day 13)

Lesson Idea: [Explain that students will do their experiments today! Explain that each group will need to plan a presentation to teach all the other groups about their experiment. Today they will do the experiment by themselves. Another day they will share the experiment with the class. Split the groups into various areas of the room. Give them their materials and guide them in doing their experiments. After groups do their initial experiments, help them explore further by guiding them to ask what would happen if….? For example, if a group uses a vibrating rubber band for their experiment, you can guide them in asking what will happen if they use a smaller rubber band.]
NGSS: 1-PS4-1. Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. [Clarification Statement: 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.]
CC Link: Speaking and Listening 1 Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups

Day 15:
Topic: How sound travels: prove it day 5 Plan presentations
Materials:

- Construction paper or posterboard, if desired

Lesson Idea: [Remind students that they will be planning their presentation today. Explain to them a little bit about presenting, including planning out a way for each person in their group to say something or participate in some way. Also, be sure to explain to them that they need to have something to explain their experiment to the class. Depending on the experiment, they could plan on doing their actual experiment in front of the class, or they could have a poster with drawings showing their experiment. In addition, be sure to explain that they must create a poster from a piece of construction paper. Their poster has to have at least two things on it: 1) Their hypothesis in a complete sentence—probably starting with "We think..." 2) Their conclusion (what they figured out) in a complete sentence.]
NGSS: 1-PS4-1. Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. [Clarification Statement: 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.]
CC Link: Speaking and Listening 5 Add drawings or other visual displays to descriptions when appropriate to clarify ideas, thoughts, and feelings.

<u>Day 16:</u>
Topic: How sound travels: prove it day 6: Present experiments
Materials:

- Student posters and experiment materials

Lesson Idea: [Student presentations…In addition, guide students in asking questions about their peers' presentations as the common core standard suggests.]
NGSS: 1-PS4-1. Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. [Clarification Statement: 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.]
CC Link: Speaking and Listening 3 Ask and answer questions about what a speaker says in order to gather additional information or clarify something that is not understood.

<u>Day 17:</u>

Topic: Conclusion about how sound travels, Explanation of how our ears receive sound

Materials:

- A way to project a video from your computer for the class to view
- Scientific method poster

Lesson Idea: [Remind the class all about the scientific method—particularly the word conclusion. Explain that today we will form conclusions about sound. Review all that has been learned about sound—including what students figured out from their experiments. Guide them to the conclusions in the NGSS standard that vibrating materials make sound and sound can make materials vibrate. Then have each student produce a complete sentence that states this conclusion. Now that students understand the relationship between vibration and sound, many will be wondering how our ears receive the sound and turn it into a message that we hear. Explain that we will watch a video in which a middle school student explains how this works: http://www.teachertube.com/viewVideo.php?video_id=17824]

NGSS: 1-PS4-1. Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. [Clarification Statement: 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.]

CC Link: language 1j Produce and expand complete simple and compound declarative, interrogative, imperative, and exclamatory sentences in response to prompts.

<u>Day 18:</u>

Topic: How sound travels videos

Materials:

- A way to project the videos from the link below for the class to see (for my free instructions on how to save a youtube video to your computer, visit http://www.teacherspayteachers.com/Product/5-Ways-to-Download-Save-a-Youtube-Video-988028store)

Lesson Idea: [Remind students all that has been learned about sound. Explain that we will wrap up our study of sound by watching some videos that explain things we should have learned in our studies. Watch all or some of the following videos as time permits. The following video is a full episode (22ish minutes) of Bill Nye the Science Guy teaching about sound: http://www.youtube.com/watch?v=lTetdgpu7MU The following videos are shorter videos that review how sound travels:

http://www.youtube.com/watch?v=ACeUO4ufx2I and http://www.youtube.com/watch?v=xH8mT2IQz7Y and only the first minute of http://www.teachertube.com/viewVideo.php?video_id=21129 Lastly, have students write a paragraph following the pattern in the common core standard that explains how sound travels.]

NGSS: 1-PS4-1. Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. [Clarification Statement: 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.]

CC Link: Writing 2 Write informative/explanatory texts in which they name a topic, supply some facts about the topic, and provide some sense of closure.

Quarter 4: Focus on Physical science standards

1-PS4-2.	Make observations to contruct an evidence-based account that objects in darkness can be seen only when illuminated. [Clarification Statement: Examples of observations could include those made in a completely dark room, a pinhole box, and a video of a cave explorer with a flashlight. Illumination could be from an external light source or by an object giving off its own light.]
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. [Clarification Statement: Examples of materials could include those that are transparent (such as clear plastic), translucent (such as wax paper), opaque (such as cardboard), and reflective (such as a mirror).] [*Assessment Boundary: Assessment does not include the speed 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.* [Clarification Statement: Examples of devices could include a light source to send signals, paper cup and string "telephones," and a pattern of drum beats.] [*Assessment Boundary: Assessment does not include technological details for how communication devices work.*]

Day 1:

Topic: Anticipatory set: light and darkness

Materials:

- A way to project the video from the link below for the class to see (for my free instructions on how to save a youtube video to your computer, visit http://www.teacherspayteachers.com/Product/5-Ways-to-Download-Save-a-Youtube-Video-988028store)

Lesson Idea: Tell the following: I am very excited for our coming science lesson. It is so interesting to learn science—to learn about the world around us! Next we get to learn about something that is around us every day. [Have a student go to the light switch and turn the lights off and then on again.] We are learning about light! The coming lessons will all be about light. Next, we get to watch a fun video to get you excited about light. This video is from a New Year's show in Disneyland that is put on using light. [Watch the following video: http://www.youtube.com/watch?v=4dXJ_WrnzQQ] It is so fun to learn about light!!! [Next, have students talk with a partner about what life would be like if there were no light. Then have them talk with a partner about what life would be like if it were never dark and always light. Then have them write about whether it would be better if it were always dark or always light. Model an opinion piece for them and teach

them to write it using the method specified in the common core standard.]
NGSS: Leading up to the following: **1-PS4-2.** Make observations to contruct an evidence-based account that objects in darkness can be seen only when illuminated. [Clarification Statement: Examples of observations could include those made in a completely dark room, a pinhole box, and a video of a cave explorer with a flashlight. Illumination could be from an external light source or by an object giving off its own light.]
CC Link: Writing 1 Write opinion pieces in which they introduce the topic or name the book they are writing about, state an opinion, supply a reason for the opinion, and provide some sense of closure.

Day 2:
Topic: Hypothesizing about seeing objects in the darkness
Materials:

- My thinking like a scientist poster, which can be downloaded for free from: http://www.teacherspayteachers.com/Product/Scientific-Method-Poster-for-Kids-Thinking-Like-a-Scientist-988698

Lesson Idea: [Remind students what you taught previously about thinking like a scientist. Explain that today we will be practicing making a hypothesis.] Tell the class the following: Since we are learning about light, I want to know how important light is to seeing things. Later on we will do experiments that will tell us. Today I want us to each make a hypothesis about whether or not we can see things without light. [Model a one-sentence hypothesis on the board, such as "I think we do not need light to see things." Then have each student write a one sentence hypothesis. Lastly, shut have students hold up their pencils in front of their noses. Shut off the lights. Ask them if they can see their pencils. (They'll probably be able to because most classrooms will have light filtering in through a window, door, etc.)] Tell the class the following: Scientists say we do need light to see things…but we just saw our pencils with the lights shut off. Are scientists wrong?...I think scientists are right, so we are going to have to do more experiments in the coming lessons to find out more about how this works!
NGSS: 1-PS4-2. Make observations to contruct an evidence-based account that objects in darkness can be seen only when illuminated. [Clarification Statement: Examples of observations could include those made in a completely dark room, a pinhole box, and a video of a cave explorer with a flashlight. Illumination could be from an external light source or by an object giving off its own light.]

CC Link: Speaking and Listening 6 Produce complete sentences when appropriate to task and situation.

Day 3:

Topic: Objects in darkness can only be seen when illuminated experiments

Materials:

- A way to project the video from the link below for the class to see (for my free instructions on how to save a youtube video to your computer, visit http://www.teacherspayteachers.com/Product/5-Ways-to-Download-Save-a-Youtube-Video-988028store)
- Black butcher paper to cover windows, cracks under doors, etc.

Lesson Idea: [Remind students that we are learning about light for science. Remind them that we left off wondering why we can see our pencils when the lights are out, and we wanted to do more experiments to find out if we really can see objects in the dark when there is no light. Have everyone set a book upright on their desks so that they can see the front cover of the book. Then shut the lights off and see if they can still see it. If they can, explain that light is sneaking into our room through cracks in the doors, windows, etc. Cover up all cracks with black butcher paper and try again. Be sure to point out to students that when there is zero light, they cannot see the picture on the front cover of the book! Next explain that you want students to be able to explore a cave, but you can't take them on that dangerous of a field trip. So we get to watch the following video: http://www.youtube.com/watch?v=3VAbHn1Jr-w As the video plays, point out that we can only see things that the light (from the flashlight or the cave lights that have been installed) is shining on. Lastly, have students describe clearly to a partner what the cave was like.]

NGSS: 1-PS4-2. Make observations to contruct an evidence-based account that objects in darkness can be seen only when illuminated. [Clarification Statement: Examples of observations could include those made in a completely dark room, a pinhole box, and a video of a cave explorer with a flashlight. Illumination could be from an external light source or by an object giving off its own light.]

CC Link: Speaking and Listening 4 Describe people, places, things, and events with relevant details, expressing ideas and feelings clearly

Day 4:

Topic: Objects in darkness can only be seen when illuminated experiments Day 2: Pinhole viewers

Materials:

- Empty oatmeal containers or Pringles cans

- Wax paper
- Rubber bands
- A Blanket

Lesson Idea: [Help students construct a pinhole viewer using empty oatmeal containers or Pringles cans as explained at the following website: https://www.highlightskids.com/science-experiment/make-pinhole-camera After the cameras are made, teach students how to use them. As a homework assignment, have them explore with their pinhole camera at home. (I say to do it as a homework assignment because otherwise—depending on the lighting in your classroom—you'll need enough blankets for each child so that each child can try this out.) What does it look like if the lights are completely out? What if the room is dim? What if they do not use a blanket to block out light? Etc. The next day help students understand the camera would only work if it were dark enough for them to see the light on the wax paper, but it also only worked if the object they were viewing was lit up enough to really view it well. Help them understand that this reinforces that we need light in order to see! Then have them write a story about how a pinhole camera works.]

NGSS: PS4-2. Make observations to contruct an evidence-based account that objects in darkness can be seen only when illuminated. [Clarification Statement: Examples of observations could include those made in a completely dark room, a pinhole box, and a video of a cave explorer with a flashlight. Illumination could be from an external light source or by an object giving off its own light.] Then have students write about how to make a pinhole camera.

CC Link: Writing 7 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).

Day 5:

Topic: Conclusions about being able to see in darkness only when there's some illumination

Materials:

- My thinking like a scientist poster, which can be downloaded for free from: http://www.teacherspayteachers.com/Product/Scientific-Method-Poster-for-Kids-Thinking-Like-a-Scientist-988698
- A way to project the videos from the links below for the class to see (for my free instructions on how to save a youtube video to your computer, visit http://www.teacherspayteachers.com/Product/5-Ways-to-Download-Save-a-Youtube-Video-988028store)

Lesson Idea: [Remind students what they've learned about the scientific method—particularly forming conclusions. Explain that today we will be forming a conclusion about something we should've learned about light in our recent lessons. Remind students of what has been covered thus far regarding light (the cave video, seeing the cover of a book in darkness, using the pinhole camera in the darkness). Ask each student to list with a learning partner things we have observed in our lessons that help us understand that objects in darkness can only be seen when there is light shining on them; guide students to the conclusion that objects in darkness can be seen only when there is some amount of light. Explain that we get to watch the following video to help us understand why we can only see objects when there is some light: http://www.youtube.com/watch?v=VM2T8qa_0LI Lastly, explain that we get to "read" a fun book by watching a video. Explain that this book is just a fun way to wrap up our learning about seeing things in the dark. Watch this video: http://www.youtube.com/watch?v=WG-ljCllMUA After the story, discuss the difference between books that tell stories and books that give information. Discuss whether we just read an informational book or story book and help students understand the difference.]
NGSS: 1-PS4-2. Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated. [Clarification Statement: Examples of observations could include those made in a completely dark room, a pinhole box, and a video of a cave explorer with a flashlight. Illumination could be from an external light source or by an object giving off its own light.]
CC Link: Reading Literature 5 Explain major differences between books that tell stories and books that give information, drawing on a wide reading of a range of text types.

Day 6:
Topic: Anticipatory set about placing things in a beam of light: shadow puppets
Materials:

- A way to project the video from the link below for the class to see (for my free instructions on how to save a youtube video to your computer, visit http://www.teacherspayteachers.com/Product/5-Ways-to-Download-Save-a-Youtube-Video-988028store
- flashlight

Lesson Idea: [Remind students what we have learned so far about light.] Tell the class the following: Now we get to learn even more about light. We get to learn about what happens when we put things in light's path. We will start off learning this with a special guest...or at least we

get to watch a video of a special guest. [Watch the following video about shadow puppets: http://www.youtube.com/watch?v=ss9FAdhX4mI After the video, have students meet the common core standard by brainstorming additional questions that the video did not answer. To the extent possible, have the students answer other kids' questions. Then explain that when you put your hand in front of a beam of light, the light stops on your hand—making a dark spot (or shadow) on the wall where there is no light. Explain that in the coming lessons we will be learning about what happens when many different things are placed in the path of a beam of light, but today we are just focusing on what happens when we do it with our hands to get excited about it. Project this picture and let students come up in front of the flashlight and try to make a shadow puppet: http://www.redtedart.com/wp-content/uploads/2011/10/we-heart-it-eo4wke64l-127354-462-700_large.jpg]

NGSS: 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. [Clarification Statement: Examples of materials could include those that are transparent (such as clear plastic), translucent (such as wax paper), opaque (such as cardboard), and reflective (such as a mirror).] [*Assessment Boundary: Assessment does not include the speed of light.*]

CC Link: Speaking and Listening 2 Ask and answer questions about key details in a text read aloud or information presented orally or through other media.

Day 7:

Topic: Hypotheses about placing things in the path of a beam of light

Materials:

- A bag of about 10 various objects (some see through, some semi-see through, some reflective, and some not at all see through…see the NGSS standard for more details…Here are some good objects to include: small mirror, plastic wrap, colored plastic wrap, tissue paper, cardboard, wax paper,)
- a flashlight

Lesson Idea: [Remind students that we are learning about what happens when various things are placed in the path of light. Turn the lights off and turn the flashlight on. Put your hand in front of the flashlight and create a shadow puppet. Explain that—as we learned yesterday—your hand is blocking the light—which creates a shadow on the wall because no light is shining in that spot. Hold up your bag of objects.] Tell the class: I wonder what will happen when I put the things in this bag in front of the flashlight. Today we will be creating a hypothesis about what will happen to each item. [Pull out one item at a time. Have students tell a partner what

his/her hypothesis is about what will happen when we block the flashlight's beam with that item. Explain that we will find out in the coming lessons. Lastly, have students choose one item and write an opinion about what will happen when we place it in the path of the flashlight's beam. Do this by following the format of the common core standard.]
NGSS: 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. [Clarification Statement: Examples of materials could include those that are transparent (such as clear plastic), translucent (such as wax paper), opaque (such as cardboard), and reflective (such as a mirror).] [*Assessment Boundary: Assessment does not include the speed of light.*]
CC Link: Writing 1 Write opinion pieces in which they introduce the topic or name the book they are writing about, state an opinion, supply a reason for the opinion, and provide some sense of closure

Day 8:
Topic: Placing items in light's path Experiments Day 1: Begin planning experiments
Materials:

- A way to project the video from the link below for the class to see (for my free instructions on how to save a youtube video to your computer, visit http://www.teacherspayteachers.com/Product/5-Ways-to-Download-Save-a-Youtube-Video-988028store

Lesson Idea: [Remind students what was done previously when they made a hypothesis about the effect of placing each random object in front of the flashlight. Explain that today the will plan the experiment in pairs. Next, explain that before planning the experiment, you want to review how we use experiments to discover the answer to science questions. Watch the following video: http://www.youtube.com/watch?v=cjC4D94lmv4 Then discuss the video—focusing on how we can discover the answer to our science questions by experimenting. Remind students that right now our question is, "What happens when different objects are placed in the path of light?" Split the students into pairs and have them plan an experiment to see what will happen when they place items in front of a beam of light. Explain that they get to choose three (or more) items to test out. Note: This experiment is simple enough that students should be able to mostly plan it on their own. However, the next science lesson mostly consists of helping students plan their experiments. Therefore, today you should focus on keeping students on task, but do not worry about guiding their experiment plan. Let them stretch their minds; you will help guide each group's experiment during the next lesson.]
NGSS: 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. [Clarification Statement: Examples of materials could include

those that are transparent (such as clear plastic), translucent (such as wax paper), opaque (such as cardboard), and reflective (such as a mirror).] [*Assessment Boundary: Assessment does not include the speed of light.*]
CC Link: Speaking and Listening 1b Build on others' talk in conversations by responding to the comments of others through multiple exchanges.

Day 9:
Topic: Placing items in light's path Experiments Day 2: Planning guidance
Materials:

- A way to project the video from the link below for the class to see (for my free instructions on how to save a youtube video to your computer, visit http://www.teacherspayteachers.com/Product/5-Ways-to-Download-Save-a-Youtube-Video-988028store

Lesson Idea: [Remind students that they have planned out an experiment with a partner to find out what happens when we place things in front of a flashlight's beam. Explain that you will be meeting with each partnership to help them plan their experiment. Put on this Magic School Bus video about light to keep the rest of the class occupied: http://www.youtube.com/watch?v=OUY8BiRRxdI Things that can be discussed when you meet with each partnership: objects they chose (whenever possible, guide them to choose a reflective object, a transparent or semi-transparent object, and an object that does not let any light through), how big the light source (flashlight) will be, how dark the room will be and whether or not something will be needed to cover the windows and doors to block out the light, how they can record their observation…After the video, have each student say one thing that he/she learned using a complete sentence.]
NGSS: 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. [Clarification Statement: Examples of materials could include those that are transparent (such as clear plastic), translucent (such as wax paper), opaque (such as cardboard), and reflective (such as a mirror).] [*Assessment Boundary: Assessment does not include the speed of light.*]
CC Link: Speaking and Listening 6 Produce complete sentences when appropriate to task and situation.

Day 10:
Topic: Placing items in light's path Experiments Day 3: Finish planning

Materials:

- My thinking like a scientist poster, which can be downloaded for free from: http://www.teacherspayteachers.com/Product/Scientific-Method-Poster-for-Kids-Thinking-Like-a-Scientist-988698

Lesson Idea: [Remind students the steps to thinking like scientist using the poster referenced above. Apply this to what we've been doing lately. Remind students that we've been working on planning out experiments to see what happens when we place items in front of a beam of light. Tell students to get with their partners and finish planning their experiment. Tell them that they will need to write down two things for you by the end of science time today: 1) The three things that they want to place in front of the flashlight for this experiment, along with any other notes about how they will conduct their experiment 2) A plan for how they are going to record what they observe (This could be as simple as "Johnny will write about the cardboard, and Suzy will write about the mirror.") Also explain that you want to meet with each partnership when they turn in their page to discuss their materials list. What will they bring from home? What will you provide? What is already available in the classroom?]

NGSS: 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. [Clarification Statement: Examples of materials could include those that are transparent (such as clear plastic), translucent (such as wax paper), opaque (such as cardboard), and reflective (such as a mirror).] [*Assessment Boundary: Assessment does not include the speed of light.*]

CC Link: Speaking and Listening 1b Build on others' talk in conversations by responding to the comments of others through multiple exchanges.

Day 11:

Topic: Placing items in light's path Experiments Day 4: Experiments

Materials:

- Materials needed for student experiments as discussed in Day 10

Lesson Idea: [Give students time to conduct their experiment in partnerships. Make sure they record what they observe. As time allows, allow them to repeat the experiment using various types of light (i.e. big flashlights, little keychain flashlights, medium sized flashlights, etc.)]

NGSS: 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. [Clarification Statement: Examples of materials could include

those that are transparent (such as clear plastic), translucent (such as wax paper), opaque (such as cardboard), and reflective (such as a mirror).] [*Assessment Boundary: Assessment does not include the speed of light.*]
CC Link: Measurement and Data 4 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 anothe

Day 12:
Topic: Placing items in light's path Experiments Day 5: Plan presentations
Materials:

- Construction paper or posterboard
- Markers

Lesson Idea: [Remind students that they will be planning their presentation today. Explain to them a little bit about presenting, including planning out a way for each person in their partnership to say something or participate in some way. Also, be sure to explain to them that they need to have something to explain their experiment to the class. Depending on the experiment, they could plan on doing their actual experiment in front of the class, or they could have a poster with drawings showing their experiment. In addition, be sure to explain that they must create a poster from a piece of construction paper. Their poster has to have at least two things on it: 1) Their hypothesis in a complete sentence—probably starting with "We think..." 2) Their conclusion (what they figured out).]
NGSS: 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. [Clarification Statement: Examples of materials could include those that are transparent (such as clear plastic), translucent (such as wax paper), opaque (such as cardboard), and reflective (such as a mirror).] [*Assessment Boundary: Assessment does not include the speed of light.*]
CC Link: Speaking and Listening 5 Add drawings or other visual displays to descriptions when appropriate to clarify ideas, thoughts, and feelings.

Day 13:
Topic: Placing items in light's path Experiments Day 6: Presentations
Materials:

- Student posters and experiment materials

Lesson Idea: [Student presentations…In addition, guide students in asking questions about their peers' presentations as the common core standard suggests.]

NGSS: 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. [Clarification Statement: Examples of materials could include those that are transparent (such as clear plastic), translucent (such as wax paper), opaque (such as cardboard), and reflective (such as a mirror).] [*Assessment Boundary: Assessment does not include the speed of light.*]

CC Link: Speaking and Listening 3 Ask and answer questions about what a speaker says in order to gather additional information or clarify something that is not understood

Day 14:

Topic: Conclusion about the effect of placing objects in light's path

Materials:

- A way to project the video from the link below for the class to see (for my free instructions on how to save a youtube video to your computer, visit http://www.teacherspayteachers.com/Product/5-Ways-to-Download-Save-a-Youtube-Video-988028store
- My thinking like a scientist poster, which can be downloaded for free from: http://www.teacherspayteachers.com/Product/Scientific-Method-Poster-for-Kids-Thinking-Like-a-Scientist-988698

Lesson Idea: [Remind the class all about the scientific method—particularly the word conclusion. Explain that today we will form conclusions about placing things in light's path. In other words, we'll discuss what we figured out from all of the many experiments that we got to see. Guide students to conclusions about each of the types of materials mentioned in the NGSS standard. (i.e. What happens when clear materials, partly clear materials, and totally unclear materials are placed in light's path.) Then have each student produce a complete sentence that states a conclusion. Now that students understand what happens when various objects are placed in the path of a beam of light, allow them to watch the following video showing some neat experiments that are similar to what they've done: http://www.youtube.com/watch?v=DThUKDM_Wtk]

NGSS: 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. [Clarification Statement: Examples of materials could include those that are transparent (such as clear plastic), translucent (such as

wax paper), opaque (such as cardboard), and reflective (such as a mirror).] [*Assessment Boundary: Assessment does not include the speed of light.*]
CC Link: language 1j Produce and expand complete simple and compound declarative, interrogative, imperative, and exclamatory sentences in response to prompts.

Day 15:
Topic: Communicating over a distance: Put yourself in history
Materials:

- A phone
- A way to project the video from the link below for the class to see (for my free instructions on how to save a youtube video to your computer, visit http://www.teacherspayteachers.com/Product/5-Ways-to-Download-Save-a-Youtube-Video-988028store)

Lesson Idea: [Hold up a phone and explain how amazing it is to be able to talk to people all around the world by pushing a few buttons. Explain that it wasn't always this way. Watch the following video so students can see the evolution of communication: http://www.youtube.com/watch?v=tqRKpTA8gD0 After the video, briefly summarize in your own words for the class how communincation has changed from cavemen til now. Explain how things that the students have probably never heard of—such as telegraphs—work.] Next tell the class the following: I want you to understand what it would be like to live without phones and email like we have today. We will have to use our imaginations to do this. I am going to give you an example of something that really happened a long time ago. You use your imagination to decide what you would do. Then you will discuss with a partner what you would do. After that, I'll tell what really happened in real history.

1. Paul Revere etc.: A long time ago, our country was at war to decide whether the King of England would rule over us or whether we would be our own country. There were no phones or emails. Some people wanted to let all the soldiers and families in the city know which direction the enemy was coming from when they came. How would you do this? [Have students think, then tell a partner, then tell them what really happened.] What they really did was hang a lantern (giant candle) in a high window of a church building. One lantern meant the enemy was coming from the land; two lanterns meant they were coming from the sea. They used light signals to communicate.

2. Generals in wars: Pretend you are a general in the civil war. There are no phones or computers. How would you get ahold of another general to let them know about your plans so you could work together? [Have students think, then tell a partner, then tell them what really happened.] They used a machine called the telegraph. Telegraphs could send little beeps but no words. They had a code to turn these beeps into letters, words, sentences, and messages.
3. Pony Express: You decide to move out west during the great gold rush of 1849. You strike it rich and want to let your family in New York know that they can come live with you now because you found gold. How do you get ahold of them? [Have students think, then tell a partner, then tell them what really happened.] The Pony Express was the way that messages and mail were delivered in that time. The Pony Express riders rode horses from the East to the West as fast as they could. Sometimes Indians chased them and other scary things happened. They usually made it all the way across the country in about one week.
4. Telling time: A long time ago, a lot of people could not afford watches. How did they tell time? [Have students think, then tell a partner, then tell them what really happened.] There was a big clock in the middle of the city. Every hour the clock rang really loudly. It rang as many times as the hour that it was. So if it rang five times, then it was five o' clock.
5. Church: Pretend you were a minister a long time ago. You want to remind everyone to come to church, but you cannot text, phone call, or email. How do you remind everyone? [Have students think, then tell a partner, then tell them what really happened.] Churches would ring a big bell on Sunday to remind everyone that it was time to come to church.

NGSS: 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.* [Clarification Statement: Examples of devices could include a light source to send signals, paper cup and string "telephones," and a pattern of drum beats.] [*Assessment Boundary: Assessment does not include technological details for how communication devices work.*]
CC Link: Speaking and Listening 1 Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups.

<u>Day 16:</u>

Topic: : Build a communications device Day 1: Introduction and planning

Materials:

- none

Lesson Idea: [Remind students what you taught yesterday about how mankind has communicated over a distance in various ways throughout the years. Also remind students how to think like a scientist as we've been learning this year, and remind them that scientists are problem solvers.] Tell students the following: We will be splitting up into groups. Each group will be creating their own communication device as people have had to do in the past. Each group will have to use their imaginations to imagine that they are in whatever place I tell them with whatever tools I tell them they have to use. You will have to figure out how to solve the problem I give you with what you have. [Assign groups and give each group one of the following scenarios:

1. Your boat crashed in the ocean. You are stuck on a dessert island with this group of people. Half of you go to find food and the other half go to find a place to sleep. All you have is the rocks, trees, and other things you find on the island. How will you let everyone know if you have trouble? How will you let everyone know if you find what you are looking for?
2. You are stuck in a very dark cave. Some rocks have collapsed and blocked the way out. You are afraid that if you talk too loud, more rocks will collapse and make you even more trapped. All you have is several flashlights. You decide to split up and search for a way out. How will you let each other know if you find a way out? How will you let each other know if you are in trouble?
3. You are playing at a friend's house. You have a secret club. Since it is secret, you do not want to shout things because the neighbors might hear. Some of you are in the treehouse, and some of you are on the ground. All you have is two toy drums. How can you use the drums to send messages between the treehouse to the ground?
4. You are going to see some fireworks with your family. Many people will be at the fireworks show. Everyone in your family has their own flashlight. What type of signal can you set up just in case you get separated in the crowd of people?
5. You live with a Native American tribe 200 years ago. The chief is trying to think of ideas about how to warn the whole camp if there is danger. Everyone has a set of loud drums in their tepee. How can the chief warn if there is danger? How can he say that it is time for a meeting? How can he say that it is time to eat?

NGSS: 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.* [Clarification Statement: Examples of devices could include a light source to send signals, paper cup and string "telephones," and a pattern of drum beats.] [*Assessment Boundary: Assessment does not include technological details for how communication devices work.*]
CC Link: Speaking and Listening 1 Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups.

Day 17:
Topic: Build a communications device Day 2: Try it out/Present
Materials:

- Materials needed for scenarios in day 16; Two toy drums, flashlights, rocks and twigs,

Lesson Idea: [Remind students about the plans they made in groups during the last science lesson. Explain that today they will be trying it out in front of the whole class. Call the groups up one at a time to present their idea. First read their scenario to the class. Then allow the group to explain their solution and demonstrate how it would work. After each group presents, give the class time to ask questions that help them understand how that groups idea would function.]
NGSS: 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.* [Clarification Statement: Examples of devices could include a light source to send signals, paper cup and string "telephones," and a pattern of drum beats.] [*Assessment Boundary: Assessment does not include technological details for how communication devices work.*]
CC Link: Speaking and Listening 3 Ask and answer questions about what a speaker says in order to gather additional information or clarify something that is not understood.

Day 18:
Topic: Build a communications device Day 3: build a telephone
Materials:

- A way to project the video from the link below for the class to see (for my free instructions on how to save a youtube video to your computer, visit http://www.teacherspayteachers.com/Product/5-Ways-to-Download-Save-a-Youtube-Video-988028store
- Paper cups
- String

- Paperclips

Lesson Idea:[Remind students what was done the previous two lessons. Remind them about the video that showed how communication changed from the cavemen to current times. Explain that a big part of the history of communication was when the telephone was invented, and telephone lines were installed across the U.S. It is a big deal to be able to talk to someone far away! Watch and explain the following video: http://www.youtube.com/watch?v=qWUP9EigdjY Even though the video already did this, explain for your class how telephones work, and explain that we can understand how a basic telephone works by building a cup and string telephone. Tell students that today we are going to build our own cup and string telephones! Follow the directions from this website to build student telephones: http://www.sciencekids.co.nz/projects/stringphone.html (I recommend using the paperclip method mentioned as part of the instructions on the website because having a paperclip hold the string in place is a lot more manageable with a whole class than knot tying.) Lastly, have students write about how to build a student telephone.]

NGSS: 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.* [Clarification Statement: Examples of devices could include a light source to send signals, paper cup and string "telephones," and a pattern of drum beats.] [*Assessment Boundary: Assessment does not include technological details for how communication devices work.*]

CC Link: Writing 7 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).