HOW MUSIC CAN BE INTEGRATED INTO LIFE SCIENCE TEACHING IN A WAY THAT ENHANCES SCIENTIFIC AND MUSICAL LEARNING IN MIDDLE SCHOOL

By

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A capstone project submitted in fulfillment of the requirements for the degree of Master of Arts in Teaching

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My project strives to answer the question: How can music be integrated into life science teaching in a way that enhances both scientific and musical learning? The project is based in both my own research and the professional developments I have attended with my school throughout the years. I have explored integration between science and visual arts, and science and theater arts before. This was my first experience diving into music and science.

The project is a six week curriculum for a music integrated ecology unit. There are six weeks of lesson plans, one week of completed workbook and the blank template for more, two assessments (complete with timeline, and rubric as needed), a letter home to families about the unit, a description of how a typical day in my classroom looks, and how I got to my unit (the standards, enduring understandings, and essential questions). The first three weeks focus on inquiry based science exploration of photosynthesis - this is an adapted iteration of the Open Sci Ed unit on Matter Cycling and Photosynthesis that was created to correspond with the 2019 Minnesota Science Standards. The inquiry stayed a part of the music integrated unit because of strong correlation between the inquiry process and the artistic process. Throughout the first three weeks students are asked to consider similarities between the musical process and the process they are going through. Students have to work in groups, and come to a class wide consensus on how photosynthesis works. Once students have this inquiry based practice the final three weeks diverge from the Open Sci Ed curriculum and explore the similarities between music and an ecosystem. Students will map both songs and ecosystems and then compare what they see and hear. Students will also be pushed in literacy in general as they are asked to make connections between songs they know and ecosystems they frequent.

The unit is intended to be implemented in the seventh grade life science class at an arts focused urban school. There are around 120 students per year, in every federal racial designation

with a variety of IEPs, WIDA scores, and other needs and abilities. The unit, and specifically the workbook(s) are highly customizable and allow for modification on the teacher side, before they ever reach students, or allow students to answer questions through writing, images, or audio recordings as they are comfortable. Students of all abilities will be expected and able to engage in every part of the unit, and bring their own knowledge to class processes, and individual work.

I used both Understanding by Design and my district's lesson planning format "ignite", "chunk", "chew" and "review" in order to create my unit. From the beginning it makes sense to first see the music and science standards that I'm focusing on. Then I created the Essential Questions that I want students to be able to answer because of the unit and the Enduring Understandings, which are broader ideas that can include the answers to the essential questions and are what I hope students will retain for the longest amount of time. The ignite, chunk, chew, review format is described in my explanation of my daily class structure. My lesson plans then follow the same format, with symbols for ignite, chunk, chew, and review that correspond to pages/sections in their workbooks.

Project Reference List

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Wilson, H. E., Song, H., Johnson, J., Presley, L. & Olson, K. (2021) Effects of transdisciplinary STEAM lessons on student critical and creative thinking, The Journal of Educational Research, 114:5, 445-457. DOI:10.1080/00220671.2021.1975090

Unit 4: Matter and Energy in Organisms and Ecosystems

7L.2.1.1.1 Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.** *Emphasis is on cause and effect relationships between resources and growth of individual organisms and the number or organisms in ecosystems during periods of abundant and scarce resources. Examples may include populations of MN deer, moose, wolf, scavengers or aquatic populations in Lake Superior or algal blooms in lakes and ponds. Examples of evidence may include the use of flow charts to organize and sequence the algorithm, and to show relationships.*

7L.3.1.1.2 Develop and use a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism. *Emphasis is on describing that molecules are broken apart and put back together and that in this process, energy is released. Examples may include models of sugar breakdown into molecules of glucose that power our bodies, or protein breakdown into amino acids that are later reassembled to create body structures.*

7L.3.1.1.3 Develop and use a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. *Emphasis is on describing the conservation of matter and flow of energy into and out of various ecosystems.*

7L.3.2.1.2 Construct an explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms. *Emphasis of the core idea is on plants and algae using energy from light to make sugars (food for themselves and as an energy source for other organisms) from carbon dioxide (from air) and water; and in the process release oxygen.*

GRADE 7

Code	Strand	Anchor Standard	Benchmark
3.A.1.1	**1. Foundations**	1. Use foundational knowledge and skills while responding to, creating, and presenting artistic work.	*The benchmarks are integrated across the other strands, highlighted in bold.*
3.7.2.2.1	**2. Create**	2. Generate and develop original artistic ideas.	1. *Create* or *improvise* musical ideas that can be combined into a melody with *expressive elements.* For example: Dynamics, articulations, tempo.
3.7.2.3.1		3. Create original artistic work.	1. Develop a *composition* consisting of a melody with expressive elements using a system of *notation* or **recording technology**.
3.7.2.4.1		4. Revise and complete original artistic work.	1. *Revise* a *composition* to include *expressive elements.*
3.7.3.5.1	**3. Perform**	5. Develop and refine artistic techniques and work for performance.	1. Demonstrate an understanding of various *genres* and styles of music by applying *musical elements* to prepare for a *performance.*
3.7.3.6.1		6. Make artistic choices in order to convey meaning through performance.	1. *Perform* music for an audience by responding to *notation,* using expressive skills. For example: Audience being a classmate, friend, online platform, or a large group.
3.7.4.7.1	**4. Respond**	7. Analyze and construct interpretations of artistic work.	1. Identify the musical or technical skills needed in *musical selections* to convey meaning or possible *intent* including *cultural* or *historical contexts.*
3.7.4.8.1		8. Evaluate artistic work by applying criteria.	1. Identify and use a variety of techniques to evaluate the qualities of a musical *performance.* For example: Student generated criteria; rubric; rating scale.
3.7.5.9.1	**5. Connect**	9. Integrate knowledge and personal experiences while responding to, creating, and presenting artistic work.	1. Describe why various musical choices are made when *creating* or *performing* music.
3.7.5.10.1		10. Demonstrate an understanding that artistic works influence and are influenced by personal, societal, cultural, and historical contexts, including the contributions of Minnesota American Indian tribes and communities.	1. Identify *cultural* or historical influences on musical compositions.

Enduring Understandings:

- Scientists sort and categorize the natural world (not everything in a set category is identical and there are exceptions to every rule)
    - Musicians do this too
    - There are different genres of music, with their own rules
    - Music has cultural context
- Matter and energy move through an ecosystem - all living things are connected and rely on each other
- Energy comes from food (via chemical reactions)
- Plants make their own food (via a chemical reaction, photosynthesis)

Essential Questions:

- What do ecosystems in a biome have in common with each other? What are the difference?
- Where do living things get their energy?
- Why do living things eat food?
- Why don't plants need to eat food?
- What does food turn into after you eat it?
- Why do we categorize music?
- What informs how we understand music?

Overview of how Hustad's Class Works

Sunday, July 17, 2022 2:08 PM

Ignite: Quiz on schoology - students get 5 attempts, and are meant to do this as soon as they enter the classroom

Chunk: Presentation of new info (in a pages, digital interactive notebook- downloaded on Monday for the whole week)

Chew: Application of new info (in a pages, digital interactive notebook- downloaded on Monday for the whole week)

Review: Quiz on schoology - students get 5 attempts, meant to do this before they leave the room (checks for understanding of a key concept from class)

HW: assigned on Wed, and due on the following Wed

Unit Explanation - Letter to Families

Monday, July 25, 2022 12:59 PM

Hello Adults with 7th graders,

We will be beginning our 4th science unit of 7th grade next week. We will be studying matter and energy in organisms and ecosystems. Students will begin the unit by doing several investigations into plants and how plants get food molecules. If you have time and space at home a great connection would be to talk to your student about what is in the food you all are eating where that food came from.

Students will get to use microscopes, CO_2 detectors, and investigate a hydroponic plant set up. Hopefully half way through the unit students will be able to explain to you where the food molecules in plants come from!

Then in the second half of the unit we will be focusing on the arts, and using connections to music to cement our understanding of matter and energy cycling. We will listen to how melodies move through an orchestra, and how music can transfer energy and what musical technique give and take away energy from a song. If you have time and space at home a great connection would be to share music with your student and talk about the different feelings that music evokes, and where the melody and chorus move to throughout the song.

Students will finish up the unit by comparing and contrasting two different situations in the same ecosystem. They will use analogy to compare their ecosystem to a song, and they will have to find two different versions of the same song that represent that different states of the same ecosystem.

If you or your student have any questions do not hesitate to reach out!

If you or your student has any specific expertise in music (orchestration, performance, or theory) or plant physiology please do not hesitate to get in touch!

Best,
Erin Hustad

Week 1:

	Monday	Tuesday	Wednesday	Thursday	Friday
Ignite 	**GQ: Where does food come from?** Ignite for schoology: DISCUSSION POST: Comment 2-3 things you eat, and describe where they come from. Example: Hustad eats yogurt. Yogurt comes from a cow.	**Where does food come from?** Ignite for Schoology: Multiple choice question: Look at this food label:  Which things listed on the label are 'food molecules' that we discussed yesterday? A. Calories B. Fat C. Sodium D. Carbohydrates E. Vitamin D F. Protein	**Where does food come from?** Ignite for Schoology: Discussion What are 2 OR MORE questions you have about the processes a plant uses to make maple syrup?	**Do plants get their food by eating?** Ignite for Schoology: Multiple Choice What body part(s) do most animals have that help them eat? • Stomach • Mouth • Lungs • Nose	**Do plants get their food by eating?** Ignite for Schoology: How could you check the hydroponic plants for food molecules? INCLUDE ANSWERS THAT THEY CAME UP WITH THE DAY BEFORE
Chunk 	• List of food, from schoology discussion onto board + into workbook • Tasting + observing maple syrup into workbook (look at both maple syrup and nutrition labels)	• Quick discussion - create a list as a class - What predictions did we make about what molecules are in our food? Are those molecules different when our food is from plants or animals? • Students are told that they'll be working with their table groups	• Using the discuss ignite we, as a class, need to create a Driving Question Board - this will inform our learning! • We need to sort questions into	• Turn and talk - where do plants get their food molecules from? • Share out answers • Today we are trying to figure out if plants get food molecules by taking them in	• Lab question - which food molecules are in the hydroponic plants? • Determine controls as a class • Jigsaw Lab Day • Iodine for complex carb test

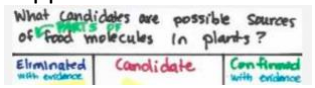
	• Video about making maple syrup (observations during video in workbook)	• They'll be handed a packet of food labels
		• They'll have to create a chart to show what types of food molecules are in each food they have a label for
		• Analyze class data once each group has looked at the nutrition labels
		  • What patterns do you see in the food that comes from plants?
		  • What surprised you?
			categories ex. Soil, air, and plant
			• Write a question that you want to learn the answer to from schoology onto a post it to transfer to the board
			• All the questions should work together to answer the question "How do plants get their food molecules? Where do they come from?"
				• Look at plants that have been growing in the classroom
				  • Look at photos, seeds, nutrition labels
				• Make a chart:
				  • Where could plants' food molecules be coming from?
				  • Once an investigation disproves something it is moved to a different column
					• Benedict's Solution for simple carbs
					• Paper Bags for fat
					• Biuret for protein
					• Review Lab Safety
					• Conduct experiments (2 groups for each food molecule - working at their tables) (remember to also check the hydroponic food for these molecules to rule that out as a food source)
					• Collect data, and have ready to present in a way other students can understand
					  • Place to do this in workbook
					• Clean up SAFELY

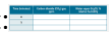
Chew 	• Review - what happens to the food we eat in inside our bodies (a few Qs in	• How do plants get food? • In student workbooks students will choose one of the plants we have looked at already	• Plan an investigation to answer one or more of the questions on the board! (work solo	• Figure out what is happening in a hydroponic set up - what would it 'rule out' as a source of	• Share results as a class, all groups record class results in workbook

	workbook, then share out) • Split food from the 'both/other' category into ingredients and move those ingredients to plant or animal • If time allows - make a vocab wall card for one of the types of food molecules • *Read about breakfast foods from around the world … (include in workbook, but VERY OPTIONAL)*	and develop a model of how that plant got its food molecules • They will also need to include where those food molecules came from • Student model share out (IF TIME)students will stand up and find someone wearing the same color shoes as them and compare their models (place to put photo and initials in workbook) • Review norms for consensus • Develop a mostly agreed upon class model with inputs and out puts for an example plant *this is SEPARATE from their ideas in the workbook so that they are accountable for both, and they should be DIFFERENT	on this in workbook) • Share investigative plans with table mates, draw connections between them, develop an idea about how the ideas they brainstormed individually could work together in an investigation • Put their questions and investigative ideas into an order of execution, make a materials list	nutrients if plants can grow in 'just' water? • Analyze the full set up - what can students see through/in the water? • Record student questions about the hydroponic set up - try to have other students answer them with evidence • How could we find out if hydroponic plant food is the source of plant nutrient? Develop an independent idea for an additional investigation.	• Groups draw conclusions based on shared results • Class discussion about conclusions that can be drawn in answer to the question • Follow up question in workbook about the similarities between science and art, pushing students to reflect on both as processes, and meaning making practices
Review 	What kinds of food molecules were most common in the maple syrup we tried today? • Carbohydrates • Sugars	Schoology - multiple choice question: What goes into a plant? (what are the inputs) • Water	Schoology - multiple choice question: What are 2 examples of things that scientists do that we did today?	Schoology - multiple choice question: What did we rule out as a source of food molecules in plants today?	Schoology - long response quiz question: Given the work we did today in class what

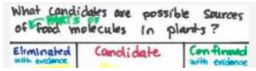
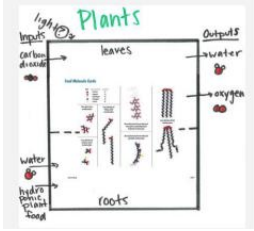
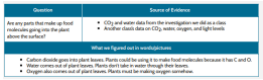
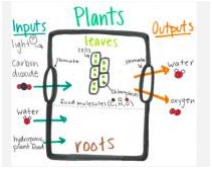
	• Fats • Protein What sort of food product is maple syrup? • Animal • Plant • Both • Other	• Nutrients (elements/compounds from the soil) • Air • Light (yes, all correct answers)	• Collaborate • Ask Questions • Do experiments • Research	• Soil • Water • Air • Sun	question(s) do you think we should try and answer next? Why?

Week 2:

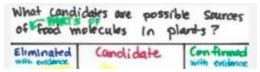
	Monday	Tuesday	Wednesday	Thursday	Friday
Ignite 	How else could plants get food? Schoology Multiple Choice: What elements are in the air? • Oxygen • Carbon • Nitrogen • Lead • Aluminum	Can plants get food from the air? Schoology Discussion: How do you think air could get into a plant?	Can plants get food from the air? Schoology Short Answer Question: What did we learn in our investigation yesterday?	How does gas get into and out of leaves? Schoology Multiple Choice: What gases move in and out of leaves in plants, that we've seen evidence for? • H2O • CO2 • O2 • CO	How do chloroplasts work? Schoology Quiz Matching: Which are inputs and which are outputs? Inputs: Light, CO2, HP Plant Food, Water Outputs: Water, Oxygen
Chunk 	• Consensus model questions in workbook - discuss at tables, then share out • What did we figure out in our last lesson? • So far, we've been looking at candidates like soil, water, and hydroponic plant food as inputs to the plant. Is there	• Leaf Investigation • Review - and share out - what's left as a potential source of food molecules? • Brainstorm: • How can we test changes in the air? • What would we be trying to measure a change in the air? • Intro the CO2 detector and ask how	• Review Investigation from Tuesday: • What questions did the investigation raise? • Are there any other gases entering/leaving the plants? • Analyze graphs of other data from labs done by 'other students' • What patterns do you see in the data?	• Review chart from yesterday, make sure everyone has evidence supplied for the moves:  • Students share out their evidence • Talk with a partner: • How do you think all these gases are moving in and out of the plants? • How could we figure out how the gases are moving? • Close observation of leaves	• Day 1 - virtual lab • Discuss as a class: • What inputs/outputs do we want/need in the simulation? • What cell parts do we need to see? • Walk through how to use simulation • Include directions with screen grabs in workbook for

	anything else below the surface that we didn't test? • So what are we still trying to figure out? • Is there anything else coming into contact with our plants above the surface besides light? • How will looking at air and sunlight help us make progress on our question about where the plant is getting food molecules? • Review • What do you already know about air? • What about light?	it would help us • Discuss how the detector works • Closed vs. open systems • How close does the detector need to be to a plant • What can it sense if it is touching a plant? • Present materials • baggie, machine to make the closed system • Students brainstorm what part of the plant they think air enters through - that should also go in the bag (eventually) • Table to be filled out:  • Students take and confirm initial	• What is going on with other gases? • Which gases are inputs and which are outputs? • How is this data different from ours? What procedures were used to collect it? • Students make What I See and What it Means statements for each graph • Share What it Means statements as a class, and discuss that the "What I see" is the evidence for the claim of What it means	• Use magnifying glasses • Record structure and function noticings etc in workbook • "What did you observe? What did that remind you of?" • Zoom in on leaves via video * *look to see if we can make stomata prints* • Close observation of things inside the leaf - make a table to fill it out • Focus on the same ideas - what structures do you see, what do they remind you of, what jobs do you think they have? • Video to watch: Video of Elodea under a Microscope - Unit 7.4 Matter Cycling & Photosynthesis Lesson 5 	them to reference • First simulation = do not change any sliders, we want to compare with the whole class • Investigate and record: • What do the plants cells start with? • What do they end with? • What does this tell us?

	• Discussion of sunlight (not made of matter) • Predict - what could be coming from it? • Analyze air for food molecules (image in workbook)	reading for the system before adding leaves • Predict - what will happen to the 2 values over time? • Record data		• Would it be possible to do this under our microscopes?	

Chew 	• Process new findings:
	  • If none of the inputs we investigated contain whole food molecules, then what could be the source of food molecules for the plant?
	  • Do you have any ideas about how plants could get food molecules without directly taking them in like we do?
		• Analyze data
		  • Are there any parts that make up food molecules going into the plant from above the surface?
		  • What other claims can you make based on evidence from this experiment?
		  • What are you unsure of or what new questions does this
			• Adjust Chart based on new evidence:
			 
			• Modify plant input output and inside model:
			 
			• May look slightly different for each kid!
			• Use a 3 box tracker for formative assessment in workbook:
			 
				• Read about plant cells
				  • Highlight, pull main ideas
				• Compare plant cells to animals cells (may need to review animal cells from human body unit)
				• Make a vocab card for chloroplast
				• Add chloroplasts to our plant model:
				 
				• Speculation, reflection, and prediction - how do we think plants might be 'turning' inputs into outputs
					• Fill out a table like this in workbook:
					 
					• Give the word photosynthesis to students, make a vocab card
					• Students are planning their own investigation for Monday
					  • Need to choose a variable
					  • Need to create a data table
					  • Need to be able to articulate what they are

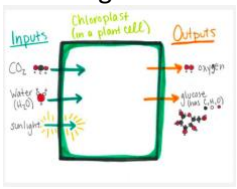
	• What evidence would help us determine whether hydroponic plant food, air, or water could be involved in a chemical reaction to make food molecules? • So, if we looked at the parts of food molecules and the parts of our candidates to see if there are any similarities, how would that help us answer our question? › Make food molecules out of air molecules (I spy style) › Follow up Qs: • What patterns did you notice when comparing the	raise for you? • Develop claims about the ways molecules move through plants based on all of the evidence we have collected so far	› Final reflection Qs and Predictions moving forward: • Matter can't just disappear and appear. How could there be less carbon dioxide and more oxygen? • What other systems have we seen that also change the amount of carbon dioxide and oxygen in the air around them? What in those systems caused that to happen? • What does this mean? What could be going on with plants? • Why are these gases moving in and out of plant leaves? How does that happen?	› What is happening inside the plant cell???	hoping to figure out through this additional investigation.

	food molecule cards with other substances surrounding the plant? • So maybe our original question when we were looking at candidates wasn't the right question! Instead, we should change our possible sources question! › Fix chart - explain new ideas with evidence:  › What is our evidence? • Fill out the chart › What do we need to do next to figure out what the sources of plant food molecule parts are? - lab brainstorm				

Review 	Schoology multiple choice quiz: What parts of food molecules are in air? • Carbon atoms • Oxygen atoms • Sulfur atoms • Iron atoms	Fill in the blanks: <u>Carbon Dioxide</u> goes into plants through the leaves. <u>Water</u> leaves the plant through the leaves.	Schoology Discussion: Post one of your paired What I see, What it means statements in claim, evidence format.	Schoology multiple choice: What is the name of the green things in plant cells? • Chloroplasts • Peas • Mitochondria • Shrek	Schoology short answer: Why is it important that you're planning to only change one thing in your investigation for Monday?

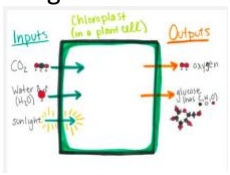
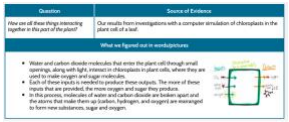
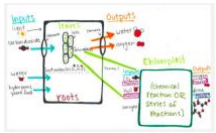
Week 3:

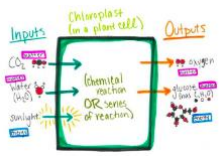
	Monday	Tuesday	Wednesday	Thursday	Friday
Ignite 	How do chloroplasts work? Schoology Discussion: Remind yourself what your question for part 2 of the investigation is. Check your workbook from last week. Make a prediction - what do you think your results will be today?	Why do plants need light? Schoology multiple choice question: Which of the following go in to the chloroplasts? • Light • Sugar (glucose) • Oxygen • Carbon Dioxide	Where are plants getting their food from? Schoology Short Answer Question: In your own words: where do plants get their food?	Where are plants getting their food from? Schoology Discussion: What do you think the most important things you've learned so far this unit are?	Where do food molecules in maple syrup come from? Schoology True/False: Maple trees also do photosynthesis which creates the sugars in the maple syrup we ate.

Chunk 	• Investigation day 2
	• Conduct the investigation (feedback provided on schoology re: plans for the investigation)
	• Students record data and generate claims with evidence based on their results
	• Students respond to several reflection questions before group share out:
	  • What are some of your observations from the simulation about
		• Remind students of this image:
		 
		
		• Ask students to discuss yesterday with their tables:
		  • In the simulation, where was sugar being made?
		  • What were the inputs?
			• Reflection on the last week and a half
			  • Partner share, and record at tables, what have we figured out so far and why does it matter?
			• Pull up driving question board, pull up first plant models (submitted by students, in their previous workbooks)
			• Students need to make a final model of
				• Assessment Day - students will be creating an individual plant model	• Make at tables:
					  • A translation of the concept map for plants that is specific to maple syrup, provide the video we watched on day 1 so students can review ideas about the translation from tree to syrup
					  • Post table created concept maps to a

	how the inputs interact within the plant? • How are these inputs interacting within the plant cell to produce food molecules?	• What were the products? • Based on what we saw happening in the simulation, what happens inside the chloroplasts in plant cells? › Talk as a whole class about those questions › Review Matter: • Which of the inputs and outputs in our model represent matter? • What about the sunlight? Is that matter? We saw that sunlight is an important input for a plant to be able to make food molecules. What could sunlight represent in our model?	how plants get their food molecules • Table groups collaborate to make a list of what that model will need to have • Tables will share out, the class will generate a list of what the final model needs		media album on schoology • Comment on similarities and differences between the tables' models • Table discussion about art experiences: • What art classes are you taking this year? • What art projects have you made/done in the past? What was that process like? • What other classes have you used art skills in? How did that help you learn? • Individually map the scientific process • What does it mean to "do science"? • What steps do you have to take to have

		• If sunlight isn't made up of molecules like carbon dioxide and water, then what is it and why do plants need it? › Push students to explain where the molecules for glucose come from, and what could be happening in the cell to allow that			people take you seriously in science? • How do you know when you're done with the investigation you're doing in science? • Why do scientists share their results? • All prompts feeding into the creation of a concept map • Individually map the artistic process • What is the first step to making art? • What do you do with your completed art? • How do you know your art is done? • Why do people display their art?
Chew	› Students share out answers to the questions	› There is no energy in our model yet, but we	› Students make a final model with their	Students have the whole period to work	• At tables students will create venn diagrams

	above, as well as their claims and evidence • Students as a whole try to make sense of this image:  • Students finalize, and submit investigation 'cards':  • Ask students to discuss/brainstorm at their tables what the light is needed for, record a list and tell them that will come up tomorrow	don't know for sure if that's why the sun is there • Explain how we measure energy in food, remind students that we get our energy from food • Look at food labels to find calories, and remind students that calories are NEUTRAL - they are just a measure of how much energy is in something • Look at labels for the food molecule parts to see if there is energy in them • Food labels should show that food (glucose) has energy - label the glucose as energy on the model • Discuss solar energy and label the sun as energy as well • Final model for the day should look like:	tables, based on the must have list the class generated • The results should look like:  • Fill out the three box conclusion 	on their plant food model. Base from open sci ed:  Can modify for multiple levels - students working at a challenge level need significantly less supporting words and images, MLL students, and SpEd students may need more	between the scientific and artistic process • Discussion questions to guide them • Consensus model venn diagram created by the whole class on similarities between 'making art' and 'doing science'

					
Review 	Discussion: Go back into the ignite and reply to yourself, share whether or not you were right based on your investigation today.	Schoology: Multiple Choice: • Which of the inputs/outputs are sources of energy? ○ Sunlight ○ Glucose ○ Oxygen ○ Carbon Dioxide ○ Water	Schoology: Short answer: • How do you know a chemical reaction happens in the chloroplasts?	Schoology: Discussion: • Do you think the assessment today showed your learning? Why or why not?	Schoology: Discussion: - How is the scientific process similar to the artistic process? Use a specific example from the last 3 weeks for the scientific process.

Week 4:

	Monday	Tuesday	Wednesday	Thursday	Friday
Ignite 	(lesson 10 - divergence from openscied) Matter and energy flow - into/through the non-living and living parts of the ecosystem What happens to matter and energy AFTER plants make glucose? Schoology: Multiple choice question: Where do you get energy from? • Food • Water • Sleeping • Exercise	What happens to matter and energy AFTER plants make glucose? Schoology: Multiple choice question: What part of the food you eat gives you energy? • Glucose • Oxygen • Carbon • Nitrogen • DNA	How does energy and matter stay in the ecosystem when living things die? Schoology: Discussion: What did you do with the energy you got from food yesterday?	How do scientists categorize different parts of the ecosystem? How does that add to our understanding? Schoology: Short answer: Make a list of all the things you categorize. Think - what do you sort into categories? It could be food, friends, clothes, or something totally different!	How do scientists categorize different parts of the ecosystem? How does that add to our understanding? Schoology: Matching question: Sort the different living things into plants and animals: • Tree • Flower • Bush • Deer • Leopard • Spider
Chunk 	• Ecosystem: • Start with a think pair share looking at images of	• Review from yesterday - full class discussion: • What is an ecosystem?	• Discussion - think pair share- framed around: • What happens to things after they die?	• Table discussion: • Why do people make categories? What does it	• Introduce relationships between organisms

	different ecosystems at various tables • Students discuss what they see and how the things they see interact with each other • Define ecosystem • Students make vocab cards for ecosystem • Students list ecosystems they are familiar with and the things in those ecosystems (ex. Lakes, ponds, rivers, forests, the park near their house) • Students find an image of the ecosystem	• How do things connect in an ecosystem? • How is an ecosystem similar to an orchestra or a band? • What is a food chain and what do they tell us? • Videos about food chains, and food webs • Going through example food chains and food webs to look at energy/matter flow and label it • How do living things use energy? • Make a chart of uses of energy in people and other living things • Recognize, and label that NOT ALL ENERGY moves up the food chain, and not all matter	• Things to consider: ○ Roadkill ○ Leaves that fall off of trees ○ Animals that die of diseases ○ Animals that are hunted ○ Plants that die seasonally • What would happen if those things stayed around forever? • What evidence do you have for what happens to them? • Introduce/define decomposer • Vocab card for decomposer • Students each read about a specific type of decomposer and share at their table how that decomposer breaks down dead things	help them do? • What does grouping things help you do? • What categories have we learned about this year? What did things in those categories have in common with one another? • Scientists categorize in order to make things seem simpler, and easier to understand - categories are not perfect, and can lead to dispute, argument, and even harm • Look at the ecosystem images with your table, how would you sort the things in that image? Make at	• Parasite (fatal ant fungus video) • Mutualism (sucker fish on a shark) • Commensalism • Students watch videos/read about a specific example and work to define the relationship they focused on • Students share out their definitions • Students workshop their definitions as a class, record them in their notebooks • Include:) :(:| notation to describe relationships • Intro students to chords, and talk about feelings, note interaction

	they listed and draw connections between the different parts in it (literally draw on the image and label interactions)
	• Introduce the full orchestra
	  • Play students an orchestral piece, ask them what interaction they heard, what feelings the song made, what energy it had
	  • Show students the different instruments ask them to describe how the different instruments and sounds work together
				least 3 categories and sort EVERYTHING in the image into one of those categories
				• Meet with another table, compare your categories
				• Share out what categories we want, and what the rules are for those categories
				• Give the categories 'official' scientific names
				  • Might be plants, animals, abiotic, biotic, producers, consumers, predators, prey *depends how students sort*
				• Same activity - but sorting music
				  • Either sort orchestra instruments OR songs into genre - time dependent	

Chew 	• Students compare their ecosystem to an orchestra, what do they see that is similar, what is dissimilar
	• Students find a different band/musical set up from an orchestra and consider how those instruments work together - challenge what does it mean if a performer is a soloist, or a looper?
	• Students consider movement of matter in their ecosystem, and movement of energy
		• Create a food web based in the ecosystem from yesterday
		• Respond to question prompts asking about energy in an orchestra/band
		  • If energy is represented by the melody how does the melody move around the orchestra?
		  • How does the melody change as it moves?
		  • Is this a good comparison or not? Why?
			• Students add decomposers to their food webs
			• Students reflect on why decomposers are necessary, how recycling matter benefits the ecosystem
				Reflection:
				• How do categories impact our understanding?
				• What size category is most helpful?
				• Do you think some categories are more important than others?
				• When is categorizing bad?
					• Match chords (on schoology) to the different relationships, describe why those sounds signify/correlate to various relationships, describe how the notes interact

Review 	Schoology: Discussion: What in an ecosystem uses the energy that plants make? Describe how it gets that energy.	Schoology: Multiple Choice: What does a food chain show? • Flow of matter and energy through living things in an ecosystem	Schoology: Discussion: Post a picture of your decomposer, share it's main job in the ecosystem	Schoology: Matching Quiz: Two categories in ecology are abiotic and biotic. Abiotic things are not alive, and have never been alive. Biotic things are alive, or used to be alive.	Schoology: Matching Quiz: Match the emoticon pairing to the relationship: - :) :) mutualism - :) :(parasitism - :) :| commensalism

		• How animals mate/reproduce • How many of a single kind of animal can live in an ecosystem • What people can safely eat		Sort the ecosystem parts into either abiotic or biotic categories. • Plants • Rocks • Water • Animals	

Week 5:

	Monday	Tuesday	Wednesday	Thursday	Friday
Ignite 	How does a song change as it progresses? Map changes in a song over time - create a visual representation of it Schoology: Discussion: Listen to the song playing as you walk in. Describe what you hear, and how it makes you feel.	How do ecosystems change over time? Map changes in an ecosystem over time - create a visual representation of it Schoology: Short answer: What changes happen in a song over time? How do you think those changes could happen in nature?	How are similar ecosystems different from one another? Why? Schoology: Discussion: Forest is a category of ecosystem. How do you think forests around the world are different from each other?	Is it good or bad for ecosystems to change? Compare 2 versions of the same ecosystem Schoology: Discussion: Do you think it is good/healthy for ecosystems to change? Why or why not?	What causes an ecosystem to change? How? Compare 2 versions of the same ecosystem Schoology: Short Answer: Think back to yesterday - what caused the change in the ecosystem you were looking at?

Chunk 	• Play a song
	• Students take notes on how it moves, changes, progresses, and if they think it returns to how it started or goes somewhere else
	• Students share out their ideas
	• Class collaborates to map the song on the board based on how
		• Ecosystem images
		  ○ Independent reflection looking at seasons in an ecosystem
		  ○ Respond to question:
		  ○ What changes between each picture?
			• Compare two ecosystems in different parts of the world - identify what goes into the same categories, and how the ecosystems are different even if they have the same parts.
			• Students look at two images - a forest in Minnesota and a forest in California
				• Each table is assigned two images (or short videos) of an ecosystem in two different stages. Might be a lake in summer and winter, or Yellowstone before and after a fire, and they have to identify what stays the same and what changes.
				• Tables discuss:
					Work time related to yesterday - this is really just the chunk based on yesterday's "chew"

	they think it felt/sounded
	• If students need help/want music words some things to consider defining/explaining:
	  • Dynamics
	  • Tempo
	  • Chorus
	  • Bridge
	  • Dissonance
	  • Harmony
	• Play the song again watching the map the class created
	• Revise the map based on the re-listen
		○ Draw arrows to make this a cycle.
		○ Which ecosystem image do you think has the most activity? Why?
		• Set up students to map an ecosystem similar to the song yesterday
		  • What would we put on the x-axis? (yesterday it was length of song, what is our time here?)
		  • What changes are we looking for?
		  ○ Volume, speed, activity level, number of animals, weather
		• Play a video of a ecosystem over time - time lapse of a forest through the seasons
		  • Students take notes
			• What things in each pictures goes into the plant category?
			• The animal category?
			• The nonliving (abiotic) category?
			• How are these forest different?
			• Why are they both still categorized as forests?
			• Play 2 songs from the same genre of music (ex classic rock)
			  • What do they have in common?
			  • Why are they classified as the same kind of music?
				• What is different between the two pictures?
				• What animals, plants, etc., go into each category for each picture?
				• What do you need more information about?
				• What do you know/think caused this change?
				• Which image do you think came first?
				• Do you think the ecosystem will change again? How and why?
				• Make a Venn Diagram comparing the two ecosystem images
				• Share which ecosystem they think is healthier and why
				• Partner with another table, share findings, come to a consensus about what a healthy ecosystem is	

		• Make a collaborative map of changes		• Class generates a list of what makes an ecosystem healthy, use that to sort and categorize the various ecosystem images at different tables	
Chew 	• Students choose a [clean] song they like (or a song off schoology if they're stuck) • They make individual maps of their songs, and then provide a description of what happens throughout the song • Students reflect on how this activity connects to science, and what we've been learning about • Share songs and maps at their tables, revise given feedback from peers	• Tables each get/choose a video from schoology of a different ecosystem • Students create time maps of those ecosystems relative to the video • Tables pair up with other tables and share their videos and their change maps	• Pick two songs in the same genre, and two ecosystems in different places and make an analogy • Analogy laid out in workbook (image, and song link on one side, and image and song link on the other side) • List of key differences and key similarities below • Describe the musical techniques that connect the song to the image of the ecosystem for you		Students choose the ecosystem, and do research into how it changes, what effects it, and create two different visuals, with descriptions of what is happening.
Review 	Schoology: Media Album - share an image of your song map Discussion: How did this activity relate to	Schoology: Media Album: One person from each table share the groups' ecosystem map	Schoology: Short Answer: What does something need to be considered a forest?	Schoology: True or False: Healthy ecosystems change.	Schoology: Discussion: Share what ecosystem you looked at and

	science? ("It didn't" isn't an acceptable answer! Talk at your table if you need ideas)	Discussion: What similarities did your ecosystem over time have to the song you chose yesterday?			what change(s/d) in that ecosystem, and what happens as a result of that change.

Week 6:

	Monday	Tuesday	Wednesday	Thursday	Friday
Ignite 	Project Planning Schoology: Discussion: What kind(s) of ecosystems are most interesting to you? Why?	Project Work Time Schoology: Discussion: What is your song? What does it inherently have in common with your ecosystem?	Project Work Time Schoology: Discussion: What are the two versions of your song? What is the main difference between them?	Presentation of Learning Schoology: Short Answer: What expectations do we have as a class that are most important to you when presenting to your peers?	Presentation of Learning Schoology: Short answer: What do you think the class audience can work on being better at today?

Chunk 	• Directions for the day:
	• Plan project:
	  ○ Choose ecosystem
	  ○ Find a change/difference that occurs in that ecosystem
	  ○ Find images that show the two different states
	  ○ Find a song that has been performed multiple times (this could be two performances by the same artist with different energy, or a cover and the original or two covers, or the
		Students are in the creation phase of an assessment - all work is 'chew'
		
		Directions for the day:
		• Work independently on project
			Students are in the creation phase of an assessment - all work is 'chew'
			
			Directions for the day:
			• Work independently on project
				• Share Ignite ideas anonymously
				• Directions for the day:
				  • Be a respectful audience
				  • Ask questions that are raised for you
				  • Learn something new
				  • Do your best while presenting, no matter what kind of presentation you decided on!
					• Share ignite ideas anonymously
					• Directions for the day:
					  • Be a respectful audience
					  • Ask questions that are raised for you
					  • Learn something new
					  • Do your best while presenting, no matter what kind of presentation you decided on!

	original and an instrumental - or a different combo like a cover and a specific instrumental) ○ Find connections between one song and one version of the ecosystem and the other song and the other version of the ecosystem ○ If you are stuck there are song pairs on schoology you can work with ○ There are also ecosystem ideas on schoology ○ If you choose your own get them approved with Hustad so you know they fit the project				
Chew 	Follow all directions, Answer planning questions, brainstorm presentation format. Look at examples on schoology in different formats	• Students work on creating presentation - goal is to get 2 representative images for the ecosystem and 2 representative	• Students work on creating their presentations - follow schoology rubric • Students who finish early find a partner and share, and	• Students present in the order they signed up in • Students fill out an audience form that has peer name, peer song choice, and peer ecosystem	• Students present in the order they signed up in • Students fill out an audience form that has peer name, peer song choice, and peer ecosystem

		segments (30 sec or less) of song so they can be shared and not make a presentation SUPER long • Fill out Venn Diagrams about songs and ecosystems to get ideas sorted • Begin presentation (presentation templated for essays, slides shows available on schoology for students who need scaffolded support)	revise (there is a spot to list changes as a result of revisions in their workbooks) • Students sign up for presentation slots, and describe what they will be presenting (is it musical, visual, a slide show, paper, etc.)	along with 1 main idea from each classmate	along with 1 main idea from each classmate
Review 	Schoology: Short answer: What format do you want to present your ecosystem and song analogy in? Why?	Schoology: Short answer: What do you time for tomorrow? What do you need specific help with during class?	Schoology: Short Answer: What do you need to finish tonight in order to be ready to present tomorrow and Friday?	Schoology: Discussion: What is one thing you learned from a peer today?	Schoology: Discussion: What is one thing a peer said that changed how you thought about something today? Why did it change your thinking?

Name: _____ Date: _____

Individual Midpoint Assessment

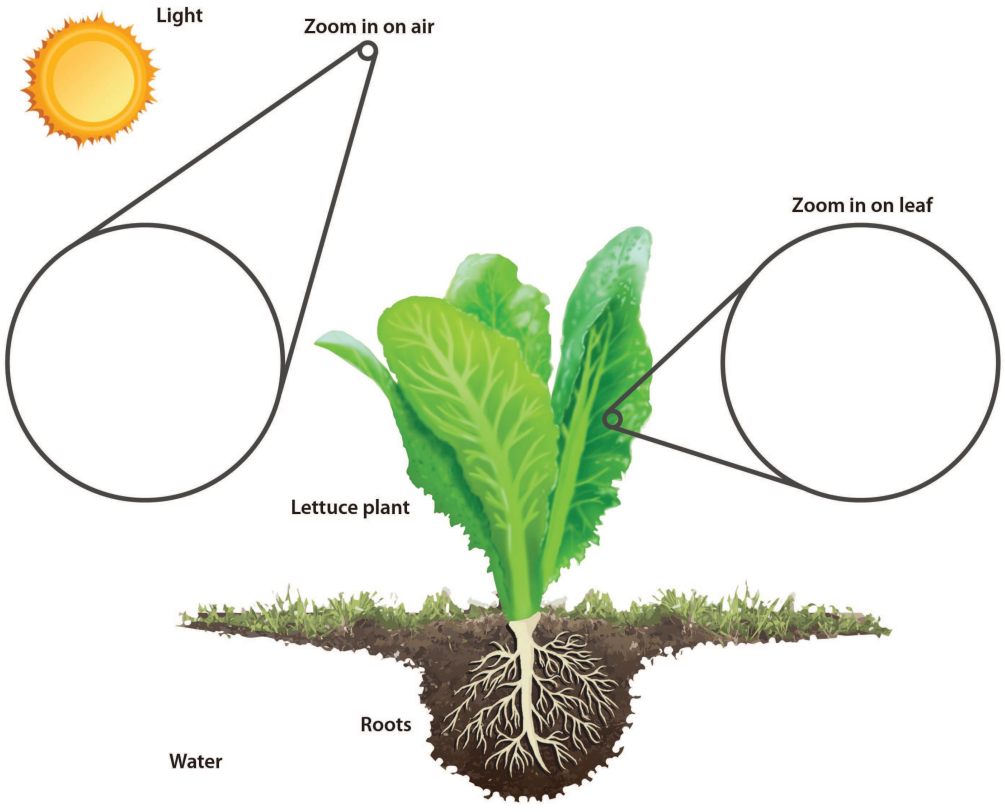
Part 1: Revising Initial Models

How did the lettuce get the food molecules that we then eat?

Lettuce grows in the ground and we eat its leaves. Thinking about the initial model you drew in Lesson 1, we have collected a lot more evidence about where plants get their food molecules. Answer the following questions to develop a revised model to explain how plants get food molecules.

1. Use your Gotta-Have-It Checklist and complete the model below to explain how lettuce gets its food molecules. Using words add the components and interactions you need to explain what is going on.

- Make sure to include things we can't see with our own eyes but we know are there.
- Add in other zoom-ins if you need them.
- If needed, add a key to explain your representations.



2. The plant itself is a system with inputs and outputs. Using your model:
    A. Label the sources of matter and energy in your model.
    B. In the space below, construct a scientific explanation for how it is possible that the inputs into the plant can enter into the plant and produce different outputs from the plant.

In your explanation, include how matter moves and energy flows in the plant system.

Part 2: Argue from Evidence: A New Scenario

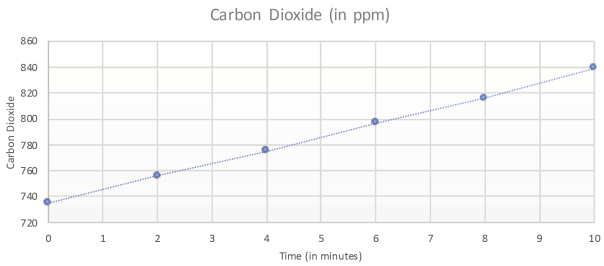
This is an actual headline from a newspaper: **Living in a box: Scientist to spend 48 hours in an airtight container with 160 plants to keep him alive.**


Ben Birchall/PA Images. All rights reserved.

The scientist survived! And he set up an experiment where he collected data before and during the time he was spending the 48 hours in the container. Throughout the study, the scientist kept the lights on and measured carbon dioxide, oxygen, and humidity (water in the air). Here we will look at three sets of data from this experiment.

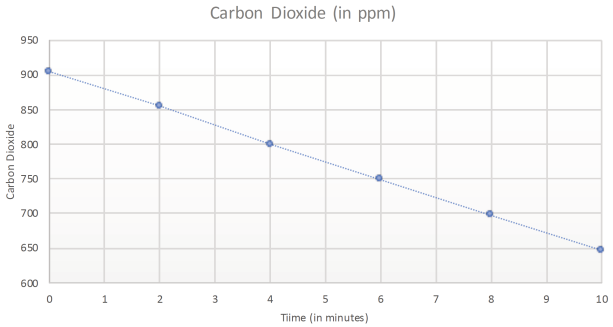
A. Before: The scientist in an empty container for 10 minutes without plants. Remember, we know from the *Inside our Bodies Unit* that animals and therefore, humans, breathe in oxygen and breathe out CO_2.

Time (in minutes)	Carbon Dioxide (in ppm)	Oxygen (in ppm)	Humidity (%)
0	735	200,200	100
2	756	200,100	93
4	775	200,000	82
6	797	199,900	72
8	816	199,700	64
10	839	199,500	56



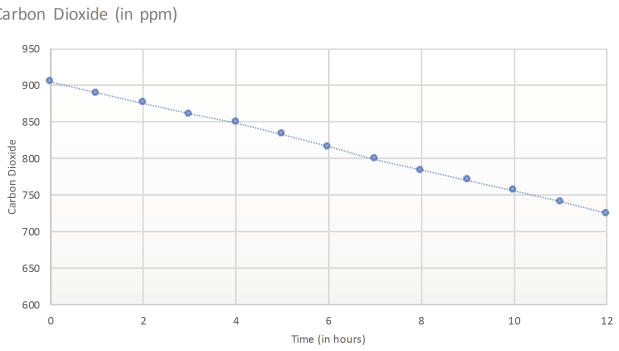
B. The plants in the container for 10 minutes before the scientist entered.

Time (in minutes)	Carbon Dioxide (in ppm)	Oxygen (in ppm)	Humidity (%)
0	905	199,600	55
2	855	199,800	63
4	800	200,000	74
6	749	200,100	82
8	698	200,200	94
10	647	200,300	100



C. Plants and the scientist in the container for 12 hours with the lights on and at the same intensity.

Time (in hours)	Carbon Dioxide (in ppm)	Oxygen (in ppm)	Humidity (%)
0	905	199,600	55
1	890	199,700	63
2	876	199,800	70
3	861	199,900	72
4	849	200,000	75
5	833	200,100	76
6	816	200,200	78
7	799	200,300	76
8	784	200,400	78
9	770	200,500	75
10	756	200,600	72
11	741	200,700	76
12	725	200,800	79



Use the prompts below to construct an argument that answers the question: Why was the scientist able to survive in an airtight (closed) space with plants? Keep in mind that he brought with him all the food and water he needed and did not eat any of the plants.

3a. Write a claim:

3b. Justify your claim by using evidence from the graphs above. Use words and phrases to state your reasoning why that evidence you have about the movement of carbon in the system supports your claim.

Music Project:

- Completion in Week 6
- **7L.2.1.1.1 (science) and 3.A.1.1, 3.7.5.9.1 (music)**
- Compare and contract
    - 2 versions of the same song (covers, reprises, genre swaps, etc.) and compare each one to different versions of the same ecosystem (eg lake superior in summer vs. winter, St. Paul forest in spring vs. fall)
    - Student choice in presentation of learning
        - Essay?
        - Poster
        - Presentation
        - Artistic representation?
    - Challenge Option(s)
        - Choose your own two songs and your own ecosystem
        - Present to a small group and revise based on feedback
        - Create short films showing your ecosystem versions with the music overlaid

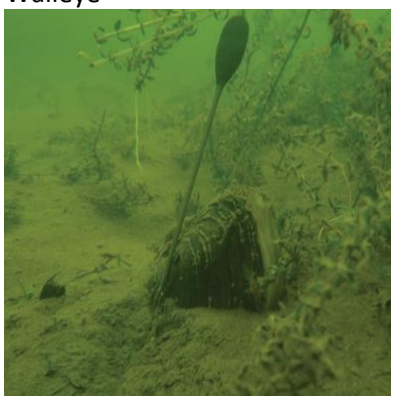
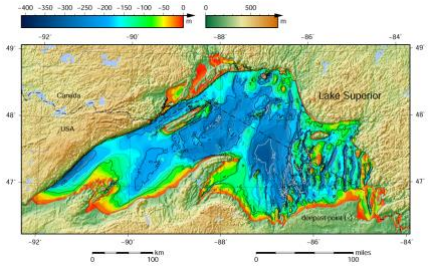
Rubric:
Out of 60 points
30 from rubric
30 for turning in a project

This balances the grades (so students do not get a 66 for all 2s - which would be a grade level performance)
It also makes it easier for students to work on their grades when they don't have 0s in the book.

	0	1	2	3
Identified 2 different versions of the same ecosystem	Not present	Attempted (incomplete or incorrect)	Present and complete	Completed with exceptional attention to detail, and clarity (beyond expectations)
Accurately portrays those two versions of the ecosystem using words and images	Not present	Attempted (incomplete or incorrect)	Present and complete	Completed with exceptional attention to detail, and clarity (beyond expectations)
Describes in detail the differences between the two versions of the ecosystem and what causes the change	Not present	Attempted (incomplete or incorrect)	Present and complete	Completed with exceptional attention to detail, and clarity (beyond expectations)

Identified 2 different version of the same song	Not present	Attempted (incomplete or incorrect)	Present and complete	Completed with exceptional attention to detail, and clarity (beyond expectations)
Accurately describes the choices performers of the songs made that make them feel the way you describe them	Not present	Attempted (incomplete or incorrect)	Present and complete	Completed with exceptional attention to detail, and clarity (beyond expectations)
Describes in detail the differences between the two versions of the song	Not present	Attempted (incomplete or incorrect)	Present and complete	Completed with exceptional attention to detail, and clarity (beyond expectations)
Connects the two songs to the two ecosystem versions	Not present	Attempted (incomplete or incorrect)	Present and complete	Completed with exceptional attention to detail, and clarity (beyond expectations)
Explains the connection between the two songs and two ecosystems clearly, and in a way that makes sense to others	Not present	Attempted (incomplete or incorrect)	Present and complete	Completed with exceptional attention to detail, and clarity (beyond expectations)
Presented to the class in some format	Not present	Attempted (incomplete or incorrect)	Present and complete	Completed with exceptional attention to detail, and clarity (beyond expectations)
Format for presentation was well prepared, and well organized	Not present	Attempted (incomplete or incorrect)	Present and complete	Completed with exceptional attention to detail, and clarity (beyond expectations)

Sample Project:

	Early Spring	Late Summer
Ecosystem	Lake Superior - Walleye Focus (located more shallowly, near sandbars, searching for schools of minnows)  Walleye  Walleye  School of Minnows  Sandbar  Shallow waters	Lake Superior - Walley Focus (located more deeply, need cooler temperatures)  Walleye  Underwater, deep  Depth map of lake superior
Music	Acoustic Version of Pompeii by Bastille (performed by Bastille)	Orchestral cover of Pompeii by Kāru Bastille - Pompeii - Epic Orchestral Cover

	Bastille - Pompeii - Acoustic [Live in Paris] 	
Description of similarities	Music feels lighter, there's no electric instruments, and guitar is light (not the main feature) so this song feels airy, like things are waking up the way a spring does. There are fewer swells, and less depth to the song because there are fewer cords, and less to focus on - it feels like the beginning of something. This is when the walleye are hunting in shallow waters, doing something consistently, and being somewhere that they are easier to catch. The deep water is still too cold for many things to live in them so the ecosystem as a whole exists in the shallows, at and near the surface.	Music feels heavy and ominous as there are more instruments, and they immediately launch into the melody together in a deep swell. This is like the deeper water where the walleye now are. The bottom of the lake has so many more textures here, ships wrecks, and other fish, all shown through the many instruments that pick up the melody.

This table would be turned into a template power point for the presentation day:

Slide 1: Spring
Slide 2: Spring song
Slide 3: Summer
Slide 4: Summer song
Slide 5: Explanation
Slide 6: Credits

Week 1: Energy and Matter Transfer Monday

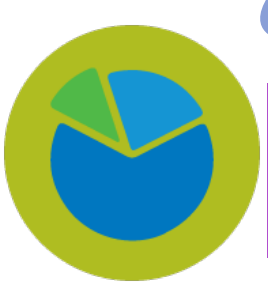
WE WILL START ANALYZING FOOD MOLECULES FROM PLANTS

Standard(s): 7L.3.2.1.2
Construct an explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.

Guiding Question: Where does food come from?

Learning Target: I can identify different sources of food and food molecules.

Don't forget your daily Ignite on Schoology!



Make a list below of the food posted in schoology ignite discussion. Sort the food(s) you and your classmates posted into the three categories below:

100% from plants	From both plants and animals, neither, uncertain	100% from animals

Use this page for observations of Maple Syrup. Place an inmate of the maple syrup below. Look at the nutrition label. Record observations you make with your 5 senses.

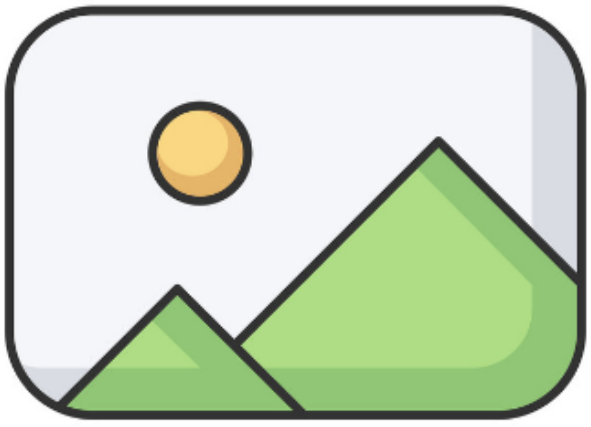


Image of Maple Syrup (from class) ^

Nutrition Facts

Serving Size 4 tbsp (60 mL)

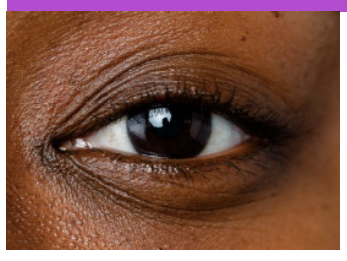
Amount Per Serving	
Calories 200	
	% Daily Values*
Total Fat 0g	**0%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Sodium 7mg	**0%**
Total Carbohydrate 53g	**18%**
Dietary Fiber 0g	**0%**
Sugars 53g	
Protein 0g	**0%**

*Percent Daily Values are based on a 2,000 calorie diet.

Nutrition label for Maple Syrup ^

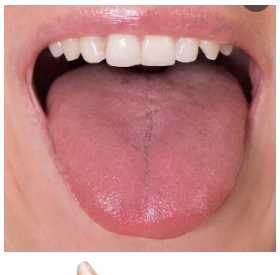
Bottled Maple Syrup ^

Record your observations of Maple Syrup below:



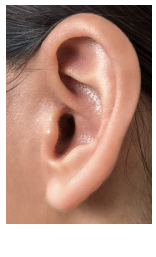
Looks like

Smells like



Tastes like

Feels like



Sounds like

We will watch the video below as a class. Record any observations you have, or questions it raises in the box below and to the right.

Maple Syrup Video ^

Video Observations and questions:

Think back to several units ago when we studied the human body. Work with your table to answer the questions below. We will then share out and discuss as a class to make sure everyone has the correct answers.

Why do people eat?	
What molecules are in our food?	
What parts of the human body are involved in digestion?	
Where does our food come from?	
What happens to the parts of food our bodies don't use?	

Go back to page 1 and split/separate as many things as you can in the middle column so they fit into plant or animal.

Make a vocab word card for one of the food molecule words: carbohydrate, fat, protein, or sugar

Make sure to use the word in a SCIENCE context

Word you chose:	Image:
Definition/Description (in your words)	Word used in a sentence:

If you finish early go to schoology and read about one of the breakfast foods in the "Breakfast around the world" folder. List the food, and 2 things you learned below.

Don't forget your daily Review on Schoology!

Tuesday: Plant Food Molecule Brainstorm

WE WILL HYPOTHESIZE ABOUT WHERE/HOW PLANTS GET FOOD

Standard(s): 7L.3.2.1.2 Construct an explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.

Guiding Question: Where does food come from?

Learning Target: I can identify types of food molecules in different foods.

Don't forget your daily Ignite on Schoology!

What molecules do we think are in our food?

Do we think different molecules are in plants vs. animals? Which ones?

With your table - go through the envelope full of nutrition labels. Fill out the table below with what you find out. (If it is easier for you you can also find the nutrition labels on schoology in the Tuesday folder)

Food we eat	Does it have carbohydrates? (How much?)	Does it have proteins? (How much?)	Does it have fat? (How much?)

Based on the class discussion write down some main ideas you heard in response to the questions below:

What patterns did you notice in the food molecules from plants data?	•
What was as you expected?	•
What surprised you?	•

Independently create a model to show your ideas about how plants get food.

Think about inputs (what goes into a plant and how) and outputs (what comes out of a plant and how)

Describe what is happening in the model you created. Focus on describing the inputs and outputs:

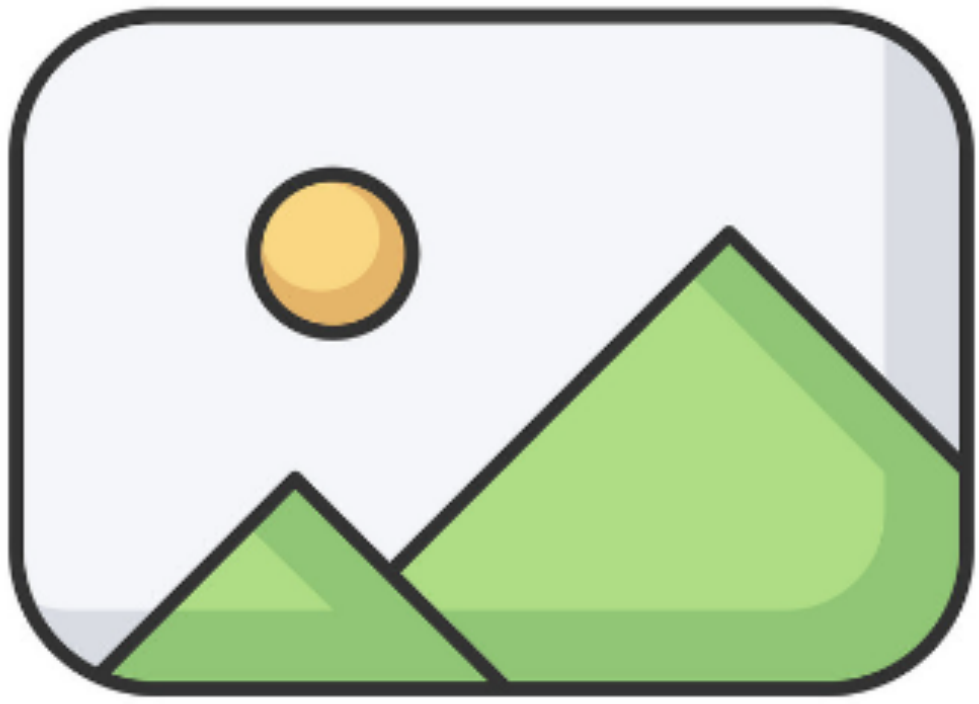
•

Answer the questions below based on class discussion, put in an image of the consensus model the class made of a plant. It should be different from your model in some way!

Review: Consensus is …

Review: How do we, as a class, get a consensus?

Class Model:



What inputs did the class include?

What outputs did the class include?

What is the same in the class model and your model?

What is different between the class model and your model?

Don’t forget your daily Review on Schoology!

Wednesday: Investigation Planning

WE WILL MAKE A PLAN TO FIGURE WHERE/HOW PLANTS GET FOOD

Standard(s): 7L.3.2.1.2 Construct an explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.

Guiding Question: Where does food come from?

Learning Target: I can design an investigation to answer a scientific question.

Don't forget your daily Ignite on Schoology!

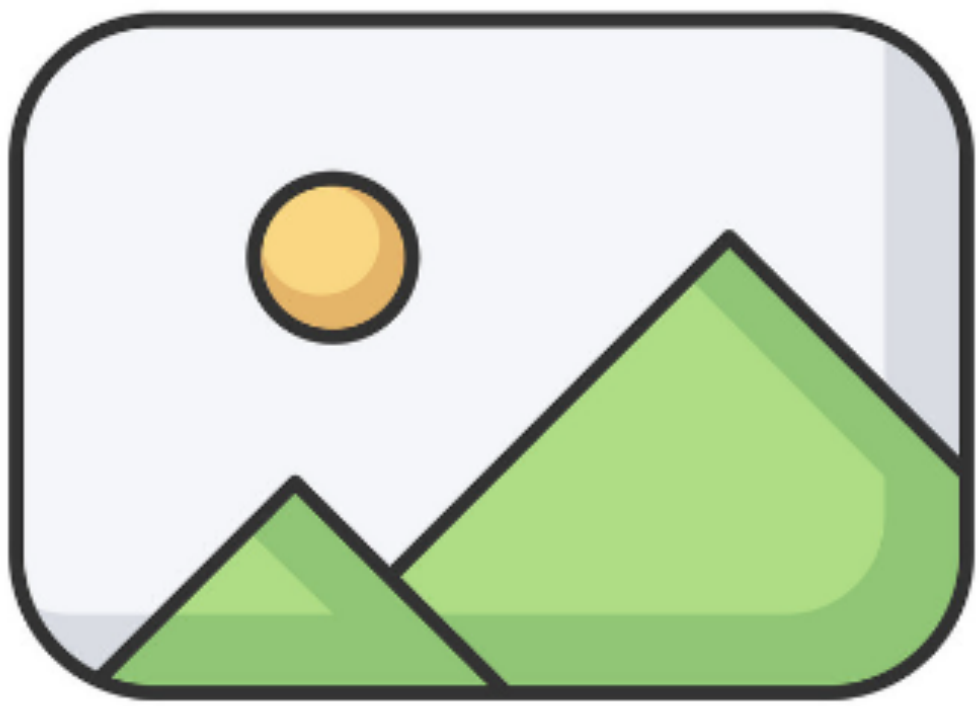
Don't forget - weekly scientist HW due today!

We are creating a driving question board. You will need a post-it note, something to write with, and access to schoology. Follow directions on the front board!

Put in an image of the driving question board the class made below. Draw little stars by the 1-5 questions that are most interesting to you.

REMEMBER:
Unit Question:

How do plants get their food molecules? Where do they come from?



Choose 1-2 questions from the driving board that are most interesting to you. Work on your own to plan an investigation using real plants to answer those questions.

Question(s) you're interested in answering:	•
What will answering that question tell us about our unit question?	•

Draw the set up you think you will need to answer your question. Label materials used!

List variables tested, and steps to complete the investigation you illustrated above:	•

Share your investigative plans with your table.

Make a list of materials you would need to execute your plan(s).

What is the same in some or all of the investigations your table planned?	•
What would you change about your investigation after collaborating with your table?	•
How would the different investigations work together to answer the unit question?	•
What order would you do the investigations in?	•
Write an overview of how you would do the investigations, as a group:	•
What materials would your group need to complete these investigations:	•

Don’t forget your daily Review on Schoology!

Thursday: Meet the Hydroponic Plants

WE WILL FIGURE OUT HOW TO USE THE HYDROPONIC PLANTS TO ANSWER OUR UNIT QUESTIONS

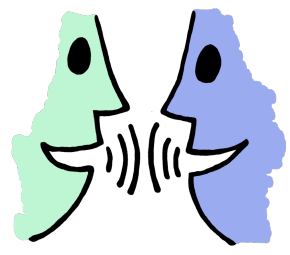
Standard(s): 7L.3.2.1.2
Construct an explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.

Guiding Question: Do plants get their food by eating?

Learning Target: I can answer a scientific question using evidence.

Don't forget your daily Ignite on Schoology!

Talk to your neighbor - where do you think plants get food molecules from? Write down any ideas you have below.



Look at the plants growing in the classroom. Record observations below. Nutritional information for them is on schoology in the Thursday folder.

Based on our ideas from earlier where could plants be getting food from? - We will revisit this chart MANY times, and we will add evidence each time we move something out of the middle column.

Eliminated with Evidence	Predictions	Confirmed with Evidence

Answer the questions below with your table. Be ready to share your answers with the group:

How would each of the "predictions" on page 13 get into the plant?	•
What evidence would you need to eliminate or confirm the predictions?	•
The images on page 12 show plants grown hydroponically. What do you think hydroponic means?	•
What does the existence of hydroponic plants tell us?	•

Go look at, and observe the hydroponic plants growing in the classroom with your table group. Record observations below. You can use all of your senses EXCEPT taste. When you feel make sure you do not damage the plants.

Observations of hydroponic system in the classroom:

•

Based on the hydroponic system you should be able to move a prediction on page 13 to the left. Do that and ADD a box describing the evidence you found for that in the hydroponic system.

What additional questions did observations of the hydroponic set up raise for you?

There is hydroponic plant food given to this system. How could we rule this out as a source of food molecules? Describe all the steps below:

Don’t forget your daily Review on Schoology!

Friday: Investigation Day

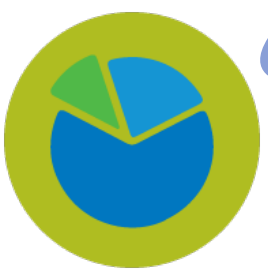
WE WILL IDENTIFY FOOD MOLECULES PRESENT IN THE HYDROPONIC PLANT FOOD AND DRAW CONCLUSIONS

Don't forget your daily Ignite on Schoology!

Standard(s): 7L.3.2.1.2 Construct an explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.

Guiding Question: Do plants get their food by eating?

Learning Target: I can answer a scientific question using evidence.

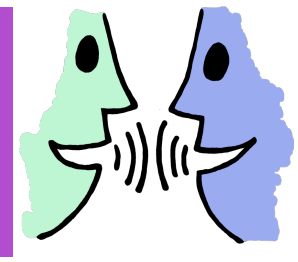


LAB TODAY. Lab question: *Which food molecules are in the hydroponic plant food?*

Before we start we need to determine our controls, and other groups for the lab!

Negative Control	
Positive Control	
Experimental Group	

Safety Review: Look at the procedure slide posted, talk at your table about what safety procedures you think will be important today. Record your ideas below:



Each group is responsible for 1 food molecule test. Circle what test you are responsible for below:

Complex Carbohydrates - Iodine	Simple Carbohydrates - Benedict's Solution
Fats - Paper Bags	Proteins - Biuret

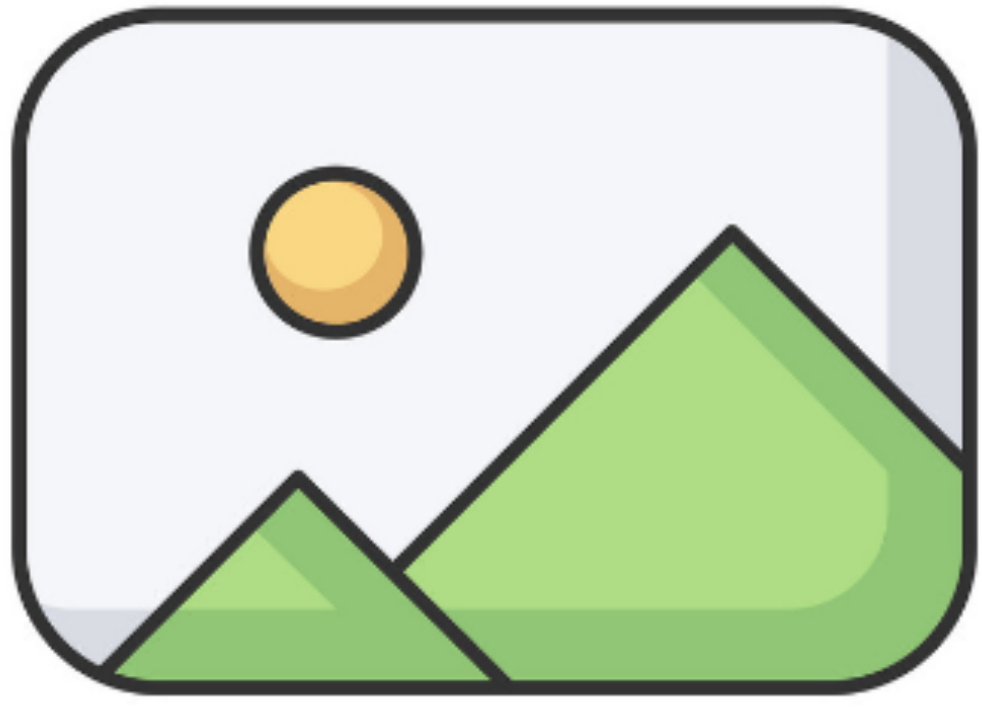
You can find detailed directions for your assigned experiment in the Friday folder on Schoology. There are written directions, and video examples.

You will need photographic data, and your data on a chart so you can share with the class.

Data goes on page 18.

Record your group's data below. Including a picture.

Our results look like:



Our results can be represented as:

Sample Food	Type of Molecule tested for	Present in Sample	Present in Hydroponic Food

Once your data is recorded above clean up your table.

Once your table is clean send someone to the board to record your data.

Then you can begin recording whole class data on page 19.

The whole class' data can be shown in a table as:

Sample Food	Type of Molecule tested for	Present in Sample	Present in Hydroponic Food

Based on class discussion write some ideas to the questions below:

What does the data tell us?	•
What is the evidence?	•
How do we know the indicators were working?	•
How should we change the EPC chart we started yesterday?	•

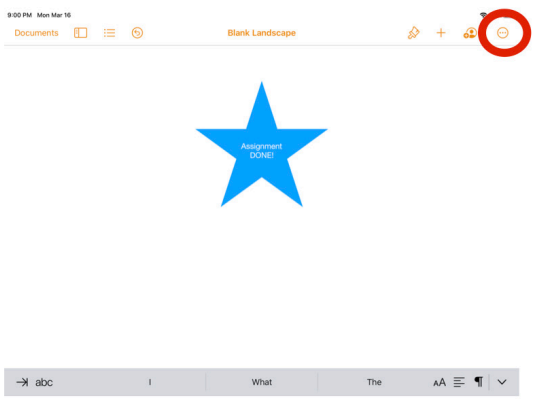
Update the EPC chart below based on today's findings:

Eliminated with Evidence	Predictions	Confirmed with Evidence

Don't forget your daily Review on Schoology!

Last: Submit your workbook

SUBMIT AS EPUB OR PDF - ASSIGNMENT NAME "WEEK _ DAY _ SCIENCE WORKBOOK"



Media Gallery: How to turn in your assignment

Submit this assignment as an EPUB if you added audio or video for any part!

If **audio or video** is in your pages document, and you want to submit it, it needs to be an EPUB document, not a PDF!

Week _ :__
Monday

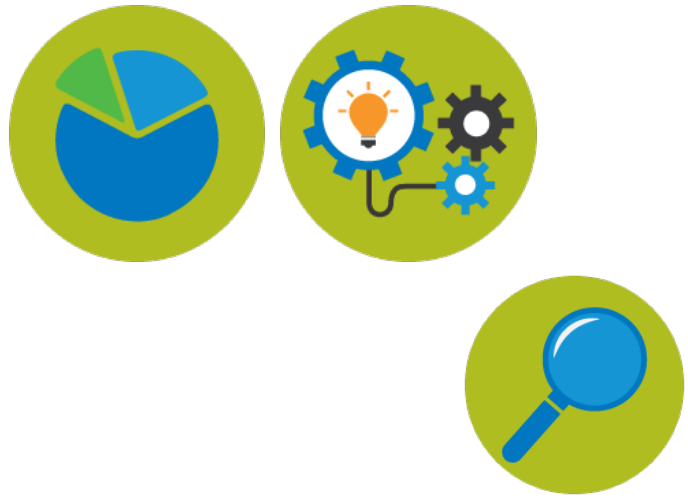
WE WILL ...

Standard(s):

Guiding Question:

Learning Target:

Don't forget your daily Do Now and Exit Ticket on Schoology!



Tuesday:__

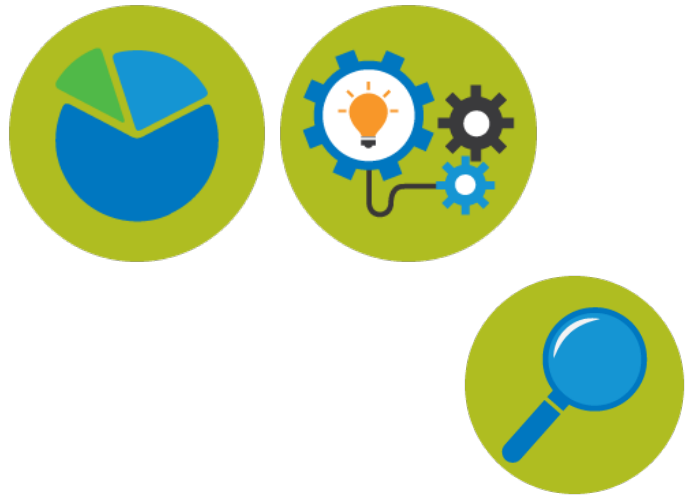
WE WILL ...

Standard(s):

Guiding Question:

Learning Target:

Don’t forget your daily Do Now and Exit Ticket on Schoology!



Wednesday:__

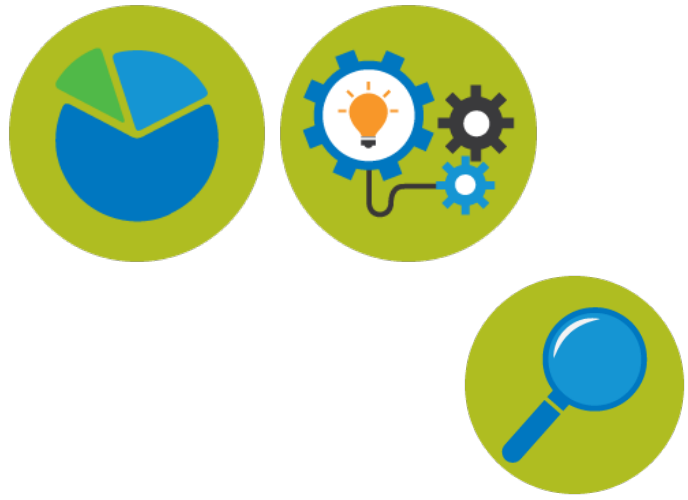
WE WILL ...

Standard(s):

Guiding Question:

Learning Target:

Don't forget your daily Do Now and Exit Ticket on Schoology!



Thursday:__

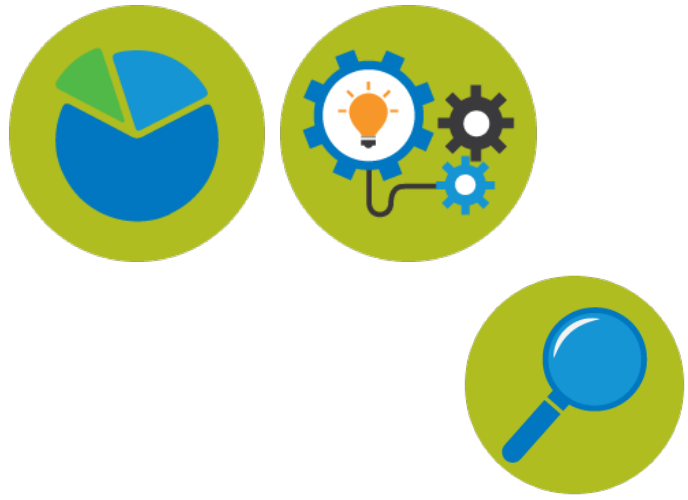
WE WILL ...

Standard(s):

Guiding Question:

Learning Target:

Don’t forget your daily Do Now and Exit Ticket on Schoology!



Friday:__

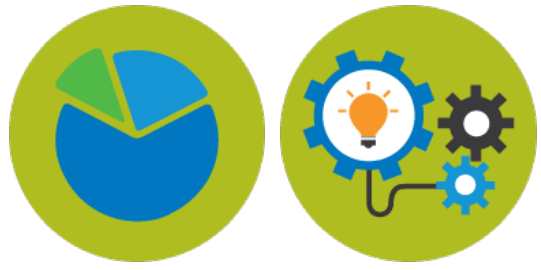
WE WILL ...

Standard(s):

Guiding Question:

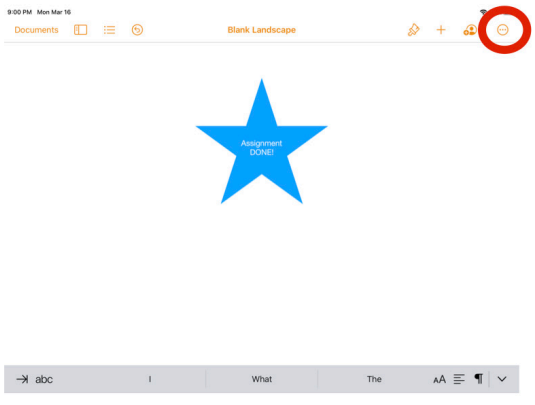
Learning Target:

Don’t forget your daily Do Now and Exit Ticket on Schoology!



Last: Submit your workbook

SUBMIT AS EPUB OR PDF - ASSIGNMENT NAME “WEEK _ DAY _ SCIENCE WORKBOOK”



Media Gallery: How to turn in your assignment

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