Mountain View
Whisman
School District

5th Grade Capstone Projects

Strategic Plan 2021

- Goal 1: Student Achievement
  - Every student will be prepared for high school and 21st Century Citizenship
    - 1.1A - Implement capstone-type projects at the conclusion of 5th and 8th grades

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PROFILE OF A GRADUATE

- *COLLABORATIVE*
- *CRITICAL THINKER*
- *CURIOUS AND ENGAGED*
- *CREATIVE*
- *FLEXIBLE AND ADAPTABLE*
- *EFFECTIVE COMMUNICATOR*

Link to district website

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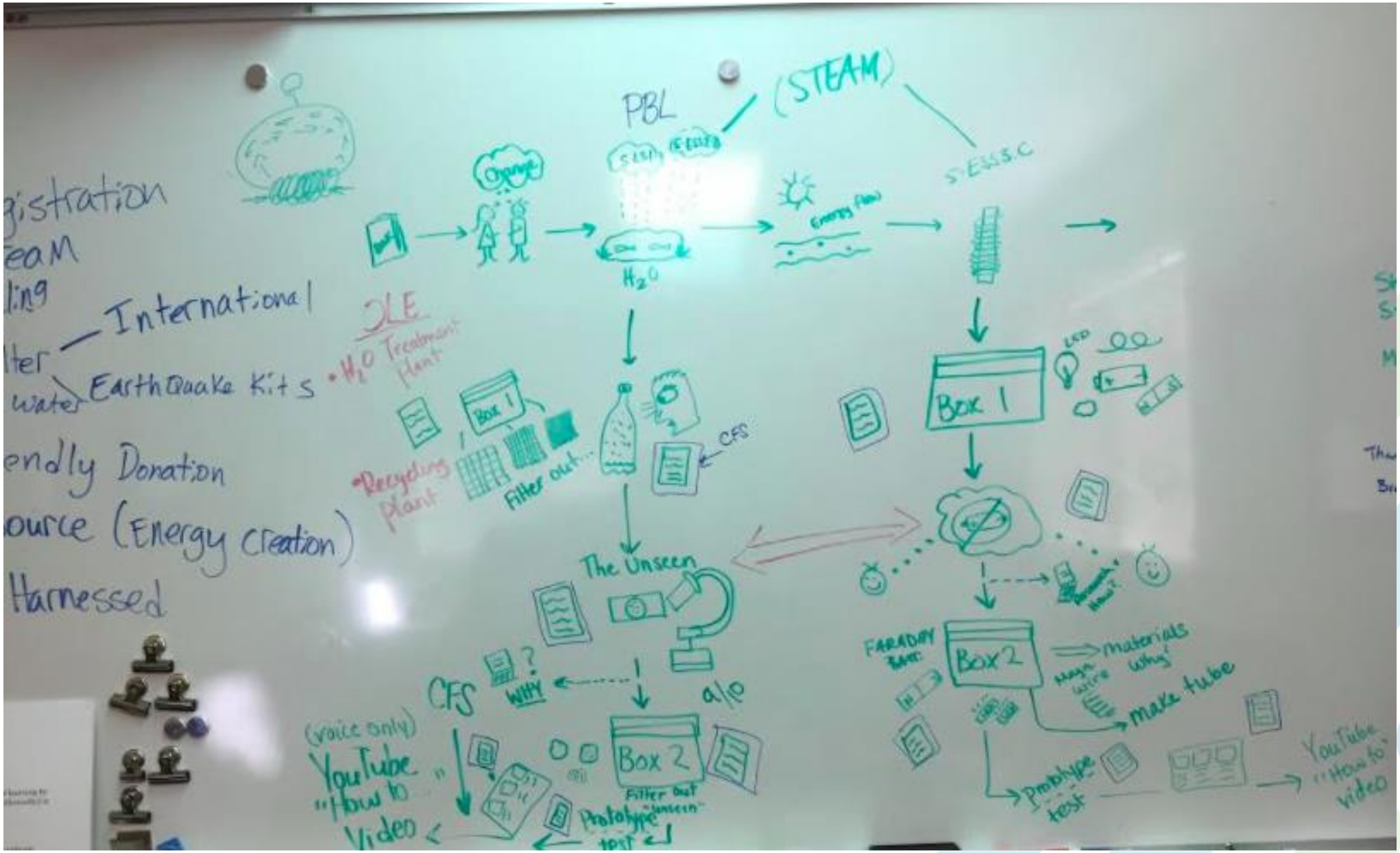
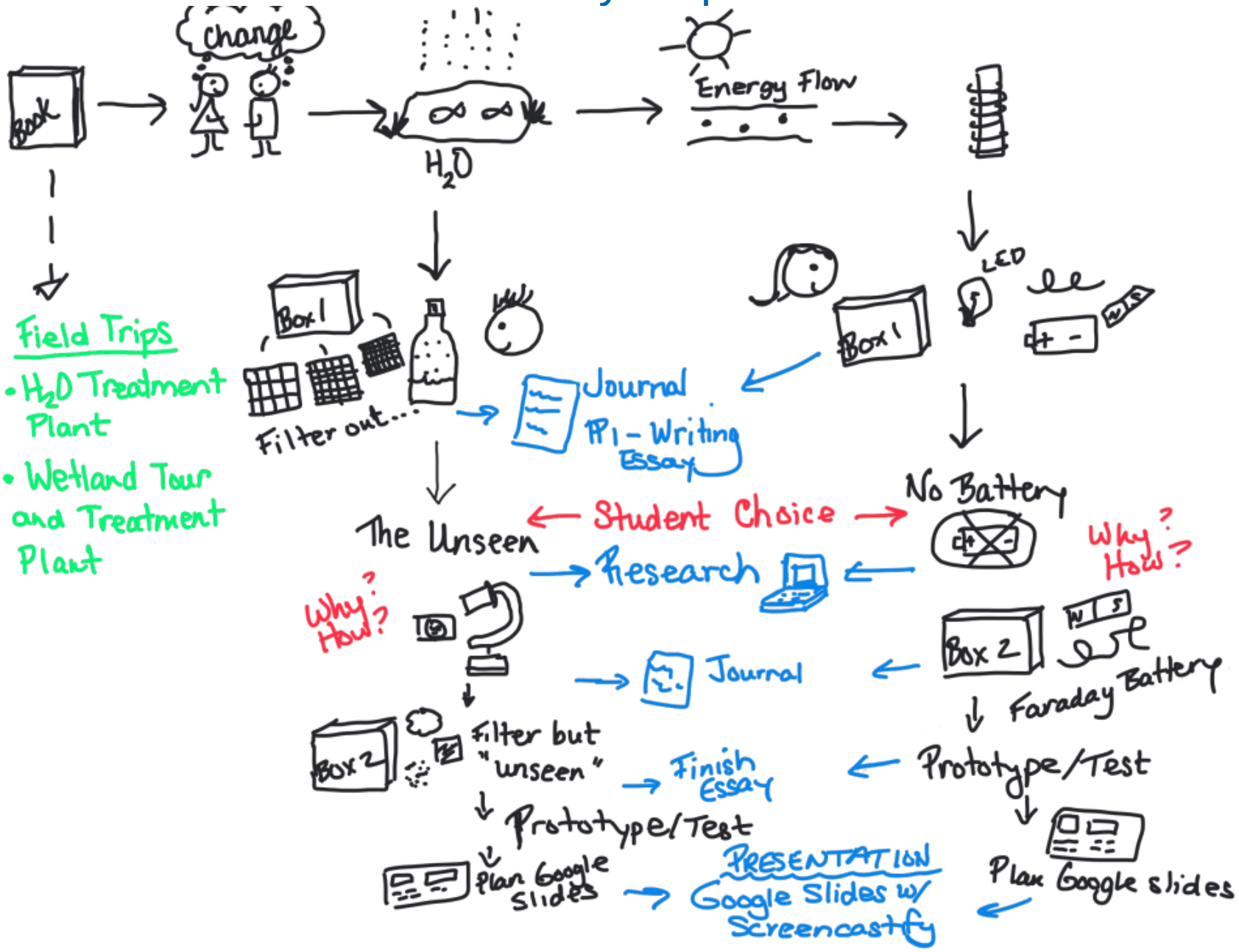
Developing the Capstone

Story Map


PBL
(STEAM)
gistration
eam
International
Earthquake Kits
endly Donation
ource (Energy creation)
Harnessed
H_2O
Box 1
Filter out...
CFS
The Unseen
Box 2
Filter out "unseen"
Prototype test
YouTube "How to" Video
FARADAY
materials
make tube
prototype test
YouTube "How to" video

Story Map


Book
Change
H_2O
Energy Flow
LED
Field Trips
• H_2O Treatment Plant
• Wetland Tour and Treatment Plant
Box 1
Filter out...
Journal
PP1 - Writing Essay
Box 1
No Battery
The Unseen
Student Choice
Research
Why? How?
Why? How?
Box 2
Journal
Faraday Battery
Box 2
Filter but "unseen"
Finish Essay
Prototype/Test
Prototype/Test
Plan Google Slides
PRESENTATION
Google Slides w/ Screencastify
Plan Google Slides

Standards

Science Standards

- **5-ESS2-2. Describe and graph the amounts of saltwater and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.**
- **5-ESS3.C. The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources.**
- **5-ESS3.C. Scientists and engineers can make major contributions by developing technologies that produce less pollution and waste and that preclude ecosystem degradation.**

Design Process Standards

- **3–5-ETS1f-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.**
- **3–5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.**
- **3–5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.**

Writing and Research Standards

- **W 5.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.**
- **W 5.6 With some guidance and support from adults, use technology, including the internet, to produce and publish writing as well as to interact and collaborate with others**
- **W 5.7 Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.**
- **W 5.8 Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.**
- **W 5.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.**

Speaking and Listening Standards

- **SL.5.1 Engage effectively in a range of collaborative discussions with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly.**
- **SL.5.4 Report on a topic or text sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.**
- **SL.5.5 Include multimedia components and visual displays in presentations when appropriate to enhance the development of main ideas or themes.**
- **SL.5.6 Adapt speech to a variety of contexts and tasks, using formal English when appropriate to task and situation.**

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Background Reading:

The Boy Who Harnessed the Wind (Young Reader's Edition) by William Kamkwamba and Bryan Mealer

Background

- **As a read aloud or as a whole group read with/along, begin/hook students with the project's guiding book, The Boy Who Harnessed the Wind by William Kamkwamba and Bryan Mealer (Young Reader's Edition)**

***If reading as a read aloud, give *at least* 3 weeks, if as a whole group...consider your blocks of time before starting the project with consideration to testing, field trips, school events, etc.**

- **As you read, use guiding questions to focus in on the big idea of the capstone project**
- **Some guiding questions for the book can be found on the following slides**

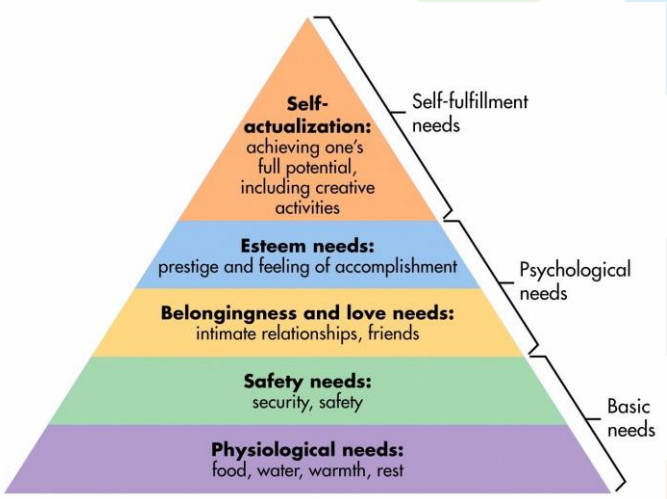
The Boy Who Harnessed the Wind

Guiding Questions:

- **Chapter 6:**

On page 100 it says “If our culture demanded that children respect their elders, it also forbade us from asking questions.” What does that say about the values of the culture? How would these limitations impact innovation?

In chapter 6, the characters of the story begin feeling depressed and only have the strength to work. Look at the Human Needs Pyramid. If your community can’t even meet its basic needs,what does that mean for innovation?



The Boy Who Harnessed the Wind

- **After reading and making conclusions chart ideas on large paper/elbow partner discussion/group discussion about the story or how combining resourcefulness and resilience can lead to making a difference (resourcefulness X resilience = a difference)**
- **You can watch the following TED talk from William Kamkwamba and his journey to make a difference .**

https://www.ted.com/talks/william_kamkwamba_on_building_a_windmill

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Water Filtration System

Water Filtration

Basic information about how water filtration works (for teacher)

http://www.explainthatstuff.com/howwaterfilterswork.html

Items to Purchase

Box One	
Item	**Location**
9 Piece Set of Stackable 13¼" sifting pans (two sets)	https://www.amazon.com/dp/B008EWOL8I/ref=sspa_dk_detail_0?pd_rd_i=B00C7YCQIQ&pd_rd_wg=04Lbm&pd_rd_r=3V1AAHFH07SC4P343HEQ&pd_rd_w=Zs8BW&th=1
Clear Plastic Cups	https://www.amazon.com/TashiBox-clear-plastic-cups-Disposable/dp/B06XSCT42Y/ref=sr_1_4_a_it?ie=UTF8&qid=1520957654&sr=8-4&keywords=plastic+cups
Dirt (make sure to get small and larger particles)	Someplace on campus

Box Two	
Item	**Location**
Innovating Science Water Treatment and Filtration Kit (1 kit for each class)	https://www.amazon.com/Innovating-Science-Water-Treatment-Filtration/dp/B00BUV8NZ2/ref=sr_1_2?ie=UTF8&qid=1520957964&sr=8-2&keywords=innovating+science+water+treatment+kit

Intro. Journal/Water Resources

Introduce capstone journal. **(*could even be introduced before the reading of the book for notes about William's thinking/design process/and reasoning.)**

- **Create sections for overall notes as well as the particular sections students will be choosing to research/design (the section they choose can be added at a later date but marking a section for notes will be helpful during discussions and while teaching each lesson).**
- **Talk table ⟶ share with whole group ⟶ chart responses**
- **What water resources do we have?**
- **How are we able to consume safe/clean water?**

- **Use a globe beach ball to demonstrate the lack of freshwater on Earth for an additional activity.**

Intro. Journal/Water Resources

BOX 1:

Water observation from "observation bottle." (Dirty water/particles)

- **Use journal to keep track of findings/thoughts/observations/notes**
- **Would be best to plan for a day outside**

Question: What's in the box?

- **Discuss materials with the class/procedures for use**
- **Use first filter to "clean" water**
- **Write materials used/observations in journal**
- **Repeat this process with the second and third filters (writing observations in the journal)**

Class discussion to clarify/sum up lesson and objectives

- **Collect conclusions and chart on paper**

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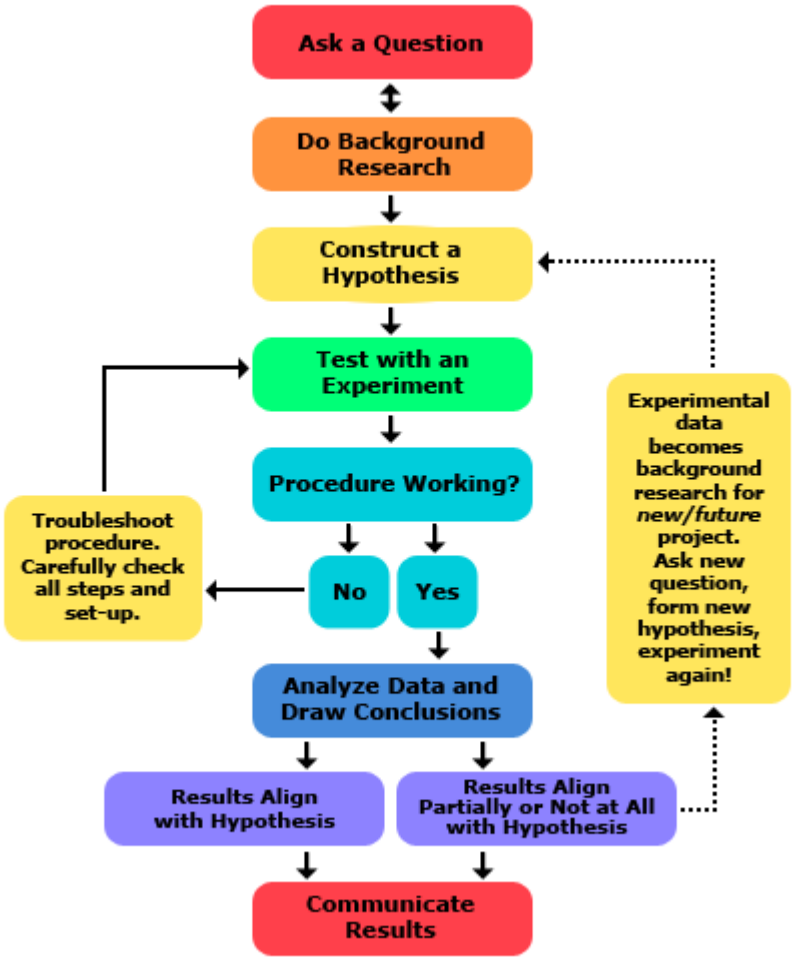
Investigations Box 1
Water Filtration

Scientific Process



Box 1 (water filtration)

How can you filter the water given the tools in the box?

You must work in groups of two

- As you work you must record your steps in your journal.

Box 1(water filtration)

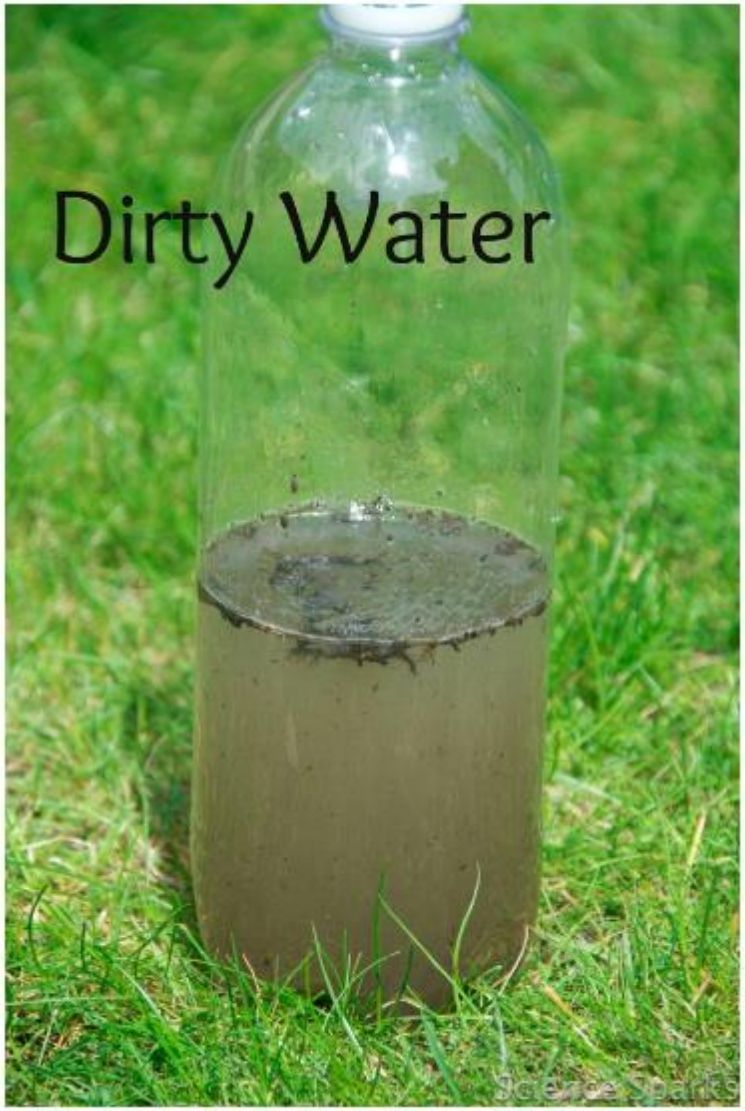
Analyze Data/ Draw Conclusions

Would you feel safe drinking the water?

Why or why not?

How could you improve the filtration process?

Photos to Review (if needed) Replace with new photos once we complete the capstone



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Flashlight

Day 1 (Energy Flow/Creating Electricity)

Talk table → share with whole group → chart responses

- **What is energy?**
- **Where/how can we tell energy is present?**

Question: What's in the box?

- **Discuss materials with the class/procedures for use**
- **Allow students to experiment with the battery, wire, and compass to find the connection between magnetism and flow of electrons.**
- **Write materials used/observations in journal**
- **Consider showing a clip from the below Bill Nye video that talks about open and closed circuits and touches on magnetism and electricity. This should be a review for the 5th grade.**

Class discussion to clarify/sum up lesson and objectives

- **Collect conclusions and chart on paper**

Flashlight

How students will make the flashlight

http://www2.ece.ohio-state.edu/~anderson/Outreachfiles/Making_a_Faraday_Flashlight.pdf

For the teacher read the tabs on **magnetism and electromagnetism** and watch the video on the first page.

Good simulation of how a magnet induces a current
https://phet.colorado.edu/sims/html/faradays-law/latest/faradays-law_en.html

Video of how a Faraday Flashlight works (simple)
https://www.youtube.com/watch?v=gfJG4M4wi1o

Second video of how a Faraday Flashlight works- we will not use capacitors or a switch
https://www.youtube.com/watch?v=fiyaYII7ROA

Items to Purchase

Box One	
Item	**Location**
D-Cell Batteries (12 pack) buy 2 sets	https://www.amazon.com/AmazonBasics-Everyday-Alkaline-Batteries-12-Pack/dp/B00MH4QKP6/ref=sr_1_3_a_it?ie=UTF8&qid=1520958369&sr=8-3&keywords=d-cell+battery
Compass (set of 20)	https://www.enasco.com/p/40-mm-Compass%2BSB37264?searchText=compass
Bar Magnets (buy 10)	https://www.enasco.com/p/Alnico-I-Bar-Magnets---Size-1-4-x-1-2-x-2%2BSB14309
22 Gauge Wire 100 ft.	https://bulkwire.com/solid-hookup-wire-300volt-ul1007
Wire Cutter and Stripper	https://bulkwire.com/wire-cutter-stripper

Items to Purchase

Box Two	
Item	**Location**
Magnet Wire, 28 gauge 1,989ft	https://bulkwire.com/magnet-wire
Rare Earth Magnets ½ inx ½ in Model ND035 (one per student)	https://www.magnet4less.com/advanced_search_result.php?osCsid=a2g5pbnvpmhdp3ok8fm120nip6&keywords=nd035
½" Clear Schedule 40 PVC Pipe- 5 ft. sections (buy 4 sections, each student needs 6")	https://www.pvcfittingsonline.com/1-2-clear-schedule-40-pvc-pipe-5-ft.html
PVC Pipe Cutter Tool	https://www.pvcfittingsonline.com/pvc-pipe-cutter-tool-cuts-up-to-1-1-4-pipe.html
10 Pack of Mighty Gadget Electrical Tape	https://www.amazon.com/TradeGear-Assorted-Electrical-Adhesive-Waterproof/dp/B01LY3FG50/ref=sr_1_5?ie=UTF8&qid=1520959660&sr=8-5&keywords=electrical+tape%2C+10+pack
Bic Lighters (5 needed for each class)	https://www.amazon.com/Bic-Lighter-Classic-12-Piece/dp/B00IMVL206/ref=sr_1_4_a_it?ie=UTF8&qid=1520959707&sr=8-4&keywords=bic+lighters

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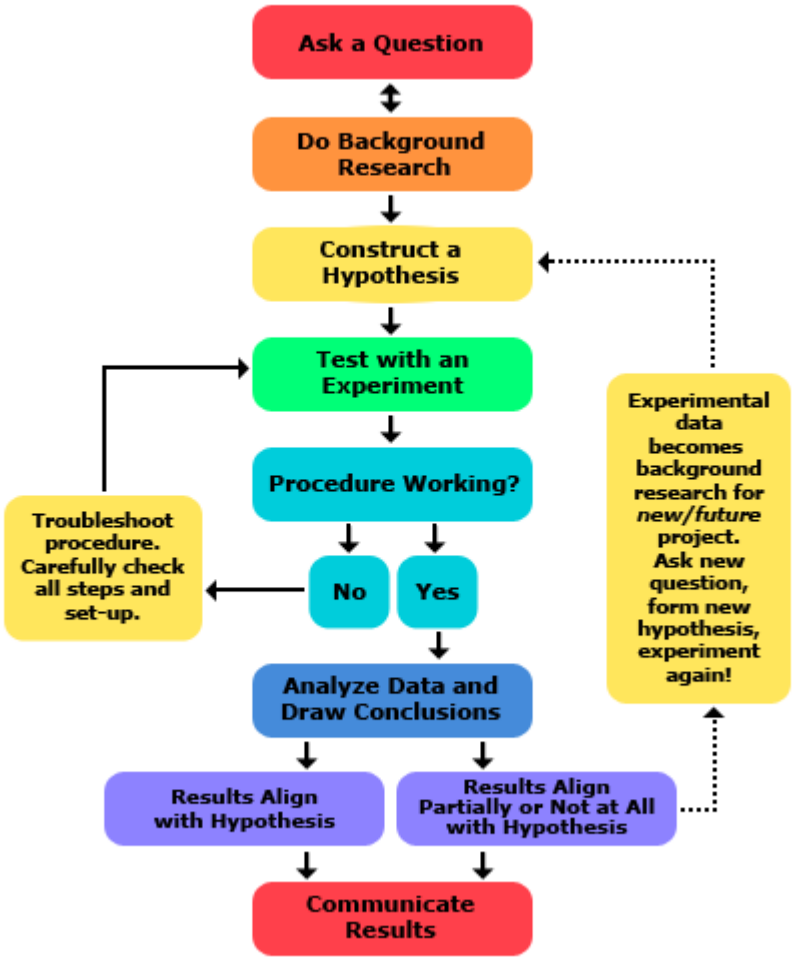
Investigations Box 1
Flashlight

Scientific Process



Box 1 (electricity and magnetism)

How are electricity and magnetism connected? Can you use the materials in the box to show they are related by moving the compass without using the magnet?

You must work in groups of two

- As you work you must record your answers in your journal.

Box 1 (electricity and magnetism)

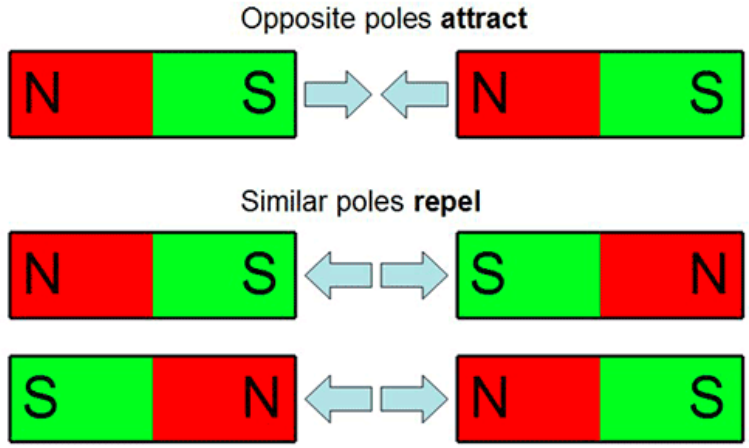
Analyze Data/ Draw Conclusions

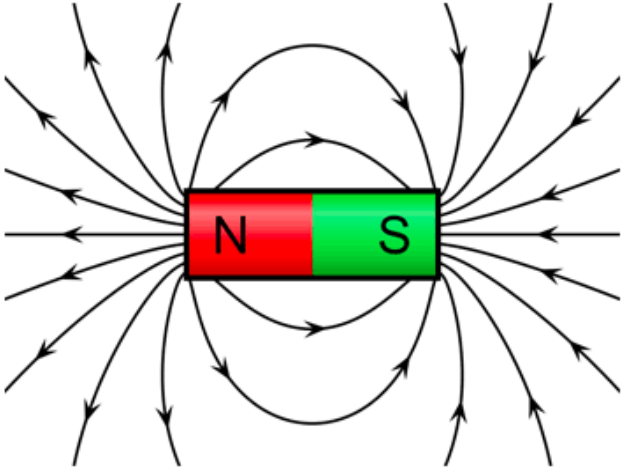
How were you able to move the compass?

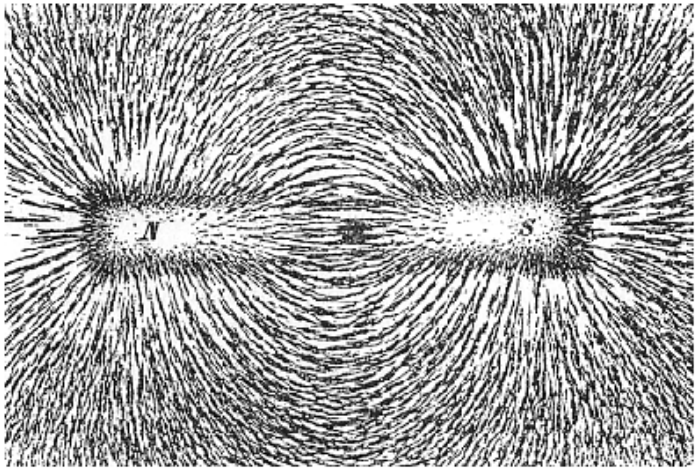
Why did the compass move?

Could you use this information to help you build a flashlight that does not use a battery?

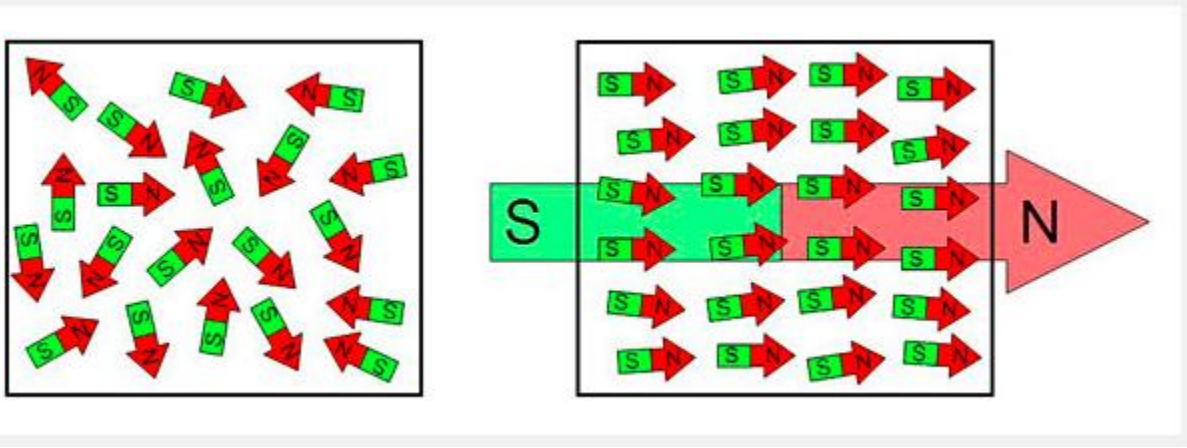
Photos to Review (if needed)

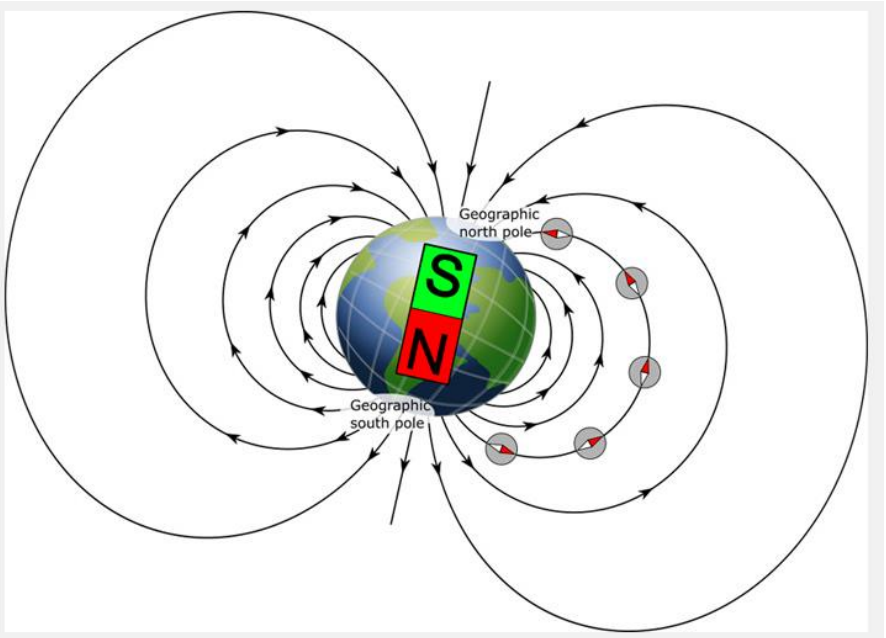


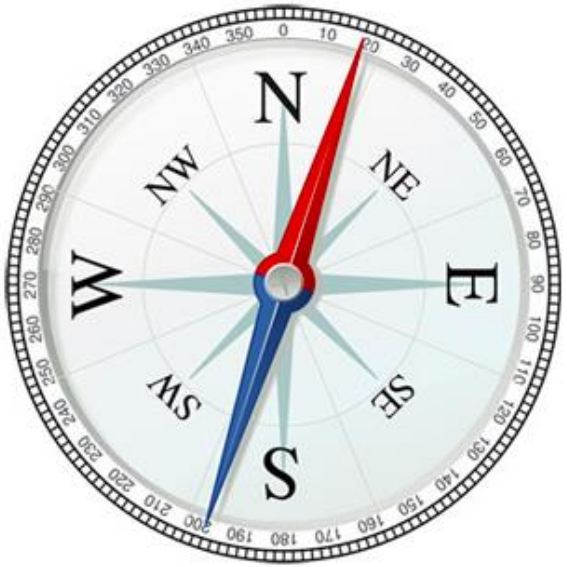




Photos to Review (if needed)







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Research

Research Project

- Using the internet, research **how** to build a water filtration system or a Faraday flashlight. You must be able to explain the materials used, each step and **why** each step is needed.
- All research notes must be in your journal
- Keep track of all resources used (You may use the attached graphic organizer) List of Resources Graphic Organizer

Research Rubrics

	STANDARD NOT MET (1)	STANDARD NEARLY MET (2)	STANDARD MET (3)	STANDARD EXCEEDED (4)
	- Locates and records minimal relevant information - Fails to organize notes; notes are messy and hard to read - Copies most or all notes word for word from the source - Provides no list of relevant sources	- Locates and records some relevant information -Writes some notes using own words and key facts - Organizes notes; most notes are neat and easy to read - Uses only one print/digital source - Provides an incomplete list of relevant sources	- Locates and records relevant information - Writes most notes using own words and key facts - Organizes neat and easy to read notes - Uses several print/digital sources - Provides a list of relevant sources	*In addition to **At Standard** criteria:* **+** Writes notes using own words and key facts **+** Uses keywords,headings, and diagrams to enhance notes

Research

List of resources you could use

https://www.epa.gov/ground-water-and-drinking-water

Technology library with information on different types of filters and filtration processes:
http://water.me.vccs.edu/concepts/filters.html

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Investigations Box 2 Flashlight or Water Filter

Box 2 (water filtration)

How can you use the materials provided to filter the water? As you experiment record your findings in your journal.

Box 2 (electricity and magnetism)

How can you use the materials provided to create a flashlight that can be used in an emergency? As you experiment record your findings in your journal.

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Informative Writing

Informative Writing Assignment

Each student will write an informative “how to” essay answering one of the following prompts:

- How can you create a water filtration system?
- How can you create a Faraday flashlight?

The essay should state the problem, explain how to build a water filtration system/Faraday flashlight as well as the importance of each step.

The essay should:

- *Have an effective introduction*
- *Have a clear focus/topic*
- *Use specific facts, statistics, and details from the resource(s) to support the focus and explain your thinking*
- *Explain the **how** and **why** of the process*
- *Group ideas in paragraphs*
- *Have a satisfying conclusion*
- *Use precise language and linking words to connect ideas*
- *Have correct spelling, capitalization, and punctuation*

Informative Writing

Finish writing essay after completing box 2 of the water filtration and Faraday flashlight projects.

The essay should:

- *Have an effective introduction*
- *Have a clear focus/topic*
- *Use specific facts, statistics, and details from the resource(s) to support the focus and explain your thinking*
- *Explain the **how** and **why** of the process*
- *Group ideas in paragraphs*
- *Have a satisfying conclusion*
- *Use precise language and linking words to connect ideas*
- *Have correct spelling, capitalization, and punctuation*

Writing Rubric

	STANDARD NOT MET (1)	STANDARD NEARLY MET (2)	STANDARD MET (3)	STANDARD EXCEEDED (4)
	Writes informative/explanatory texts to examine a topic and convey ideas and information clearly. **-** Responds to none of the prompt - Does not demonstrate understanding of topic/text(s) - Does not introduce a topic or provide a general observation or focus. - Does not develop the topic with facts, definitions, and concrete details - Does not link ideas within and across categories of information using words, phrases, and clauses. - Uses no precise language and domain-specific vocabulary to inform about or explain the topic. - Provides no concluding statement or section related to the information or explanation presented	Writes informative/explanatory texts to examine a topic and convey ideas and information clearly. - Responds to most of the prompt. - Demonstrates limited understanding of topic/text(s) - Introduces a topic and vaguely provides a general observation and focus. - Inconsistently groups related information logically; include formatting (e.g., headings), illustrations, and multimedia when useful to aiding comprehension. -Develops the topic with some facts, definitions, and concrete details. - Inconsistently inks ideas within and across categories of information using words, phrases, and clauses. - Inconsistently uses precise language and domain-specific vocabulary to inform about or explain the topic. - Provides a weak concluding statement or section related to the information or explanation presented	Writes informative/explanatory texts to examine a topic and convey ideas and information clearly. (5.W.2) - Responds to all parts of the prompt. - Demonstrates an understanding of topic/text(s) - Introduces a topic clearly and provides a general observation and focus. (5.W.2.a) - Groups related information logically; include formatting (e.g., headings), illustrations, and multimedia when useful to aiding comprehension. (5.W.2.a) -Develops the topic with facts, definitions, and concrete details. (5.W.2.b) -Links ideas within and across categories of information using words, phrases, and clauses. (5.W.2.c) -Uses precise language and domain-specific vocabulary to inform about or explain the topic. (5.W.2.d) -Provides a concluding statement or section related to the information or explanation presented. (5.W.2.e)	*In addition to **At Standard** criteria:* **+** Responds skillfully to all parts of the prompt **+** Demonstrates a strong understanding of topic/text(s). + Organizes ideas and information into purposeful, coherent paragraphs that include an elaborated introduction with clear thesis, structured body, and insightful conclusion. **+** Skillfully uses relevant and substantial text support from the resources with accuracy **+** Uses varied transitions and syntax to link the major sections of text, create cohesion, and clarify relationship among complex ideas and concepts
	Demonstrates limited understanding of the conventions of standard English capitalization, punctuation, and spelling when writing.	Demonstrates some command of the conventions of standard English capitalization, punctuation, and spelling when writing.	Demonstrates command of the conventions of standard English capitalization, punctuation, and spelling when writing. (5.L.2)	*In addition to **At Standard** criteria:* ***+** Demonstrate creativity and flexibility when using conventions (grammar, punctuation, capitalization, and spelling) <u>to enhance meaning</u>*

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Presentation

Presentation

Students will create a “how to” presentation using Google slides and Screencastify. Using their essays as a starting point, groups design Google slides to teach others the importance of a *water filtration system or Faraday flashlight* and the steps involved in building one. Once students have their slides complete, they will use Screencastify to add vocal instructions.

Presentation Rubric (Google Slides with Screencastify)

	STANDARD NOT MET (1)	STANDARD NEARLY MET (2)	STANDARD MET (3)	STANDARD EXCEEDED (4)
	-Needs to use accurate facts and details to support main ideas	- Uses some accurate facts and details to support main ideas but there may not be enough or some are irrelevant	- Uses accurate facts and relevant details to support main ideas and themes (CC 3-5 SL4)	*In addition to **At Standard** criteria:* **+** Uses facts and details that show an in depth understanding of the ideas and themes
	- Is missing many project requirements - Ideas are not presented in an order that makes sense - Presentation timing is too short or too long -Needs an introduction and/or conclusion	- Includes almost all project requirements - Tries to present ideas in an order, but it doesn't always makes sense - Presents for the right length of time, but some parts may be too short or too long - Introduction and conclusion are present, but they are not clear or interesting	- Includes everything required in presentation - Presents ideas in an order that makes sense (CC 3-5.SL.4) - Organizes time well; no part of the presentation is rushed, too short or too long - Has a clear and interesting introduction and conclusion	*In addition to **At Standard** criteria:* **+** Has a memorable introduction and conclusion
	- Speaks too quietly or not clearly - Does not speak appropriately for the situation (may be too informal or use slang) - Does not use visual aids - Uses inappropriate or distracting visuals on Google slides	- Speaks loudly and clearly most of the time - Speaks appropriately for the situation most of the time - Uses Google slides, but they sometimes distract from the presentation, or do not add to ideas and themes	- Speaks loudly and clearly - Speaks appropriately for the situation, using formal English when appropriate (CC 3-5.SL.6) - Uses well-produced Google slides to add to main ideas and themes (CC 3-5.SL.5)	*In addition to **At Standard** criteria:* **+** Uses appropriate pausing **+** Google slides are especially creative and/or powerful **+** Shows skill in using technology

**Adapted from the 2013 Buck Institute for Education*

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Optional OLE's

Field Trip

Consider taking the below field trips to enrich the students knowledge in addition to science camp.

Wastewater Treatment Plant (scroll down to “other tours”)

Wetland Tour and Treatment Plant - there may be a fee

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Rubrics

Collaboration Rubric

	STANDARD NOT MET (1)	STANDARD NEARLY MET (2)	STANDARD MET (3)	STANDARD EXCEEDED (4)
Takes Responsibility	-I need to prepare for and join team discussions - I need reminders to do project work - My project work is not done on time -I need to learn how to use feedback from others	- I am usually prepared for and join team discussions - I do some project work, but sometimes need to be reminded - I complete most project work on time - I sometimes use feedback from others	- I am prepared for work with the team; I have studied required material and use it to explore ideas in discussions (CC3-5.SL.1a) - I do project work without having to be reminded - I complete project work on time - I use feedback from others to improve my work	*In addition to **At Standard** criteria:* + does more than what he or she has to do + asks for additional feedback to improve his or her work, beyond what everyone has been given
Helps the Team	- I need to cooperate with my team and help the team solve problems - I need to learn how to help make discussions effective - I need to learn how to give useful feedback to others - I need to learn to offer to help others if they need it	- I cooperate with the team but do not help it solve problems - I usually help make discussions effective, but do not always follow the rules, ask enough questions, or express ideas clearly - I give feedback to others, but it may not always be helpful - I sometimes offer to help others if they need it	-I help the team solve problems and manage conflicts - I help make discussions effective by following agreed-upon rules, asking and answering questions, clearly expressing ideas (CC 3-5.SL.1b,c,d) - I give helpful feedback to others - I offer to help others do their work if needed	*In addition to **At Standard** criteria:* + steps in to help the team when another member is absent + encourages others to share ideas, helps to make them clear, and connects them to the team's work + notices if a team member does not understand something and takes action to help
Respects Others	- I am sometimes impolite or unkind to teammates (may interrupt, ignore others' ideas, hurt feelings) - I need to learn how to listen to other points of view and disagree kindly	- I am usually polite and kind to teammates -I usually listen to other points of view and disagree kindly	- I am polite and kind to teammates - I listen to other points of view and disagree kindly	*In addition to **At Standard** criteria:* + encourages the team to be respectful to each other + recognizes everyone's strengths and encourages the team to use them

**Adapted from the 2013 Buck Institute for Education*