5th PBL 1st Semester Plan

Grade: 5th Grade	**Teacher**: Appling, Chatman, Martin, Pyle	**Dates**: August-December
PBL/Ongoing Question: How can we promote higher yields in our WES gardens through our investigational research? **Specific Unit of Study:** How can our research on potassium polyacrylate help 3rd and 1st grade with the soil in their gardens? **(**Plant & Animal Cells, Microorganisms, Physical and Chemical Changes)		

	Science	**Social Studies**	**Math**	**Reading**	**Writing**
Standards	**UNIT 1** S5E1 S5L3 S5L4 **UNIT 2** S5P1	Unit 2 SS5E3	5. NR.1 5.MDR.7 5. MP	**UNIT 1** 5RI3 5SL1 **UNIT 2** 5SL1 5SL4	**UNIT 1** 5W4 5W8 5W10 **UNIT 2** 5W7 5W10

Technology	**Resources/Supplies Needed**	**STE(a)M Integration**	**Community Partnerships**
● Students will create a superhero comic strip introducing kids to potassium polyacrylate.	● Laptops ● Orbeez ● Poster Paper ● Markers ● Potassium ● Contact Solution ● Glue ● Borax ● Baking Soda ● Egg ● Sandwich bags ● Vinegar ● Potassium Polyacrylate Articles	● Students will experiment with Orbeez to see what happens with potassium polyacrylate. ● Students will “jigsaw” articles on the use of potassium polyacrylate in Georgia agriculture and will create posters to share with 3rd and 1st grade encouraging them to consider it for their next planting.	● Dr. Robert Young, Regional Coordinator of Etowah Georgia Youth Science and Technology Center (GYSTC) talked with 5th grade about physical and chemical changes, and how he uses this knowl ● edge in his career.

		• Students will identify physical and chemical changes through the construction and manipulation of slime. • Students will participate in 4 different lab stations using physical and chemical changes.	

Lesson Plans

DT Stage	DTP Plan	
Empathize (Ask)	**Timeframe**: August (2 days) **Probing Questions:** What do you notice about the picture in 2004 of White, Georgia compared to the same picture in 2024? What are some possible reasons for this change? What do you think the land will look like in 20 more years? **Progression of Tasks**: • Students analyzed two Google Earth pictures of the area their school is in to see the difference in the land and industry in 20 years. • Students wrote their observations in their STEM Journals. • Students then brainstormed and wrote their thoughts about what had been affected by the changes and what the land would look like in 20 more years in their STEM Journals. **Resources**: STEM Journal, Google Earth images	**Standards during this Stage:** **S5E1.c**.: Ask questions to obtain information on how technology is used to limit and/or predict the impact of constructive and destructive processes. **5SL1**: Engage effectively in a range of collaborative discussions. **5.MP.4:** Modeling with Mathematics **ELAGSE5W10:** Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline specific tasks, purposes, and audiences
Define (Imagine)	**Timeframe**: August (1 day) • **Probing Questions:** How are animal and plant cells similar and different? How are microorganisms harmful? How are microorganisms beneficial? **Progression of Tasks**:	**Standards during this Stage:** **S5L3**: Obtain, evaluate, and communicate information to compare and contrast the parts of plant and animal cells. **5SL1**: Engage effectively in a range of collaborative discussions.

	• Students analyzed a plant and animal cell through the NCBioNetworks online microscope. • Students drew what they saw and brainstormed similarities and differences they witnessed in their STEM Journals. • Students learned to differentiate viruses and bacteria. • Students analyzed different scenarios and determined if the microorganism was harmful or beneficial. **Resources**: STEM Journals, Virtual Microscope | NCBioNetwork.org https://www.youtube.com/watch?v=XldMeDOy8AY	**ELAGSE5W10:** Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline specific tasks, purposes, and audiences
Define, Ideate, Protype (Imagine) (Plan) (Create)	**Timeframe**: Sept. (2 days) • **Probing Questions:** How are microorganisms harmful? How are microorganisms beneficial? **Progression of Tasks**: • Students chose a scenario to research (making chocolate, making cheese, food poisoning, how bacteria can affect plants). They determined if the microorganisms involved were harmful or beneficial. • Students outlined and wrote a CER response to the questions "How are microorganisms harmful?" or "How are microorganisms beneficial?" **Resources**: microorganism reading.docx	**Standards during this Stage:** **S5L4**: Obtain, evaluate, and communicate information about how microorganisms benefit or harm larger organisms. **5SL1**: Engage effectively in a range of collaborative discussions **5W7:** Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic. **5W8:** Gather relevant information from print and digital sources; summarize information in notes. **ELAGSE5W10:** Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline specific tasks, purposes, and audiences
Define, Ideate, Protype (Imagine) (Plan) (Create)	**Timeframe**: Oct. (2 days) **Probing Questions:** What are the many uses of Potassium Polyacrylate? How might potassium polyacrylate help us in our gardens at WES? How could we test it to see if it works? **Progression of Tasks**: • Students researched the different uses of potassium polyacrylate and participated in a Jigsaw activity. Small groups read about 1 use of the substance and created a poster to teach the class with.	**Standards during this Stage:** **S5P1.** Obtain, evaluate, and communicate information to explain the differences between a physical change and a chemical change. **5SL1:** Engage effectively in a range of collaborative discussions. **5SL4:** Report on a topic or text; speak clearly at an understandable pace. **5W4:** Produce clear and coherent writing in which the development and organization are appropriate to the task, purpose, and audience.

	● During group presentations, students took notes in their STEM Journals on important ways potassium polyacrylate can be used. ● Groups then answered the above question in their STEM Journals and brainstormed how this substance might help our garden beds. ● Students decided to observe the polyacrylate in different temperatures to see if that affected the beading. They decided the type of change that occurred and justified their response. **Resources**: STEM Journal, poster board, potassium polyacrylate information	**5W7:** Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic. **5W8:** Gather relevant information from print and digital sources; summarize information in notes. **ELAGSE5W10:** Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline specific tasks, purposes, and audiences
Empathize (Ask)	**Timeframe**: Oct. (5 days) **Probing Questions:** How much polyacrylate is needed for ½ our garden bed? Why is the potassium polyacrylate not beading as much as it should be? **Progression of Tasks**: ● Students planted 4 cabbages in one side of the garden bed and another 4 cabbages in the other side of the garden bed. ● Students measured the bed and figured out how much potassium polyacrylate would be needed for the size of ½ the bed. ● Students measured 4 tablespoons of potassium polyacrylate and spread it across the left side of the garden bed. ● **Resources**: STEM Journal, ruler	**Standards during this Stage:** **5SL1:** Engage effectively in a range of collaborative discussions. **5.NR.1:** Use place value understanding to solve real-life, mathematical problems. **5.MDR.7:** Solve problems involving customary measurements, metric measurements, and time and analyze graphical displays of data to answer relevant questions. **ELAGSE5W10:** Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline specific tasks, purposes, and audiences
Define, Ideate, Protype (Imagine) (Plan) (Create)	**Timeframe**: Oct. (4 days) **Probing Questions:** How does potassium polyacrylate affect the growth of the cabbage in the 5th grade garden beds? **Progression of Tasks**: ● Students will measure the growth of the plants that were planted with potassium polyacrylate and compare to the measurements of the plants that were not planted with potassium polyacrylate.	**Standards during this Stage:** **S5P1.** Obtain, evaluate, and communicate information to explain the differences between a physical change and a chemical change. **5.MDR.7:** Solve problems involving customary measurements, metric measurements, and time and analyze graphical displays of data to answer relevant questions. **ELAGSE5W10:** Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single

	● Students are going to plant using potassium polyacrylate and watch it grow at different temperatures (Under a grow lamp with a heat mat, outside in cooler weather and inside by a window) and see if temperature makes a difference for its growth. ● **Resources**: STEM Journals	sitting or a day or two) for a range of discipline specific tasks, purposes, and audiences
Define, Ideate, Protype (Imagine) (Plan) (Create)	**Timeframe:** Nov. (3 days) **Probing Questions:** How can potassium polyacrylate be used to help Georgia's agriculture production? **Progression of Tasks:** ● Students will experiment with Orbeez in a lab. Then students will jigsaw several articles on how potassium polyacrylate is being used in agriculture in Georgia. The small groups will then teach the class and create a poster to be shared with 3rd and 1st graders to encourage them to use potassium polyacrylate in their next planting session to yield a higher return. ● **Resources:** STEM Journal, Orbeez, Potassium Polyacrylate articles, poster paper, markers	**Standards during this Stage:** **S5P1.** Obtain, evaluate, and communicate information to explain the differences between a physical change and a chemical change. **SS5E3** Describe how consumers and producers interact in the U. S. economy. **5W4:** Produce clear and coherent writing in which the development and organization are appropriate to the task, purpose, and audience. **5W8:** Gather relevant information from print and digital sources; summarize information in notes. **ELAGSE5W10:** Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline specific tasks, purposes, and audiences
Define, Ideate, Protype (Imagine) (Plan) (Create)	**Timeframe:** Nov. (3 days) **Probing Questions:** How can 5th grade grab younger students' attention on the importance of using potassium polyacrylate in the garden? **Progression of Tasks:** ● In partners, students will create a Superhero comic strip introducing kids to potassium polyacrylate. The comic strip will include the following: -A Potassium Polyacrylate Superhero that introduces potassium polyacrylate to younger students. -A story line that is engaging -At least 2 common uses for potassium polyacrylate are explained.	**Standards during this Stage:** **S5P1.** Obtain, evaluate, and communicate information to explain the differences between a physical change and a chemical change. **5W4:** Produce clear and coherent writing in which the development and organization are appropriate to the task, purpose, and audience. **5W8:** Gather relevant information from print and digital sources; summarize information in notes. **5W2:** Write informative/explanatory texts to examine a topic and convey ideas and information clearly. **ELAGSE5W10:** Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline specific tasks, purposes, and audiences

	-A "Call to Action" for other students to try potassium polyacrylate. **Resources:** STEM Journal, laptops, Storyboard.com	
Test & Improve	**Timeframe:** Nov. (1 day) **Probing Questions:** What did you observe that helped you decide whether a change was physical or chemical? **Progression of Tasks:** ● Students will participate in 4 lab stations where they witness physical and chemical changes at work. Students will record their observations on lab sheets in their STEM journals. Stations: 1. Diaper Experiment 2. Measurement Station 3. Egg and Vinegar 4. Paper Investigations ● **Resources:** STEM Journal	**Standards during this Stage:** **S5P1.** Obtain, evaluate, and communicate information to explain the differences between a physical change and a chemical change. **ELAGSE5W10:** Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline specific tasks, purposes, and audiences
Test & Improve	**Timeframe:** Nov. (1 day) **Probing Questions**: Is the creation of slime a physical or chemical change? **Progression of Tasks:** ● Students will identify physical or chemical changes through the construction and manipulation of slime. They will record their findings on a lab sheet in their STEM journals. ● **Resources**: STEM Journal, glue, baking soda, contact solution, Borax, lab sheet, sandwich bags	**Standards during this Stage:** **S5P1.** Obtain, evaluate, and communicate information to explain the differences between a physical change and a chemical change. **ELAGSE5W10:** Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline specific tasks, purposes, and audiences.
Empathize, Ideate, Protype (Ask Imagine Plan)	**Timeframe:** November **(1** day) **Probing Questions:** What types of physical and chemical changes are happening around you every day? **Progression of Tasks:** ● Dr. Robert Young, Regional Coordinator of Etowah Georgia Youth Science and Technology Center (GYSTC) talked with 5th grade about physical and chemical changes, and how he uses this knowledge in his career.	**S5P1.** Obtain, evaluate, and communicate information to explain the differences between a physical change and a chemical change. **ELAGSE5W10:** Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline specific tasks, purposes, and audiences.

	• **Resources:** STEM Journals	

5th PBL 2nd Semester Plan

Grade: 5th Grade	**Teacher**: Appling, Chatman, Martin, Pyle	**Dates**: January-May
PBL/Ongoing Question: How can we promote higher yields in our WES gardens through our investigational research? **Specific Unit of Study:** How can our research on electricity, magnetism, grow lights, and hydroponics help other grade levels yield more in their gardens? (**Electricity-stick/manmade, circuits, conductors/insulators & Magnetism-electromagnets, magnetic fields**)		

	Science	**Social Studies**	**Math**	**Reading**	**Writing**
Standards	**<u>UNIT 2</u>** S5P2 S5P3	**<u>UNIT 2</u>** SS5E1	**<u>UNIT 2</u>** 5.NR.4 5.NR.1 5. MDR.7	**<u>UNIT 2</u>** 5RI3 5RI4 5RI7 5SL1	**<u>UNIT 2</u>** 5W2 5W4 5W6 5W7

Technology	**Resources/Supplies Needed**	**STE(a)M Integration**	**Community Partnerships**

• Students will compare traditional farming vs. hydroponics using Minecraft. Students will set up one farm using dirt and one farm using different features to mimic a hydroponics farm. They will then compare the growth. • Students will draft an argument that answers the question, "Which would yield more…traditional farming or hydroponics?" Students will use their research notes and resources to create a poster or PowerPoint/Canva presentation presenting their response.	• Laptops • STEM Journals • Poster board • Circuit Sets	• Students will use trial and error to create different types of circuits through hands-on labs and Circuit Construction Kit: AC - RLC Circuit | AC Circuits | Kirchoff's Law - PhET Interactive Simulations. • Students will research possible ways for the 5th grade to add solar lights to our garden with the $200 donated by Harbor Freight. Students will work in small groups to create a budget plan and present it to the 5th grade.	• Students will work with Master Gardener, Mary Willis, to harvest the cabbage the 5th grade grew. • Students will work with Mrs. Betta in the lunchroom to prepare the cabbage for the 5th grade to try.

Lesson Plans

DT Stage	DTP Plan

Empathize (Ask)	**Timeframe**: January (1 day) **Probing Questions:** What is hydroponics? How could we use hydroponics in our WES gardens to help us with our goal? **Progression of Tasks**: ● Students took part in a virtual trip to *The Land* at Walt Disney World where they learned how hydroponics is being used. ● Students then completed a reflection on how this process could help us yield more crops in our WES gardens. **Resources**: STEM Journals, https://youtu.be/M6qcPkddT4I	**Standards during this Stage:** ELAGSE5W7: Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.
Define (Imagine)	**Timeframe**: January (4 days) **Probing Questions:** What information do I need to know about electricity to understand it better? **Progression of Tasks**: ● Students researched in groups different scientific terms to strengthen their understanding of the standard topics (What is Electricity, Types of Electrical Circuits, Conductors & Insulators) ● Students experimented with static electricity through the stations laid out by the GADOE. It's Shocking ● Students compared electromagnets to permanent magnets and looked at how electromagnets are connected to electricity. Science-5th-phenomenon-task-electromagnets.pdf **Resources**: STEM Journal, Task Cards, Passages	**Standards during this Stage:** S5P2. Obtain, evaluate, and communicate information to investigate electricity. S5P3. Obtain, evaluate, and communicate information about magnetism and its relationship to electricity. ELAGSE5RI3: Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text. ELAGSE5RI4: Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area. ELAGSE5SL1: Engage effectively in a range of collaborative discussions one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly.

Define, Ideate, Protype (Imagine) (Plan) (Create)	**Timeframe**: February (1 day) **Probing Questions:** How do we grow plants inside in the winter? **Progression of Tasks**: • Students were introduced to 3 different types of seed pods and compared and contrasted their benefits in their STEM Journals **Resources**: notes pages, STEM Journals, Canva Presentation	**Standards during this Stage:** ELAGSE5RI4: Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area. ELAGSE5SL1: Engage effectively in a range of collaborative discussions one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly. ELAGSE5W7: Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.
Define, Ideate, Protype (Imagine) (Plan) (Create)	**Timeframe**: February (3 weeks) **Probing Questions:** Which pod will be more successful in growing seedlings to be transferred to the hydroponics tower (rock wool or peat moss pellets)? **Progression of Tasks**: • Students started seedlings for lettuce using rock wool pods and peat moss pellets under the grow lights. Students will measure and track the growth of the seedlings. They will transfer the lettuce grown in rock wool to the hydroponics tank when it is ready, and the peat moss pellet lettuce will be transferred to bigger containers and stay under the grow lights when ready. **Resources**: peat moss pellets, rock wool pods, grow lights and stand, STEM Journal, water, vermiculite, heated grow pads	**Standards during this Stage:** ELAGSE5W7: Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.

Empathize (Ask)	**Timeframe**: February (1 days) **Probing Questions:** What more do I need to know about hydroponics? **Progression of Tasks**: ● Students did a "jigsaw" task with the article, "Hydroponics: Understanding Hydroponics" ● Students took notes on their specific part and taught the class about how hydroponics is used around the world, its benefits, the different types of systems, planting steps, and its sustainability. **Resources**: STEM Journals, Big Sticky Notes, article	**Standards during this Stage:** ELAGSE5RI3: Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text ELAGSE5RI4: Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area. ELAGSE5W2: Write informative/explanatory texts to examine a topic and convey ideas and information clearly. ELAGSE5W7: Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.
Define, Ideate, Protype (Imagine) (Plan) (Create)	**Timeframe**: February (2 days) **Probing Questions:** How can we use technology to compare and contrast traditional farming with hydroponics farming? **Progression of Tasks**: ● Students will compare traditional farming vs. hydroponics using Minecraft. Students will set up one farm using dirt and one farm using different features to mimic a hydroponics farm. They will then compare the growth. **Resources**: laptops, STEM Journals, Minecraft	**Standards during this Stage:** ELAGSE5W6: 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; demonstrate sufficient command of keyboarding skills to type a minimum of two pages in a single sitting. ELAGSE5W2: Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

Define, Ideate, Protype (Imagine) (Plan) (Create)	**Timeframe:** February (2days) **Probing Questions:** What would be the best way to spend our donation from Harbor Freight to light our 5th grade garden area? **Progression of Tasks:** ● Students will research possible ways for the 5th grade to add solar lights to our garden with the $200 donated by Harbor Freight. Students will work in small groups to create a budget plan and present it to the 5th grade. **Resources:** laptops, STEM Journals	**Standards during this Stage:** ELAGSE5W7: Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic. ELAGSE5RI7: Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. 5.NR.1: Use place value understanding to solve real-life, mathematical problems 5.NR.4: Read, write, and compare decimal numbers to the thousandths place, and round and perform operations with decimal numbers to the hundredths place to solve relevant, mathematical problems. 5.MDR.7: Solve problems involving customary measurements, metric measurements, and time and analyze graphical displays of data to answer relevant questions.
Define, Ideate, Protype (Imagine) (Plan) (Create)	**Timeframe:** February (1 day) **Probing Questions:** What is the difference between series and parallel circuits? **Progression of Tasks:** ● Students will use trial and error to create different types of circuits through hands-on labs and Circuit Construction Kit: AC - RLC Circuit | AC Circuits | Kirchoff's Law - PhET Interactive Simulations. ● Students will record their observations in their STEM Journals **Resources:** laptops, STEM Journals, Snap Circuit Kits	**Standards during this Stage:** S5P2. Obtain, evaluate, and communicate information to investigate electricity.

Test & Improve	**Timeframe:** February (2 days) **Probing Questions:** Which would yield more…traditional farming or hydroponics? **Progression of Tasks:** ● Students will draft an argument that answers the question, "Which would yield more…traditional farming or hydroponics? Students will use their research notes and resources to create a poster or PowerPoint/Canva presentation presenting their response. **Resources:** laptops, STEM Journals, poster board	**Standards during this Stage:** ELAGSE5W7: Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic. ELAGSE5RI7: Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.