Great Teaching and Leading Fund Final Annual Report 2015-2016 Pinecrest Academy of Nevada

I. Summary

a. Program Name & Overall Goals/Objectives of Program

Pinecrest Reflective Practice and STEM/ NGSS Integration provided job- embedded professional development through the use of a dedicated STEM Instructional Coach and a focused Science Technology Engineering and Math (STEM) curriculum aligned to the Next Generation Science Standards (NGSS). In addition to providing high quality professional development, it is expected that recruitment, selection, and retention of effective teachers and principals would increase as a result of the implementation of the Pinecrest Reflective Practice and STEM/ NGSS Integration model. As a result of best practices spreading throughout the building, the teacher evaluation system would reflect an increase in teacher effectiveness scores on the Pinecrest Formal Evaluation Tool. Finally, student outcomes would include increases in reading, math, and science proficiency scores on the STAR assessments and State assessments.

b. Abstract and Results Overview

Nevada's teacher and leader shortage is alarming. This grant will help grow teachers and leaders by providing specific tools, practice, feedback, and time to build confidence to be successful in the profession. Pinecrest Academy of Nevada is working to create a sustainable teacher and leader professional development to grow exceptional teachers and leaders within their system. This grant is submitted on behalf of three Pinecrest Academy of Nevada campuses: Pinecrest Horizon, Pinecrest St. Rose, and Pinecrest Inspirada. Growing effective teachers and leaders who thrive in the STEM-focused Pinecrest Academy charter will positively impact student achievement. This is our ultimate goal.

c. Next Steps

Pinecrest Academy will continue to implement the STEM curriculum written and vetted during year one of the Reflective Practice and STEM/ NGSS Integration. Although funding has not been received to continue year two of the program, Pinecrest Academy will continue to implement reflective practice and will utilize STEM coaches to provide support and professional development to the teachers in the proper integration of STEM and NGSS curriculum.

II. Grant Funded Activities

a. Name of Activity and Overview

STEM Director/NGSS Curriculum Writer, STEM Instructional Coach, and STEAM specialists were hired to provide professional development and assistance with STEM curriculum integration. The STEM Director also wrote a STEM curriculum and provided professional development related to the STEM curriculum across the three campuses. STEM coaches worked with reflective practice substitutes to model lessons, work alongside teachers, teach classes, and provide curricular support to teachers in grades K-8.

b. Participant Information

Participants included teachers in grades K-8 at three Pinecrest Academy campuses: Horizon, St. Rose, and Inspirada.

c. Area(s) of Effectiveness Measured

i. Improving student achievement

1. Increase student achievement on science proficiency in 5th and 8th grade.

2. Increase student achievement on the math and reading State assessments for grades 3-8.

3. Increase student achievement on STAR Reading and Math assessments.

4. Increase all student reading levels on Accelerated Reader.

5. Increase all student math levels on Every Day Math assessments.

ii. Improving Recruitment/Selection/Retention of Effective Teachers

1. Targeted increase in the use of NGSS, STEM integration, and Kagan strategies in all classrooms throughout the year with a review of lesson plans and documented in classroom observations.

2. In addition to quantitative measurable objectives in student outcomes, evaluation will also occur in pre- and post-surveys of teacher perceptions, measuring confidence levels in their ability to implement specific items in the instructional model.

3. Finally, the plan will be evaluated by comparing scores in the various domains on the 2014-2015 teacher evaluations to the scores on the teacher evaluations at the end of the 2015-2016 school year.

iii. Teachers/Principals- No measures selected in this area

iv. Assisting Teachers/Administrators/Other Licensed Personnel- No measures selected in this area

d. Effectiveness Measure for Each Area, Including Rationale for Chosen Measure

1. By the spring of 2016, increase 5th and 8th grade Science proficiency by 10% as measured by the Nevada Science CRT. This goal was met. System-wide, Pinecrest 5th graders increased to an overall 81% proficiency from 73% and 8th grade increased to an overall 82% proficiency from 45%. This is an average of a 23% increase. This measure was chosen because it matched the goals outlined in the grant. For a focus on STEM integration and science instruction, it was imperative to measure growth in science achievement.

2. By the spring of 2016, increase student achievement by 10% in both ELA/Reading and Mathematics on the 3rd through 8th Grade state assessments. Though this goal was not met in ELA, proficiency did increase by 5%. The goal was met in Math, as proficiency increased exactly 10%.

This measure was chosen because it matched the goals outlined in the grant. For a focus on STEM integration, it was imperative to measure growth in math achievement.

3. By the spring of 2016, increase student achievement by +1.5 to +2 grade levels from the beginning of the year to the end of the year as measured by the STAR Reading and Math assessments. This goal was met in STAR Math where student achievement increased an average of 1.6 grade levels per campus. In STAR reading, campus grade levels increased by an average of 1.2 – 1.5. This measure was chosen because it matched the goals outlined in the grant. With an emphasis on reflective practice and sharing best practices across Pinecrest, it is imperative to measure growth in math and reading achievement.

4. By the spring of 2016, increase all student reading levels by +2 levels, as measured by Accelerated Reader reading book levels and Wonders pre-post assessments. The school relied more heavily on STAR reading results because it is normed data and linked to Accelerated Reader (AR). 60% of our system-wide student population achieved this goal, with 887 of our students achieving graduating their Power Reader levels and moving up. This measure was chosen because it matched the goals outlined in the grant. With an emphasis on reflective practice and sharing best practices across Pinecrest, it is imperative to measure growth in math and reading achievement. Pinecrest realized it was more feasible and a better indicator to track STAR results and statewide assessment results.

ii. Improving Recruitment/Selection/Retention of Effective Teachers

1. By the spring of 2016, increase all student math levels by 10% in Math on 3rd, 4th, and 5th Every Day Math assessments. The tracking of this goal was modified. The school relied more heavily on STAR math results because it is normed data. In terms of modifying the goal tracking to align with STAR math achievement, this goal was met, as grades 3-5 increased an average of 1.5 grade levels from the time of baseline assessment. This measure was chosen because it matched the goals outlined in the grant. With an emphasis on reflective practice and sharing best practices across Pinecrest, it is imperative to measure growth in math and reading achievement. Pinecrest realized it was more feasible and a better indicator to track STAR results and statewide assessment results.

iii. Improving Recruitment/Selection/Retention of Effective Teachers

1. Targeted increase in the use of NGSS, STEM integration, and Kagan strategies in all classrooms throughout the year with a review of lesson plans and documented in classroom observations. This area was only partially measured as funding was not provided for Kagan training. There was a marked increase during the 2015-2016 school year in the use of NGSS and STEM integration as teachers implemented 4 month-long units of study that were written for STEM integration and NGSS alignment. The previous year, teachers created their own science lessons and were not aligned to the

NGSS. Kagan strategies were not tracked or monitored for the purposes of this grant.

2. In addition to quantitative measurable objectives in student outcomes, evaluation will also occur in pre- and post-surveys of teacher perceptions, measuring confidence levels in their ability to implement specific items in the instructional model. This measure was chosen to document attitudes and perceptions about the Pinecrest Instructional Model as a result of the reflective practice model and STEM/ NGSS integration. Pinecrest felt it was important to derive qualitative feedback on the quality of instruction and perceptions of abilities as they related to the requirements of the Pinecrest Instructional Model. Much of this was also related to Title II funding and goals in the Title II plan. There was an increase in all areas of confidence levels and teacher perceptions of the instructional model and NGSS. See optional supporting documents for full pre and post-survey results, but the item pertaining to NGSS is shown below:

   I understand the Next Generation Science Standards. 1= area of need September: 36% June: 10%

   2= somewhat comfortable in understanding September: 28% June: 20%

   3= comfortable in understanding September: 28% June: 50%

   4= extremely comfortable; could train others September: 8% June: 20%

3. Finally, the plan will be evaluated by comparing scores in the various domains on the 2014-2015 teacher evaluations to the scores on the teacher evaluations at the end of the 2015-2016 school year. This measure was chosen to document professional growth and effectiveness as a result of the grant. There was an increase in the overall levels of effectiveness demonstrated by teachers and measured on the formal evaluation tool. An overall comparison of teachers at the varying levels of mastery on the Pinecrest Teacher Evaluation Tool is shown in the table below:

Level	2014-2015 ES	2015-2016 ES	2014-2015 MS	2015-2016 MS
Emerging	0	0	0	0
Developing	4	2	NA	1
Effective	14	11	8	18
Master/ Exemplary	4	8	0	0

e. Implications for Future Implementation

1. Implications for future implementation include a clear need to continue these best practices as currently established while strengthening them with more focused reflective practice sessions. Additional support is needed for STEM and science

coaches to continue to refine practices and strengthen instruction in science. Pinecrest strives to be a premier STEM academy, and the continued focus on STEM instruction is crucial to this goal.

f. Optional – Supporting Materials (agendas, training documents, assessment results, etc.)

I understand the Nevada Academic Content Standards for English Language Arts.
1= area of need September: 4% June: 5%
2= somewhat comfortable in understanding September: 16% June: 5%
3= comfortable in understanding September: 44% June: 30%
4= extremely comfortable; could train others September: 32% June: 60%

I understand the Nevada Academic Content Standards for math.
1= area of need September: 8% June: 5%
2= somewhat comfortable in understanding September: 32% June: 10%
3= comfortable in understanding September: 44% June: 40%
4= extremely comfortable; could train others September: 16% June: 45%

I understand the Next Generation Science Standards.
1= area of need September: 36% June: 10%
2= somewhat comfortable in understanding September: 28% June: 20%
3= comfortable in understanding September: 28% June: 50%
4= extremely comfortable; could train others September: 8% June: 20%

I teach small group guiding reading lessons.
1= weekly September: 28% June: 10%
2= 2-3 times/week September: 8% June: 20%
3= 4 days a week September: 28% June: 10%
4= 5 days a week or every day if it is a short week September: 12% June: 50% NA= 10%

I teach small group guided math lessons.
1= weekly September: 24% June: 10%
2= 2-3 times/week September: 20% June: 20%
3= 4 days a week September: 12% June: 35%
4= 5 days a week or every day if it is a short week September: 8% June: 20% NA= 15%

I am able to differentiate instruction in reading to meet the needs of all learners.
1= strongly disagree September: 0% June: 0%
2= disagree September: 4% June: 5%
3= agree September: 28% June: 45%
4= strongly agree September: 64% June: 45% NA= 5%

I am able to differentiate instruction in math to meet the needs of all learners.
1= strongly disagree September: 8% June: 0%
2= disagree September: 8% June: 5%
3= agree September: 60% June: 60%
4= strongly agree September: 12% June: 30% NA= 5%

I am confident in my ability to engage all learners during reading lessons.
1= strongly disagree September: 0% June: 0%
2= disagree September: 4% June: 0%
3= agree September: 48% June: 35%

4= strongly agree September: 40% June: 50% NA= 15%

I am confident in my ability to engage all learners during math lessons.
1= strongly disagree September: 4% June: 0%
2= disagree September: 4% June: 0%
3= agree September: 60% June: 45%
4= strongly agree September: 20% June: 40% NA= 15%

I value the opinions and feedback from my peers regarding lessons they have observed me teach.
1= strongly disagree September: 4% June: 0%
2= disagree September: 0% June: 0%
3= agree September: 40% June: 15%
4= strongly agree September: 56% June: 85%

I reflect on lessons I teach and make adjustments to my lesson planning.
1= strongly disagree September: 4% June: 0%
2= disagree September: 0% June: 0%
3= agree September: 20% June: 20%
4= strongly agree September: 76% June: 80%

I use data to reflect on the effectiveness of my instruction and make adjustments accordingly.
1= strongly disagree September: 4% June: 0%
2= disagree September: 8% June: 0%
3= agree September: 36% June: 25%
4= strongly agree September: 52% June: 75%

I seek input from others on how to improve my instruction.
1= strongly disagree September: 4% June: 0%
2= disagree September: 0% June: 0%
3= agree September: 28% June: 25%
4= strongly agree September: 68% June: 75%

III. Budget Summary

a. Narrative Overview of Use of GTL Funds Awarded
GTL funds were used to pay for 3 STEM Curriculum Specialists and coaches to provide STEM coaches were hired to provide professional development and assistance with STEM curriculum integration. The lead coach also wrote a STEM curriculum and provided professional development related to the STEM curriculum across the three campuses. STEM coaches worked with reflective practice substitutes to model lessons, work alongside teachers, teach classes, and provide curricular support to teachers in grades K-8.

b. Brief Description of Expenditure Categories and Description
Expenditures included salaries for STEM coaches to write curriculum and provide instructional support to teachers as well as teach STEM classes to students and model lessons for teachers.

c. Awarded Funds vs. Unexpended Funds, Including Narrative of All Unexpended Funds
There were no unexpected funds provided, and awarded funds were used for the purposes outlined in this grant.

Pinecrest Reflective Practices and STEM/NGSS Integration

Final Report

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Nevada Department of Education

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Executive Summary

The goal of this STEM/NGSS grant funded project was to develop STEM curriculum for elementary and middle school, to pilot the newly created STEM units across campuses, and to provide teachers with professional development in content integration. Furthermore, the goal of this project was to form a collaboration between STEM specialists across the three sister schools (Horizon, Inspirada, St. Rose). The design and implementation of this year-long project was divided into multiple phases. An explanation of each phase is provided below.

Introduction

The new science framework defines the "foundational knowledge and skills" (NRC, 2012, p. 2) in science and engineering that students in K-12 acquire by the end of 12th grade. There are three major dimensions recommended in this framework to foster meaningful learning in science and engineering that include:

- Scientific and engineering practices;
- Crosscutting concepts that unify the study of science and engineering through common application across fields;
- Core ideas in four disciplinary areas: physical sciences; life sciences; earth, and space sciences along with engineering, technology, and applications of science (NRC, 2012, p. 2).

Scientific and engineering practices in the new science framework are included to assist students to form a relationship between science and engineering disciplines. Moreover, to help students understand that a distinct process (e.g. the scientific method or the engineering design process) for conducting scientific investigation in each discipline does not exist. To emphasize this concept, eight knowledge-based practices are included in the new science framework for students to engage in and recognize the process of developing scientific knowledge (NRC, 2012).

Project Phases Phase 1:

STEM Project-Based Curriculum (Elementary)

Development

This phase initiated with first reviewing the current science curriculum (Delta Science) to find correlations between science disciplinary core ideas and practices addressed in the New Science Standards and create new STEM integrated project-based curriculum.

The Delta science curriculum currently used by Pinecrest Horizon campus at the elementary grade level was reviewed and no correlation was found between the Delta science activities and current NGSS standards. All the Delta unit tubs were removed from the elementary classrooms. The Delta science consumable materials were organized in a cabinet situated in the STEM office to utilize with the new STEM project-based units.

Additionally, since the Delta science curriculum did not align with the science standards, new

STEM project-based units were created for elementary (K-5th). The primary focus for development was elementary grades, due to the lack of consistency in science particularly at the elementary level. As a result of the project, STEM integrated project-based units were developed (See Table 1). The units are based on the NGSS topics presented in the science standards. All the units are aligned with Common Core Mathematics and English Language Arts standards as well as, each unit has an engineering based STEM project that reinforces the science and mathematics concepts covered in the lessons. The units are also infused with technology to promote technology in science learning. The unit lessons are created using a research based instructional framework known as the BSCS 5E Instructional Model. The 5E's in the framework represent engage, explore, explain, evaluate and elaborate. The STEM project as part of the unit is designed using the research based Engineering Design process. The aim of the units is to not only develop and reinforce STEM content knowledge, but also to expose students to scientific and engineering practices as required by the new science standards while providing students with real world experiences.

Table 1.
STEM Integrated Elementary Science Unit

Grade	Life Science	Earth Science	Physical Science
K	Interdependent Relationships in Ecosystems: Animals, Plants, and their Environment	Weather and Climate	Forces and Interactions: Pushes and Pulls
1st	Structure, Function, and Information Processing	Space Systems: Patterns and Cycles	Waves: Light and Sound
2nd	Interdependent Relationships in Ecosystems	Earth's Systems: Processes that Shape the Earth	Structure and Properties of Matter
3rd	Interdependent Relationships in Ecosystems Inheritance and Variation of Traits: Life Cycles and Traits	Weather and Climate	Forces and Interactions
4th	Structure, Function, and Information Processing	Earth's Systems: Processes that Shape the Earth	Energy Waves: Waves and Information
5th	Matter and Energy in Organisms and Ecosystems	Earth's Systems Space Systems: Stars and the Solar System	Structure and Properties of Matter

Implementation

In addition to developing new NGSS curriculum for elementary grades, another component of this phase was to pilot implementation of the new STEM curriculum at all campuses (Horizon, Inspirada, St. Rose). A detailed explanation of the implementation process in described below for each campus.

Horizon campus

At the horizon campus, many of the STEM units were implemented. Students from kinder to fourth engaged in scientific and engineering practices to learn about weather and climate, ecosystems, energy, Earth's processes, and structure and properties of matter. Students during their STEM specials, also utilized the five step engineering design process (Ask, Imagine, Plan, Create, Improve) to design tornado proof shelters, solar ovens, catapults, pollinators, earthquake proof shelter, insulators, and a Rube Goldberg device. Furthermore, as part of their unit, kinder and third grade students also participated in an informal STEM activity. For kindergarten students, professional from the Nevada PE Foundation STEM Outreach were invited to conduct an engineering activity. In this activity, the students learned about the engineering design process, then created and tested their hoop gliders. While for third grade, representatives from Discovery on Wheels were invited to teach a lesson on cells and heredity. The third graders also incubated duck eggs to learn about animal life cycles.

Inspirada campus

At the Inspirada campus during the entire third marking period, STEM units were implemented in grades (K-5th). Students from kinder to fifth engaged in scientific and engineering practices to learn about forces and interactions, space systems, ecosystems, structure and functions, and weather and climate. Students during their technology specials, also utilized the five step engineering design process (Ask, Imagine, Plan, Create, Improve) to design models of a space shuttle using tinker CAD (See Appendix A).

St. Rose campus

At the St. Rose campus also during the third marking period, STEM units were implemented in grades (K-4th). Students from kinder to fourth engaged in scientific and engineering practices to learn about forces and interactions, space systems, ecosystems, structure and functions, and weather and climate. Students during their technology specials, also utilized the five step engineering design process (Ask, Imagine, Plan, Create, Improve) to design tornado shelter, solar oven, and animal ecosystem. Additionally, as various grade levels requested further STEM units were emailed. Table two below displays all the STEM units implemented at various grade levels across campuses (See table 2).

Table 2.
STEM Units Implemented

Grade	Horizon Campus	Inspirada Campus	St. Rose Campus
K	Forces and Interactions: Pushes and Pulls	Forces and Interactions: Pushes and Pulls	Forces and Interactions: Pushes and Pulls
1st	Structure, function and information processing Space systems: Patterns and cycles	Structure, function and information processing Space systems: Patterns and cycles Waves: light and sound	Structure, function and information processing Space systems: Patterns and cycles Waves: light and sound
2nd	Interdependent relationships in ecosystems Earth's systems: Processes that shape the Earth	Interdependent relationships in ecosystems Earth's systems: Processes that shape the Earth	Earth's systems: Processes that shape the Earth Structure and properties of matter

Grade	Horizon Campus	Inspirada Campus	St. Rose Campus
	Structure and properties of matter		
3rd	Weather and Climate Interdependent Relationships in Ecosystems Inheritance and Variation of Traits: Life Cycles and Traits	Weather and Climate Interdependent Relationships in Ecosystems	Weather and climate
4th	Earth's Systems: Processes that Shape the Earth Energy	Earth's Systems: Processes that Shape the Earth	Earth's Systems: Processes that Shape the Earth
5th	Structure and Properties of Matter	Space Systems: Stars and the Solar System	Structure and Properties of Matter

STEM Project-Based Curriculum (Middle School)

The development of elementary STEM integrated units took longer than expected, due to which there was not sufficient time to create units for middle school. However, the currently utilized Pearson Interactive Science curriculum was reviewed and aligned with the state science standards and scope and sequence was developed. The suggested Scope and Sequence for Middle School covers multiple science disciplines at each grade. The science topics are divided based on what the district plans to roll out each year. The science topics are aligned with the current Pearson Interactive Science Textbooks in use at all campuses, along with essential questions for each topic and an engineering project (See Table 3 below). Moreover, the scope and sequence includes a list of consumable and non-consumable materials.

Table 3.
Science Progression Middle School

Grade	Life Science	Earth Science	Physical Science
6th	Growth, Development, and Reproduction Structure, Function, and Information Processing	Weather and Climate Human Impact	Energy
7th	Matter and Energy In Ecosystems	History of Earth Earth's System and Human Impacts	Matter and Chemical Reactions
8th	Heredity Natural Selection and Adaptations	Gravity and Space Systems	Forces and Interaction Waves and Information Transfer

SIXTH GRADE SCIENCE

PEARSON INTERACTIVE SCIENCE ALIGNMENT

SCIENCE TOPICS	ESSENTIAL QUESTIONS	PEARSON TEXT	ENGINEERING PROJECT (Tentative)
ENERGY	How does adding or removing thermal energy affect the movement of particles? How do energy and gravity cause the movement of water in Earth's systems? What variables affect energy transfer within a system? How can scientific principles be used to design a device that minimizes or maximizes heat transfer?	**Forces and Energy** Chapter 4: Lesson 1, 3 Chapter 5: Lesson 1, 2, & 3 Chapter 3: Lesson 5	Design and build an air powered sail car that can achieve maximum speed (specify speed) over a specified distance.
WEATHER AND CLIMATE	How do the complex interactions of air masses cause changes in weather patterns? How does the water cycle relate to weather? What global factors determine regional climate? Why is Las Vegas a desert?	**Water and Atmosphere** Chapter 1: pgs. 4-30 Chapter 2: pgs. 38-59 Chapter 3: pgs. 72-89 & 100-108 Chapter 4: pgs. 114-156 Chapter 5: 164-196	Design, build and test an aquifer model how an aquifer can get polluted. Find possible solution to prevent/diminish pollution
HUMAN IMPACT	How are human activities contributing to climate change? What impact do humans have on the environment?	**Astronomy and Space** pgs. 88-101 **Ecology & Environment** Chapters 2-3 **Forces and Energy** **pgs. 104 – 185** **Earth's Surface** **pgs. 102 – 137** **Weather and Atmosphere** **pgs. 184-195**	Design and build a sustainable house in the dessert ecosystem. The house structure plan and the materials used should justify the environment.

SCIENCE TOPICS	ESSENTIAL QUESTIONS	PEARSON TEXT	ENGINEERING PROJECT (Tentative)
GROWTH, DEVELOPMENT, AND REPRODUCTION	What is the basic unit of life? How do the parts of a cell contribute to its function as a whole? How do cells and organisms reproduce? What factors influence successful reproduction? What factors influence the growth and development of organisms?	**Cells and Heredity** Chapter 3: pgs. 89-91 & 102, Chapter 4: Lesson 1 & 3 Chapter 3: Lesson 1, 2, & 4 Chapter 5: Lesson 3 & 5	Design and test a method for using the amount of CO^2 given off by yeast to evaluate how much sugar is in a variety of energy drinks.
STRUCTURE, FUNCTION, AND INFORMATION P R OCESSING	How does the body operate as an interdependent system? How does your body respond to stimuli?	**Cells and Heredity** Chapter 1: Lessons 1 & 2, & 4 Chapter 2: Lessons 1, 2, & 3 **Human Body Systems** Chapter 1: Lessons 1, 2, & 3 Chapter 2: Lessons 1 & 2 Chapter 3: Lessons 1, 3, & 4 Chapter 4: Lessons 1, 2, & 3 Chapter 5: Lessons 1, 2, & 3 Chapter 7: Lessons 1, 2, 3 & 4	Design, build and test a peripheral vision testing device.

SEVENTH GRADE SCIENCE
PEARSON INTERACTIVE SCIENCE ALIGNMENT

SCIENCE TOPICS	ESSENTIAL QUESTIONS	PEARSON TEXT	ENGINEERING PROJECT (Tentative)
MATTER AND CHEMICAL REACTIONS	How can particles combine to produce a substance with different properties? How does thermal energy affect particles?	**Introduction to Chemistry** Chapter 5: Lesson 1, 2 & 3 **Forces and Energy** Chapter 5: Lesson 1, 2, & 3	Design, construct, and test a device that releases thermal energy by chemical processes
MATTER AND ENERGY IN ECOSYSTEMS	How do organisms obtain matter and energy? How do organisms use matter and energy? How do matter and energy move through an ecosystem?	**Ecology and the Environment** Chapter 1: Lessons 1, 2, 3, & 4 Chapter 2: Lesson 1, 2, & 5 **Cells and Heredity** Chapter 2: Lesson 1, 2	Build a model dam and examine the effect of changing water flow from both above and below the dam.

SCIENCE TOPICS	ESSENTIAL QUESTIONS	PEARSON TEXT	ENGINEERING PROJECT (Tentative)
HISTORY OF EARTH	How do people figure out that the Earth has changed over time? How do people figure out that life on Earth has changed over time? How does the movement of tectonic plates impact the surface of Earth?	**Earth's Surface** Chapter 3: Lesson 1- 5 Chapter 4: Lesson 1- 5 **Earth's Structure** Chapter 3: Lesson 1, 2, & 3 Chapter 4: Lesson 1, 2, & 3 Chapter 5: Lesson 1, 2, & 3	Students will design, build, and test a model that simulates an earthquake and its effect on topographical features and built structures.
EARTH'S SYSTEM AND HUMAN IMPACTS	How do minerals in and on Earth's crust change over time? How does water influence weather, circulate in the oceans, and shape Earth's surface?	**Earth's Structure** Chapter 1: Lesson 1, 2, & 3 Chapter 2: Lesson 1, 2, 3, 4, 5, & 6 Chapter 3: Lesson 1, 2 and 3 **Water and the Atmosphere** Chapter 1: Lesson 1, 2, & 3 Chapter 2: Lesson 3 Chapter 3: Lesson 1 & 5 Chapter 5: Lesson 4	Design, build, and test a river model that shows how water erosion and deposition lead to various land features.

EIGHT GRADE SCIENCE
PEARSON INTERACTIVE SCIENCE ALIGNMENT

SCIENCE TOPICS	ESSENTIAL QUESTIONS	PEARSON TEXT	ENGINEERING PROJECT (Tentative)
FORCES AND INTERACTION	Why objects fall to the ground? Why some materials are attracted to each other while others are not? How can one describe physical interactions between objects and within systems of objects?	**Forces and Energy** Chapter 1: Lesson 1-3 Chapter 2: Lesson 1-5 Chapter 4: Lesson 1-3 Chapter 7: Lesson 1-5	Design and build air powered sail car with a goal of achieving maximum speed over a specified distance.
GRAVITY AND SPACE SYSTEMS	What is Earth's place in the Universe? What makes up our solar system and how can the motion of Earth explain seasons and eclipses?	**Astronomy and Space Science** Earth, Moon, Space Chapter 1: Lesson 1-6 Chapter 2: Lesson 1-3 Chapter 3: Lesson 1-6 Chapter 4: Lesson 1-6	Build Models of a Mars base and tool that would allow humans to live on Mars and do experiments.
WAVES AND INFORMATION TRANSFER	What are the characteristic properties of waves and how can they be used? Describe and predict characteristic properties and behaviors of waves when the waves interact with matter.	**Sound and Light** Chapter 1: Lesson 1-3 Chapter 2: Lesson 1-3 & 5 Chapter 3: Lesson 1-3 Chapter 4: Lesson 1-5	Design and build a maze. Students will use mirrors and lens to guide a beam of light through the maze and hit a specific target.

SCIENCE TOPICS	ESSENTIAL QUESTIONS	PEARSON TEXT	ENGINEERING PROJECT (Tentative)
HEREDITY	How does genetic variation among organisms in a species affect survival and reproduction?	**Cells and Heredity** Chapter 3: Lesson 1-4 Chapter 4: Lesson 1-3 Chapter 5: Lesson 1-4 Chapter 6: Lesson 1-3	Build a device that can be used for mutation.
NATURAL SELECTION AND ADAPTATIONS	How does the environment influence genetic traits in populations over multiple generations?	**Cells and Heredity** Chapter 3: Lesson 1, 2 & 3 Chapter 6: Lessons 1, 2 & 3 **Earth's Surface** Chapter 4: Lessons 4, 5, & 6 **Diversity of Life** Chapter 1: Lessons 2 & 4	Design feeding adaptations for a basic animal body.

Phase 2: Scope and Sequence (Elementary)

The Scope and Sequence for the STEM integrated units was created once all the units for grades K-5th were developed. The scope and sequence shows the order of the units and the outcomes that each unit addresses. Moreover, it shows the sequence in which the units should be implemented for each grade level. The major elements in the scope and sequence (See Appendix B) include:

- Title of each units
- Titles of lessons in each unit
- Sequence of units
- Essential question or questions for each unit
- Standards (Science, Math, ELA)/Crosscutting concepts, and,
- STEM unit project for each unit.

Table 4.
Unit Progression Elementary

Grade	Life Science	Earth Science	Physical Science
K	Interdependent Relationships in Ecosystems: Animals, Plants, and their Environment	Weather and Climate	Forces and Interactions: Pushes and Pulls
1st	Structure, Function and Information Processing	Space Systems: Patterns and Cycles	Waves: Light and Sound
2nd	Interdependent Relationships in Ecosystems	Earth's System: Processes that Shape the Earth	Structure and Properties of Matter
3rd	Interdependent Relationships in Ecosystems Inheritance and Variation of Traits: Life Cycles and Traits	Weather and Climate	Forces and Interactions

Grade	Life Science	Earth Science	Physical Science
4th	Structure, Function, and Information Processing	Earth's System: Processes that Shape the Earth	Energy Waves: Waves and Information Processing
5th	Matter and Energy in Organisms and Ecosystems	Earth Systems Space Systems: Stars and Solar System	Structure and Properties of Matter

All the elementary units as well the scope of sequence for elementary and middle have been saved on flash drives for the four campuses (Horizon, Inspirada, St. Rose, and Cadence). Also, a hand copy has been compiled and delivered to Dr. Buck for the Executive Office.

Phase 3: Professional Development

As STEM makes its way into the classrooms across America, another integral factor in determining its success is teachers' content knowledge, quality, and preparedness.
Thus, professional development for teachers is necessary to develop a STEM environment, which creates an engaging learning experience for all students and promotes achievement among diverse learners.

The STEM director met with teachers at each grade level prior to implementing the first STEM units. The STEM director visited St. Rose campus and Inspirada campus at the start of the third marking period to meet the grade level teachers and share the units to be implemented during the marking period. Also, the STEM specialist observed STEM lessons in the classrooms (See Appendix C).

Phase 4: Science Interactive notebooks

Writing in science is equally important as writing in other disciplines. It is one way that children learn science. An interactive science notebook can be used in science as a tool to promote writing, creativity, and strengthen students' learning of science concepts. Therefore, all teachers, particularly in grades K-5th were asked to introduce science notebooks in their classroom. These notebooks were to be used for all STEM activities. The STEM director explained to the teachers in grades K-4th how the science notebook should be setup and provided the teachers with a power point to introduce science notebooks in the classroom. Students at all campuses were required to keep science notebooks (See Appendix D student science notebooks).

Evaluation

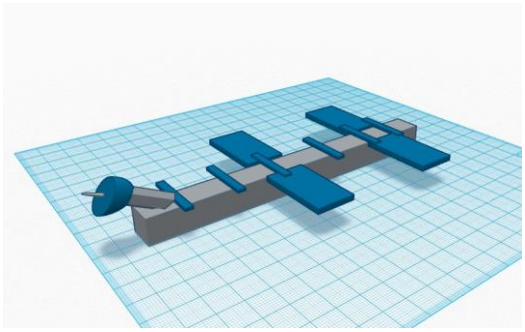
The fundamental purpose of evaluation is to create greater understanding, to improve educational efforts, and to address accountability. For this academic year, it may be difficult to assess the effectiveness of the units; since, the units were being developed and piloted at the same time, and not all campuses implemented the same units. However, some effectiveness can be assessed from the end of the year assessments. These assessments include SBAC's, and end of the year charter school assessments. However, assessment should be a critical piece for next academic year. Therefore, assessments will need to be conducted next academic year to gain a deeper understanding of students' content knowledge and unit effectiveness.

Appendix A

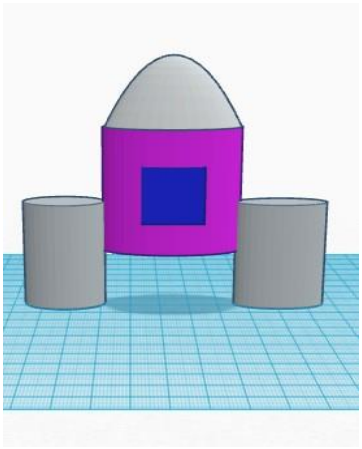
Student Satellite Models (Inspirada)

Model 1

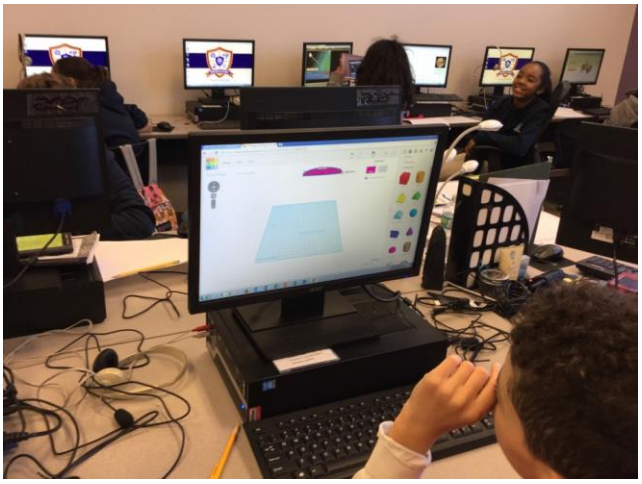
Model 2



Model 3



Student Working



Appendix B
Scope and Sequence Elementary

Kindergarten

Science Discipline: Unit Titles	Lesson Titles	Essential Question(s)	Standards: Cross Cutting Concepts	STEM Unit Project
Physical Science: Forces and Interactions: Pushes and Pulls	**Lesson 1:** How do things move? **Lesson 2:** What is the difference between pulling and pushing an object? **Lesson 3:** How do pulls and pushes change the motion of an object? **Lesson 4:** How do shapes, size and weight change the speed of an object? **Lesson 5:** What kinds of objects roll? **Lesson 6:** Where is the object? **Lesson 7:** Why do some objects fall to the ground?	• What happens if you push or pull an object harder?	**Science:** K-PS2-1, K-PS2-2 **ELA:** RI.K.1, W.K.7, SL.K.3 **Math:** MP.2, K.MD.A.1, K.MD.A.2 Cause and Effect	Design a gummy bear launcher to help the gummy bears cross the broken bridge and experience flying. **Engineering Design:** K-2 - ETS1-1, K-2 - ETS1- 2, K-2- ETS1-3
Earth Science: Weather and Climate	**Lesson 1:** What is weather? **Lesson 2:** How do we describe weather? **Lesson 3:** How does sunlight effect the Earth's surfaces? **Lesson 4:** Does weather change throughout the day? **Lesson 5:** Does weather change throughout the year? **Lesson 6**: Why do we need to forecast the weather?	• What is the weather like today? • How is it different from yesterday?	**Science:** K-PS3-1, K-PS3-2 **ELA:** RI.K.1, W.K.7, SL.K.3 **Math:** MP.2, MP.4, K.CC, K.CC. A, K.MD.A.1, K.MD.A.2, K.MD.B.3. Patterns Cause and Effect	Design a structure to reduce the warming effect of sunlight. **Engineering Design:** K-2 - ETS1-1, K-2 - ETS1- 2, K-2- ETS1-3

Science Discipline: Unit Titles	Lesson Titles	Essential Question(s)	Standards: Cross Cutting Concepts	STEM Unit Project
Life Science: Independent Relationships in Ecosystems: Animals, Plants, and their Environments	**Lesson 1:** What is the difference between living and non-living things? **Lesson 2:** What do plants and animals need to survive? **Lesson 3:** How do plants and animals change their **environment?** **Lesson 4:** Why do animals and plants live in certain places? **Lesson 5:** How do humans effect the environment? **Lesson 6: How can humans reduce their impact on the environment?**	• Where do animals live? • Why do they live there?	**Science**: K-LS1-1, K- ESS2-2, K-ESS3-1, K-ESS3-3 **ELA**: RI.K.1, W.K.7, SL.K.3 **Math**: MP.2, MP.4, K.CC, K.CC. A, K.MD.A.1, K.MD.A.2, K.MD.B.3. Patterns Cause and Effect Systems and	Design a bird feeder for birds that migrate during the winter to ease the migration process. **Engineering Design**: K-2 - ETS1-1, K-2 - ETS1- 2, K-2-ETS1-3

First Grade

Science Discipline: Unit	Lesson Titles	Essential Question(s)	Standards: Cross Cutting Concepts	STEM Unit Project
Physical Science: Waves: Light and Sound	**Lesson 1:** What is sound? **Lesson 2:** What causes a vibration? **Lesson 3:** How do we hear sound? **Lesson 4:** What is a pitch? **Lesson 5:** What is rhythm? **Lesson 6:** What is volume? **Lesson 7**: How is sound used to communicate? **Lesson 8:** What is light? **Lesson 9:** How does light behave? **Lesson 10 (part a):** How do shadows form? **Lesson 10 (part b):** How can you change the size of the shadow?	• What happens when materials vibrate? • What happens when there is no light?	**Science:** 1-PS4-1, 1-PS4-2, 1-PS4-3, 1-PS4-4 **ELA:** W.1.2, W.1.7, W.1.8, SL.1.1 **Math:** MP.5, 1. MD.A.1, 1. MD.A.2. Cause and Effect	Design musical instruments to use at a school performance that can demonstrate sound and pitch. **Engineering Design:** K-2 - ETS1-1, K-2 – ETS1-2, K-2-ETS1-3

Science Discipline: Unit	Lesson Titles	Essential Question(s)	Standards: Cross Cutting Concepts	STEM Unit Project
Life Science: Structure, Function and Information Processing	**Lesson 1:** What are the needs of living things? **Lesson 2:** How do animals and plants live every day? **Lesson 3:** What are some special features of plants and animals? **Lesson 4:** How does animal behavior help it to survive? **Lesson 5 (part a):** Why do children often look like their parents?	• What are some ways plants and animals meet their needs so that they can survive and grow?	**Science:** 1-LS1-1, 1-LS1-2, 1-LS-3-1 **ELA:** RI.1.1, RI.1.2, RI.1.10, W.1.7, W.1.8; **Math:** 1. NBT.B.3, 1.NBT.C.4, 1.NBT.C.5, 1.NBT.C.6, MP.2, MP.5, MD.A.1 Patterns Structure and Function	Build an animal that lives in their chosen habitat focusing on traits or characteristics which help it better survive. **Engineering Design:** K-2 - ETS1-1, K-2 - ETS1- 2, K-2- ETS1-3
Physical Science: Waves: Light and Sound	**Lesson 1:** What is sound? **Lesson 2:** What causes a vibration? **Lesson 3:** How do we hear sound? **Lesson 4:** What is a pitch? **Lesson 5:** What is rhythm? **Lesson 6: What is volume?** **Lesson 7:** How is sound used to communicate? **Lesson 8:** What is light? **Lesson 9:** How does light behave? **Lesson 10 (part a):** How do shadows form? **Lesson 10 (part b):** How can you change the size of the shadow?	•What happens when materials vibrate? •What happens when there is no light?	**Science:** 1-PS4-1, 1-PS4-2, 1-PS4-3, 1-PS4-4 **ELA:** W.1.2, W.1.7, W.1.8, SL.1.1 **Math:** MP.5, 1. MD.A.1, 1. MD.A.2. Cause and Effect	Design musical instruments to use at a school performance that can demonstrate sound and pitch. **Engineering Design:** K-2 - ETS1-1, K-2 - ETS1- 2, K-2- ETS1-3
Life Science: Structure, Function and Information Processing	**Lesson 1:** What are the needs of living things? **Lesson 2:** How do animals and plants live every day? **Lesson 3:** What are some special features of plants and animals? **Lesson 4:** How does animal behavior help it to survive? **Lesson 5 (part a):** Why do children often look like their parents? **Lesson 5 (part b):** Why do children often look like their parents?	• What are some ways plants and animals meet their needs so that they can survive and grow?	**Science:** 1-LS1-1, 1-LS1-2, 1-LS-3-1 **ELA:** RI.1.1, RI.1.2, RI.1.10, W.1.7, W.1.8; **Math:** 1. NBT.B.3, 1.NBT.C.4, 1.NBT.C.5, 1.NBT.C.6, MP.2, MP.5, MD.A.1. Patterns Structure and Function	Build an animal that lives in their chosen habitat focusing on traits or characteristics which help it better survive. **Engineering Design:** K-2 - ETS1-1, K-2 - ETS1- 2, K-2- ETS1-3

Science Discipline: Unit	Lesson Titles	Essential Question(s)	Standards: Cross Cutting Concepts	STEM Unit Project
Life Science: Structure, Function, and Information Processing *(Cont.)*	**Lesson 1:** What are the needs of living things? **Lesson 2:** How do animals and plants live every day? **Lesson 3:** What are some special features of plants and animals? **Lesson 4:** How does animal behavior help it to survive? **Lesson 5 (part a):** Why do children often look like their parents? **Lesson 5 (part b):** Why do children often look like their parents?	• What are some ways plants and animals meet their needs so that they can survive and grow?	**Science:** 1-LS1-1, 1-LS1-2, 1-LS-3-1 **ELA:** RI.1.1, RI.1.2, RI.1.10, W.1.7, W.1.8; **Math:** 1. NBT.B.3, 1.NBT.C.4, 1.NBT.C.5, 1.NBT.C.6, MP.2, MP.5, MD.A.1. Patterns Structure and Function	Build an animal that lives in their chosen habitat focusing on traits or characteristics which help it better survive. **Engineering Design**: K-2 - ETS1-1, K-2 - ETS1- 2, K-2- ETS1-3
Earth Science: Space Systems: Patterns and Cycles	**Lesson 1:** What are those objects in the night sky? **Lesson 2:** What is the sun? **Lesson 3:** How does the moon move? **Lesson 4:** Does the moon look the same all the time? **Lesson 5:** How is day different from night? **Lesson 6:** How is the sun different throughout the year?	• What are objects in the sky? • How do those objects seem to move?	**Science:** 1-ESS1-1, 1-ESS1-2 **ELA:** W.1.7, W.1.8 **Math:** MP.2, MP.4, MP.5, 1. OA.A.1, 1.MD.C.4 Patterns Scientific knowledge Assumes an Order and Consistency in Natural Systems	Design and build a solar oven that can used to bake treats. **Engineering Design**: K-2 - ETS1-1, K-2 - ETS1- 2, K-2- ETS1-3

Second Grade

Science Discipline: Unit Titles	Lesson Titles	Essential Question(s)	Standards: Cross Cutting Concepts	STEM Unit Project
Life Science: Interdependent Relationships in Ecosystems	**Lesson 1**: Do plants need sunlight and water to grow? **Lesson 2**: What do plants make? **Lesson 3**: Why are plants important? **Lesson 4**: How is data organized in an investigation? **Lesson 5**: What lives in our schoolyard? **Lesson 6**: How are plants and animals in our schoolyard the same or different? **Lesson 7**: What is a habitat? **Lesson 8**: What are the characteristics of different habitats? **Lesson 9**: How do animals and plants interact?	• What do plants need to grow • How many living things live in a place?	**Science**: 2-L2-1, 2-LS2, 2- LS4-1 **ELA**: W.2.7, W.2.8, SL.2.5 **Math**: MP.2, MP.4, MP.5, 2. MD.D.10. Cause and Effect Structure and Function	Design and build a pollinator to increase pollution, which can help the ecosystem thrive. **Engineering Design**: K-2 - ETS1-1, K-2 - ETS1- 2, K-2- ETS1-3

Science Discipline: Unit Titles	Lesson Titles	Essential Question(s)	Standards: Cross Cutting Concepts	STEM Unit Project
Life Science: Interdependent Relationships in Ecosystems *(Cont.)*	**Lesson 1**: Do plants need sunlight and water to grow? **Lesson 2**: What do plants make? **Lesson 3**: Why are plants important? **Lesson 4**: How is data organized in an investigation? **Lesson 5**: What lives in our schoolyard? **Lesson 6**: How are plants and animals in our schoolyard the same or different? **Lesson 7**: What is a habitat? **Lesson 8**: What are the characteristics of different habitats? **Lesson 9**: How do animals and plants interact?	• What do plants need to grow • How many living things live in a place?	Science: 2-L2-1, 2-LS2, 2- LS4-1 ELA: W.2.7, W.2.8, SL.2.5 Math: MP.2, MP.4, MP.5, 2. MD.D.10. Cause and Effect Structure and Function	Design and build a pollinator to increase pollution, which can help the ecosystem thrive. **Engineering Design**: K-2 - ETS1-1, K-2 - ETS1- 2, K-2- ETS1-3
Earth Science: Earth's System: Processes that Shape the Earth	**Lesson 1:** What can we find on the Earth's surface? **Lesson 2:** Where does the water come from? **Lesson 3:** What are the different kinds of water on Earth? **Lesson 4:** What are the different kinds of landforms on Earth? **Lesson 5:** How can soil on the Earth's surface be changed by wind? **Lesson 6:** How can soil on the Earth's surface be changed by water? **Lesson 7:** How can soil on the Earth's surface be changed by ice? **Lesson 8:** How can slow and fast changes due to water affect land?	• How does land change and what are some things that cause it to change? • What are the different kinds of land and bodies of water?	**Science**: 2-ESS1-1,2-ESS2-1, 2-ESS2-2, 2-ESS2-3 **ELA**: RI.2.1, RI.2.3, RI.2.9, W.2.6, W.2.7, W.2.8, MP.2 **Math**: MP.4, MP.5, 2.NBT.A, 2.NBT.A.3 Patterns Stability and Change Science Addresses Questions about the Natural and Material World	Design and build a levee to help prevent flooding and erosion. **Engineering Design**: K-2 - ETS1-1, K-2 - ETS1- 2, K-2- ETS1-3
Physical Science: Structure and Properties of Matter	**Lesson 1:** How can matter be classified? **Lesson 2:** How can matter be solid, liquid, and gas? **Lesson 3:** What are some ways matter can change? **Lesson 4:** What are some properties of matter? **Lesson 5 (part a):** How can properties of matter be used for specific purposes? **Lesson 5 (part b):** How can properties of matter be used for specific purposes? **Lesson 6:** Can you combine smaller pieces of matter to create new objects?	• How are materials similar and different from one another? • How do the properties of the materials relate to their use?	**Science:** 2-PS1-1, 2-PS1-2, 2-PS1-3, 2-PS1-4 **ELA:** RI.2.1, RI.2.3, W.2.1, W.2.7, W.2.8 **Math:** MP.2, MP.4, MP.5, 2. MD.D.10 Patterns Cause and Effect Energy and Matter Influence of Engineering, Technology, and Science on Society and the Natural World	Design and build a cooler to keep matter from getting warm during the hot summer days. **Engineering Design**: K-2 - ETS1-1, K-2 - ETS1- 2, K-2- ETS1-3

Third Grade

Science Discipline: Unit	Lesson Titles	Essential Question(s)	Standards: Cross Cutting	STEM Unit Project
Physical Science: Forces and Interactions	**Lesson 1:** What is force? **Lesson 2:** How are force and motion related? **Lesson 3:** How does changing the surface affect the object's motion? **Lesson 4:** How does changing the height affect the distance an object travels? **Lesson 5:** What is gravity? **Lesson 6:** Can some forces work without touching? **Lesson 7:** How do magnets interacts with other magnets? **Lesson 8:** How do magnets interact with different objects?	• How do Equal and Unequal Forces on the Object Effect the Object? • How can Magnets Be Used?	**Science:** 3-PS2-1, 3-PS2-2, 3-PS2-3, 3-PS2-4 **ELA:** RI.3.1, RI.3.3, RI.3.8, W.3.7, W.3.8, SL.3.3 **Math:** MP.2, MP.5, 3. MD.A.2. Patterns Cause and Effect Interdependence of Science, Engineering, and Technology	Design and build a roller coaster that is able to transport a marble through the different turns and loops. **Engineering Design:** 3-5 - ETS1-1, 3-5 -ETS1- 2, 3-5 ETS1-3
Earth Science: Weather and Climate	**Lesson 1:** What is weather? **Lesson 2:** What are the elements of weather? **Lesson 3:** How is weather data collected over time? **Lesson 4:** How is weather data used to create a weather report? **Lesson 5:** What are weather-related hazards? **Lesson 6:** What are preventions for weather- related hazards? **Lesson 7:** What is climate? **Lesson 8:** How can weather data be used to tell us about the world? **Lesson 9:** How are weather and climate different?	• What is the typical weather in different parts of the world and different times of the year? • How can impact of weather-related hazards be reduced?	**Science:** 3-ESS2-1, 3-ESS2-2, 3-ESS3-1 **ELA:** RI.3.1, RI.3.9, W.3.1 **Math:** Pattern Cause and Effect Interdependence of Science, Engineering, and Technology	Design and build a tornado shelter that can withstand tornadoes in the valley. **Engineering Design:** 3-5 - ETS1-1, 3-5 - ETS1- 2, 3-5 ETS1-3

Science Discipline: Unit	Lesson Titles	Essential Question(s)	Standards: Cross Cutting	STEM Unit Project
Life Science: Interdependent Relationships in Ecosystems	**Lesson 1:** What is an ecosystem? **Lesson 2:** What are the parts of an ecosystem? **Lesson 3:** How do organisms get energy in an ecosystem? **Lesson 4:** How does energy move through an ecosystem? **Lesson 5:** How do organisms survive in the ecosystem? **Lesson 6:** Do ecosystems ever change? **Lesson 7:**How do we know ecosystems have changed?	• How are plants, animals and environments of the past similar or different from current plants, animals and environments? • What happens to organisms when their environments changes?	**Science**: 3-LS2-1, 3-LS4-1, 3-LS4-3, 3-LS4-4 **ELA:** RI.3.1, RI.3.2, RI.3.3, W.3.1, W.3.2, W.3.8, SL.3.4 **Math**:MP.2, MP.4, MP.5, 3.NBT, 3. MD.B.3, 3. MD.B.4. Cause and Effect Scale, Proportion, and Quantity Systems and System Models Interdependence of Science, Engineering, and Technology Scientific Knowledge Assumes an Order and Consistency in Natural Systems	Design a humane trap to catch an invasive species. **Engineering Design**: 3-5 - ETS1-1, 3-5 - ETS1- 2, 3-5 ETS1-3
Life Science: Inheritance and Variation of Traits: Life Cycles and Traits	**Lesson 1:** What is a life cycle? **Lesson 2:** Are life cycles of all organisms the same? **Lesson 3:** Why is the life cycle important to survival? **Lesson 4:** Do all organisms of the same species look the same? **Lesson 5:** Can the environment influence traits of organisms? **Lesson 6:** Can trait variations help organisms better survive?	• How do organisms vary in their traits?	**Science:** 3-LS1-1, 3-LS3-1, 3-LS3-2, 3-LS4-2 **ELA:** RI.3.1, RI.3.2, RI.3.3, RI.3.7, W.3.2, SL.3.4, SL.3.5 **Math:** MP.2, MP.4, 3.NBT, 3.NF, 3. MD.B.3, 3. MD.B.4 **Patterns Cause and Effect**	Design and build a sporting equipment that mimics the characteristics of an animal. **Engineering Design**: 3-5 - ETS1-1, 3-5 - ETS1- 2, 3-5 ETS1-3

Fourth Grade

Science Discipline: Unit Titles	Lesson Titles	Essential Question(s)	Standards: Cross Cutting Concepts	STEM Unit Project
Life Science: Structure, Function, and Information Processing	**Lesson 1:** What are components of a habitat that animals need in order to survive? **Lesson 2:** What roles do external structures play in an animal's growth and survival? **Lesson 3:** What roles do internal structures play in an animal's survival? **Lesson 4:** What roles do internal structures play in an animal's behavior? **Lesson 5:** How do animals' senses help them survive?	• How do internal and external structures support the survival, growth, behavior, and reproduction of plants and animals?	**Science:** 4-PS4-2, 4-LS1-1, 4-LS1-2 **ELA:** W.4.1, SL.4.5 **Math:** MP.4, 4.G.A.1, 4. G.A.3. Cause and Effect Systems and System Models	Design and build a prosthetic leg for an injured individual that is cost effective and environmentally safe. **Engineering Design:** 3-5 - ETS1-1, 3-5 -ETS1-2, 3-5 ETS1-3
Earth Science: Earth's System: Processes that Shape the Earth	**Lesson 1:** How is the Earth structured? **Lesson 2:** How can we use maps to learn about the Earth's features? **Lesson 3:** What are landforms and how are they formed? **Lesson 4:** How long does it take for the Earth's landform to change due to nature? **Lesson 5:** What can we learn by observing the Earth's rock layers? **Lesson 6 (Part A):** What is weathering? **Lesson 6 (Part B):** What is erosion? **Lesson 7:** What are the components of soil? **Lesson 8:** How do volcanoes and earthquakes occur? **Lesson 9:** How can we better prepare ourselves for natural disasters?	• How can water, ice, wind, and vegetation change the land? • What patterns of Earth's features can be determined with the use of maps?	**Science:** 4-ESS1-1, 4-ESS2-1, 4-ESS2-2, 4-ESS3-2 **ELA:** RI.4.1, RI.4.7, RI.4.9, W.4.7, W.4.8, W.4.9, MP.2 **Math:** MP.5, 4. MD.A.1, 4. MD.A.2, 4. OA.A.1 Patterns Cause and Effect	Design and build and earthquake proof structure that can sustain an earthquake. **Engineering Design:**3-5 - ETS1-1, 3-5 - ETS1- 2, 3-5 ETS1-3

Science Discipline: Unit Titles	Lesson Titles	Essential Question(s)	Standards: Cross Cutting Concepts	STEM Unit Project
Physical Science: Energy	**Lesson 1**: What is energy? **Lesson 2**: What are the two major forms of energy? **Lesson 3**: How does mass affect energy? **Lesson 4**: How can energy be converted from one form to another? **Lesson 5**: How can natural resources be used to produce energy? **Lesson 6**: How does human use, waste, and conservation of natural resources affect the environment? **Lesson 7**: How can natural resources be used to generate electricity? **Lesson 8**: How can electricity be turned into light?	• What is energy and how it relates to motion? • How is energy transferred? • How can energy be used to solve a problem?	**Science:** 4-PS3-1, 4-PS3-2, 4-PS3-3, 4-PS3-4, 4-ESS3- 1 **ELA:** RI.4.1, RI.4.3, RI.4.9, W.4.2, W.4.7 **Math:** MP.2, MP.4, 4. OA.A.1, 4. OA.A.3. Cause and Effect Energy and Matter Science is a Human Endeavor	Design and build a Rube Goldberg machine that can demonstrate energy transfer **Engineering Design**: 3-5 - ETS1-1, 3-5 - ETS1- 2, 3-5 ETS1-3
Physical Science: Waves: Waves and Information Processing	**Lesson 1:** What is a wave? **Lesson 2:** What are some types of waves? **Lesson 3**: How do waves travel in different mediums? **Lesson 4 (Part A):** How can waves be used to send information? **Lesson 4 (Part B):** How can waves be used to send complex information?	• What are waves? • What are some things waves can do?	**Science**: 4-PS4-1, 4-PS4-3 **ELA:** RI.4.1, RI.4.9, SL.4.5 **Math:** MP.4, 4. G.A.1. Patterns Interdependence of Science, Engineering, and Technology	Design a device that can help individuals with vision loss to better navigate through the world. **Engineering Design**: 3-5 - ETS1-1, 3-5 - ETS1- 2, 3-5 ETS1-3

Fifth Grade

Science Discipline: Unit Titles	Lesson Titles	Essential Question(s)	Standards: Cross Cutting Concepts	STEM Unit Project
Physical Science: Structure and Properties of Matter	**Lesson 1:** What is matter? **Lesson 2:** What Are the states of matter? **Lesson 3:** Does the mass of matter change due to its state? **Lesson 4:** What are the properties of matter? **Lesson 5:** What is a mixture? **Lesson 6:** What is a solution? **Lesson 7:** What are the properties of a mixture? **Lesson 8:** What are the properties of a solution? **Lesson 9:** What is a physical change? **Lesson 10:** What is a chemical change?	• When matter changes, does its weight change? • Can new substances be created by combining other substances?	**Science:** 5-PS1-1, 5-PS1-2, 5-PS1-3, 5-PS1-4. **ELA:** RI.5.7, W.5.7, W.5.8, W.5.9. **Math:** MP.2, MP.4, MP.5, 5. NBT.A.1, 5. NF.B.7, 5. MD.A.1, 5. MD.C.3, 5. MD.C.4. Cause and Effect, Scale, Proportion, and Quantity	Design and build a new filtration system that can used by individual households to remove the impurities of water. **Engineering Design:** 3-5 - ETS1-1, 3-5 - ETS1- 2, 3-5 ETS1-3

Science Discipline: Unit Titles	Lesson Titles	Essential Question(s)	Standards: Cross Cutting Concepts	STEM Unit Project
Life Science: Matter and Energy in Organisms and Ecosystems	**Lesson 1:** How does an organism fit into a biosphere? **Lesson 2:** What are the trophic levels? **Lesson 3:** How does a food web differ from a food chain? **Lesson 4:** How efficient is the energy transfer to each trophic level? **Lesson 5:** How do plants acquire energy from the sun? **Lesson 6**: How do decomposers contribute to the ecosystem? **Lesson 7:** How does matter cycle through the ecosystem? **Lesson 8:** What happens when an ecosystem gets out of balance?	• How does matter cycle through ecosystems? • Where does the energy in food come from and what is it used for?	**Science:** 5-PS3-1, 5-LS1-1, 5-LS2-1. **ELA:** RI.5.1, RI.5.7, RI.5.9, W.5.1, SL.5.5. **Math:** MP.2, MP.4, MP.5, 5. MD.A.1. Systems and Systems Models Energy and Matter	Design and create a human shelter based on the structures and homes of animals. **Engineering Design:**3-5 - ETS1-1, 3-5 -ETS1-2, 3-5 ETS1-3
Earth Science: Earth Systems	**Lesson 1:** What are Earth's major systems? **Lesson 2:** How do these systems interact? **Lesson 3:** What types of resources are on Earth? **Lesson 4:** What are the many roles of water on Earth? **Lesson 5:** How much water do we have on Earth? **lesson 6:** Where is all the fresh water? **Lesson 7:** How have humans impacted Earth's systems? **Lesson 8:** How have humans used science to protect Earth?	• How do the four systems of Earth interact? • How much water can be found in different places on Earth?	**Science:** 5-ESS2-1, 5-ESS2-2, 5- ESS3-1. **ELA:** RI.5.1, RI.5.7, RI.5.9, W.5.8, W.5.9, SL.5.5: **Math:** MP.2, MP.4, 5. G.2. Scale, Proportion, and Quantity, Systems and System Models, Science Addresses Questions About the Natural and Material World	Design and build a device that can be used to clean up oil spills. **Engineering Design**:3-5 - ETS1-1, 3-5 - ETS1- 2, 3-5 ETS1-3
Earth Science: Space Systems: Stars and Solar System	**Lesson 1:** What is gravity? **Lesson 2:** What does gravity do to objects on Earth? **Lesson 3:** How is the solar system organized? **Lesson 4:** How do objects in the solar system move? **Lesson 5:** Do all stars look the same? **Lesson 6:** How are shadows related to Earth's rotation? **Lesson 7:** Does the night sky look the same throughout the year?	• How do lengths and directions of shadows or relative lengths of day and night change from day to day? • How does the appearance of some stars change in different seasons?	**Science:** 5-PS2-1, 5-ESS1-1, 5-ESS1- 2. **ELA:** RI.5.1, RI.5.7, RI.5.8, RI.5.9, W.5.1, SL.5.5. **Math:** MP.2, MP.4, 5. NBT.A.2, 5. G.A.2. Patterns, Cause and Effect, Scale, Proportion, and Quantity	Design and build a satellite that can travel to space to conduct a space exploration for NASA. **Engineering Design**: 3-5 - ETS1-1, 3-5 -ETS1-2, 3-5 ETS1-3

Unit Sequence

Kindergarten

QUARTER	SCIENCE DISCIPLINE	UNIT TITLE/ LESSONS	ESSENTIAL QUESTION(S)	STANDARDS	CROSS CUTTING CONCEPTS	STEM UNIT PROJECT
FIRST	Physical Science	Forces and Interactions: Pushes and Pulls Lessons - 7	What happens if you push or pull an object harder?	**Science:** K-PS2-1, K-PS2- 2. **ELA:** RI.K.1, W.K.7, SL.K.3. **Math:** MP.2, .MD.A.1, K.MD.A.2.	Cause and Effect	Design a gummy launcher to help the gummy bears experience flying.
SECOND	Earth Science	Weather and Climate Lessons - 6	What is the weather like today? How is it different from yesterday?	**Science:** K-PS3-1, K-PS3- 2. **ELA:** RI.K.1, W.K.7, SL.K.3. **Math**: MP.2, MP.4, K.CC, K.CC.A, K.MD.A.1, K.MD.A.2, K.MD.B.3.	Patterns Cause and Effect	Design a structure to reduce the warming effect of sunlight.
THIRD	Life Science	Interdependent Relationships in Ecosystems: Animals, Plants, and their Environment Lessons - 6	Where do animals live? Why do they live there?	**Science:** K-LS1-1, K-ESS2-2, K-ESS3-1, K-ESS3-3. **ELA:** RI.K.1, W.K.7, SL.K.3. **Math:** MP.2, MP.4, K.CC, K.CC.A, K.MD.A.1, K.MD.A.2, K.MD.B.3.	Patterns Cause and Effect Systems and System Models	Design a bird feeder for birds that migrate during the winter to ease the migration process.

First Grade

QUARTER	SCIENCE DISCIPLINE	UNIT TITLE/ LESSONS	ESSENTIAL QUESTION(S)	STANDARDS	CROSS CUTTING CONCEPTS	STEM UNIT PROJECT
FIRST	Physical Science	Waves: Light and Sound Lessons - 10	What happens when materials vibrate? What happens when there is no light?	**Science:** 1-PS4-1, 1-PS4-2, 1-PS4-3, 1-PS4-4. **ELA:** W.1.2, W.1.7, W.1.8, SL.1.1. **Math:** MP.5, 1.MD.A.1, 1.MD.A.2.	Cause and Effect	Design musical instruments to use at a school performance that can demonstrate sound and pitch.
SECOND	Life Science	Structure, Function and Information Processing Lessons - 5	What are some ways plants and animals meet their needs so that they can survive and grow? How are parents and their children similar and different?	**Science:** 1-LS1-1, 1-LS1- 2, 1-LS-3-1. **ELA:** RI.1.1, RI.1.2, RI.1.10, W.1.7, W.1.8. **Math**: 1. NBT.B.3, 1.NBT.C.4, 1.NBT.C.5, 1.NBT.C.6, MP.2, MP.5, MD.A.1.	Patterns Structure and Function Influence of Science, Engineering	Design a new animal from a real habitat which will have similar features/traits as a real animal.

QUARTER	SCIENCE DISCIPLINE	UNIT TITLE/ LESSONS	ESSENTIAL QUESTION(S)	STANDARDS	CROSS CUTTING CONCEPTS	STEM UNIT PROJECT
					and Technology on Society and the Natural World	
FOURTH	Earth Science	Space Systems: Patterns and Cycles Lessons - 6	What objects are in the sky? How do those objects seem to move?	**Science:** 1-ESS1-1,1-ESS1-2; **ELA:** W.1.7, W.1.8. **Math:** MP.2, MP.4, MP.5, 1.OA.A.1, 1.MD.C.4.	Patterns Scientific Knowledge Assumes an Order and Consistency in Natural Systems	Design and build a solar oven.

Second Grade

QUARTER	SCIENCE DISCIPLINE	UNIT TITLE/ LESSONS	ESSENTIAL QUESTIO	STANDARDS	CROSS CUTTING CONCEPTS	STEM UNIT PROJEC
FIRST	Life Science	Interdependent Relationships in Ecosystems Lessons – 9	What do plants need to grow? How many living things live in a place?	**Science:** 2-L2-1, 2-LS2, 2- LS4-1. **ELA:** W.2.7, W.2.8, SL.2.5. **Math:** MP.2, MP.4, MP.5, 2.MD.D.10.	Cause and Effect Structure and Function	Design and build a pollinator to help with pollination which will help the ecosystem to thrive.
THIRD	Earth Science	Earth's System: Processes that Shape the Earth Lessons - 8	How does land change and what are some things that cause it to change? What are the different kinds of land and bodies of water?	**Science**: 2-ESS1-1, 2-ESS2-1, 2-ESS2-2, 2- ESS2-3. **ELA**: RI.2.1, RI.2.3, RI.2.9, W.2.6, W.2.7, W.2.8, MP.2. **Math**: MP.4, MP.5, 2.NBT.A, 2.NBT.A.3.	Patterns Stability and Change, Science Addresses Questions About the Natural and Material	Design and build a levee to help prevent flooding and erosion.
FOURTH	Physical Science	Structure and Properties of Matter Lessons - 6	How are materials similar and different from one another? How do the properties of the materials relate to their use?	**Science:** 2-PS1-1, 2-PS1- 2, 2-PS1-3, 2-PS1-4. **ELA:** RI.2.1, RI.2.3, W.2.1, W.2.7, W.2.8. **Math:** MP.2, MP.4, MP.5, 2. MD.D.10.	Patterns Cause and Effect, Energy and Matter Influence of	Design and build a cooler.

Third Grade

QUARTER	SCIENCE DISCIPLINE	UNIT TITLE/ LESSONS	ESSENTIAL QUESTION(S)	STANDARDS	CROSS CUTTING CONCEPTS	STEM UNIT PROJECT
FIRST	Physical Science	Forces and Interactions Lessons - 8	How do equal and unequal forces on an object effect the object? How can magnets be used?	**Science:** 3-PS2-1, 3-PS2-2, 3-PS2-3, 3-PS2-4. **ELA:** RI.3.1, RI.3.3, RI.3.8, W.3.7, W.3.8, SL.3.3. **Math:** MP.2, MP.5, 3.MD.A.2.	Patterns Cause and Effect Interdependence of Science, Engineering, and Technology	Design and build a roller coaster that is able to transport a marble through the different turns and loops.
SECOND	Earth Science	Weather and Climate Lessons - 9	What is the typical weather in different parts of the world and during different times of the year? How can impact of weather-related hazards be reduced?	**Science:** 3-ESS2-1, 3-ESS2- 2, 3-ESS3-1. **ELA:** RI.3.1, RI.3.9, W.3.1. **Math:** MP.2, MP.4, MP.5, 3. MD.A.2, 3. MD.B.3.	Patterns Cause and Effect Influence of Engineering, Technology, and Science on Society and the Natural World, Science is a Human Endeavor	Design and build a tornado shelter to protect people during a tornado.
THIRD	Life Science	Interdependent Relationships in Ecosystems Lessons - 7	How are plants, animals and environments of the past similar or different from current plants, animals and environments? What happens to organisms when their environment changes?	**Science:** 3-LS2-1, 3-LS4-1, 3-LS4-3, 3-LS4-4. **ELA**: RI.3.1, RI.3.2, RI.3.3, W.3.1, W.3.2, W.3.8, SL.3.4. **Math**:MP.2, MP.4, MP.5, 3.NBT, 3. MD.B.3, 3. MD.B.4.	Cause and Effect Scale, Proportion, and q antity, Systems and System Models Interdependence of Technology, Scientific Knowledge Assumes an Science, Engineering, and Order and Consistency in Natural Systems	Design a humane trap to catch an invasive species.

QUARTER	SCIENCE DISCIPLINE	UNIT TITLE/ LESSONS	ESSENTIAL QUESTION(S)	STANDARDS	CROSS CUTTING CONCEPTS	STEM UNIT PROJECT
FOURTH	**Life Science**	Inheritance and Variation of Traits: Life Cycles and Traits Lessons - 6	How do organisms vary in their traits?	**Science:** 3-LS1-1, 3-LS3-1, 3-LS3-2, 3-LS4-2. **ELA:** RI.3.1, RI.3.2, RI.3.3, RI.3.7, W.3.2, SL.3.4, SL.3.5. **Math:** MP.2, MP.4, 3.NBT, 3.NF, 3. MD.B.3 , 3. MD.B.4	Patterns Cause and Effect	Design and build a sporting equipment that mimics the characteristics of an animal.

Fourth Grade

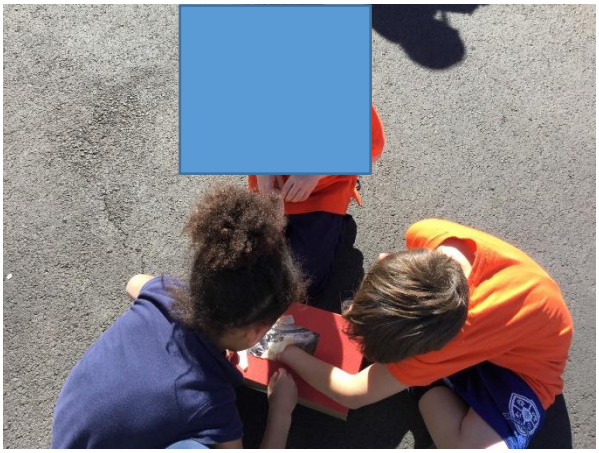
QUARTER	SCIENCE DISCIPLINE	UNIT TITLE/ LESSONS	ESSENTIAL QUESTION(S)	STANDARDS	CROSS CUTTING CONCEPTS	STEM UNIT PROJECT
FIRST	Life Science	Structure, Function, and Information Processing Lessons - 5	How do internal and external structures support the survival, growth, behavior, and reproduction of plants and animals?	**Science**: 4-PS4-2, 4-LS1-1, 4-LS1-2. **ELA:** W.4.1, SL.4.5. **Math:** MP.4, 4.G.A.1, 4.G.A.3.	Cause and Effect Systems and System Models	Design and build a prosthetic leg that is cost effective.
SECOND	Earth Science	Earth's System: Processes that Shape the Earth Lessons - 9	How can water, ice, wind and vegetation change the land? What patterns of Earth's features can be determined with the use of maps?	**Science**: 4-ESS1-1, 4-ESS2-1, 4-ESS2-2, 4-ESS3-2. **ELA**: RI.4.1, RI.4.7, RI.4.9, W.4.7, W.4.8, W.4.9, MP.2. **Math**: MP.5, 4.MD.A.1, 4.MD.A.2, 4.OA.A.1.	Patterns Cause and Effect	Design and build an earthquake proof structure that can sustain an earthquake in the valley.
THIRD	Physical Science	Energy Lessons - 8	What is energy and how it relates to motion? How is energy transferred? How can energy be used to solve a	**Science**: 4-PS3-1, 4-PS3-2, 4-PS3-3, 4-PS3-4, 4-ESS3-1. **ELA**: RI.4.1, RI.4.3, RI.4.9, W.4.2, W.4.7. **Math**: MP.2, MP.4, 4.OA.A.1, 4.OA.A.3.	Cause and Effect Energy and Matter Science is a Human Endeavor	Build a Rube Goldberg machine that demonstrates energy transfer.
FOURTH	Physical Science	Waves: Waves and Information Processing Lessons - 4	What are waves? What are some things waves can do?	**Science:** 4-PS4-1, 4-PS4-3. **ELA:** RI.4.1, RI.4.9, SL.4.5. **Math:** MP.4 , 4. G.A.1.	Patterns Interdepende-nce of Science Engineering and Technology	Design a device that can help individuals with vision loss to better navigate the world.

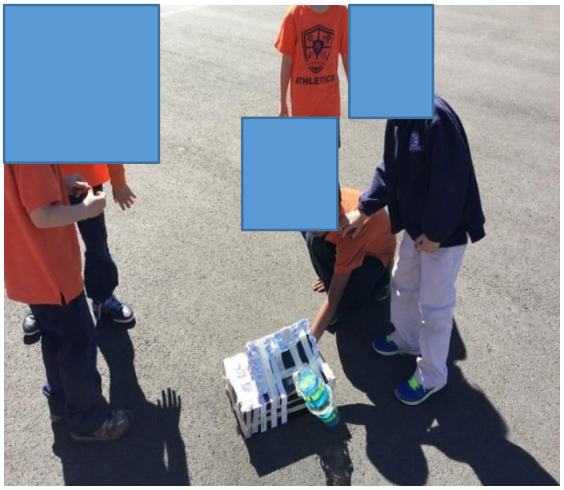
Fifth Grade

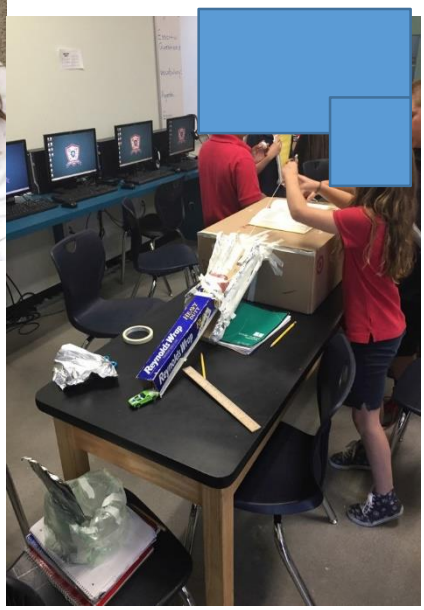
QUARTER	SCIENCE DISCIPLINE	UNIT TITLE/ LESSONS	ESSENTIAL QUESTION(S)	STANDARDS	CROSS CUTTING CONCEPTS	STEM UNIT PROJECT
FIRST	Physical Science	Structure and Properties of Matter Lessons - 10	When matter changes, does its weight change? Can new substances be created by combining other substances?	**Science:** 5-PS1-1, 5-PS1-2, 5-PS1-3, 5-PS1-4. **ELA:** RI.5.7, W.5.7, W.5.8, W.5.9. **Math:** MP.2, MP.4, MP.5, 5. NBT.A.1, 5. NF.B.7, 5. MD.A.1, 5. MD.C.3, 5.	Cause and Effect Scale, Proportion and Quantity	Design and build a new filtration system that can used by individual households to remove the impurities of water.
SECOND	Life Science	Matter and Energy in Organisms and Ecosystems Lessons - 8	How does matter cycle through ecosystems? Where does the energy in food come from and what is it used for?	**Science**: 5-PS3-1, 5-LS1-1, 5-LS2-1. **ELA**: RI.5.1, RI.5.7, RI.5.9, W.5.1, SL.5.5. **Math**: MP.2, MP.4,MP.5, 5. MD.A.1.	Systems and System Models Energy and Matter	Design and create a human shelter based on the structures and homes of animals.
THIRD	Earth Science	Earth Systems Lessons - 8	How do the four systems of Earth interact? How much water can be found in different places on Earth?	**Science**: 5-ESS2-1, 5-ESS2-2, 5-ESS3-1. **ELA**: RI.5.1, RI.5.7, RI.5.9, W.5.8, W.5.9, SL.5.5. **Math**:MP.2, MP.4 , 5. G.2.	Scale, Proportion and Quantity Systems and System Models Science Addresses	Design and oil spill cleanup device.
FOURTH	Earth Science	Space Systems: Stars and Solar System Lessons - 7	How do lengths and directions of shadows or relative lengths of day and night change from day to day? How does the appearance of some stars change in different seasons?	**Science:** 5-PS2-1, 5-ESS1-1, 5-ESS1-2. **ELA:** RI.5.1, RI.5.7, RI.5.8, RI.5.9, W.5.1, SL.5.5. **Math:** MP.2, MP.4, 5. NBT.A.2, 5. G.A.2.	Patterns Cause and Effect Scale, Proportion, and Quantity	Design a satellite for NASA exploration.

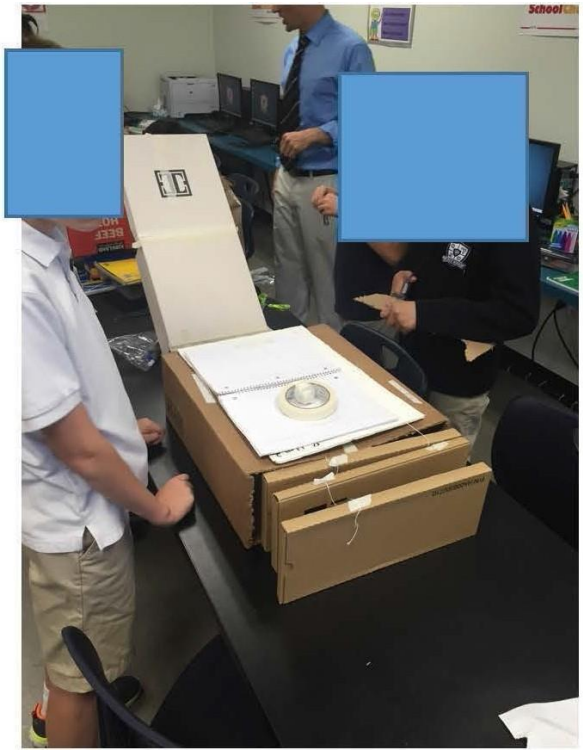
Appendix C STEM in the Classrooms

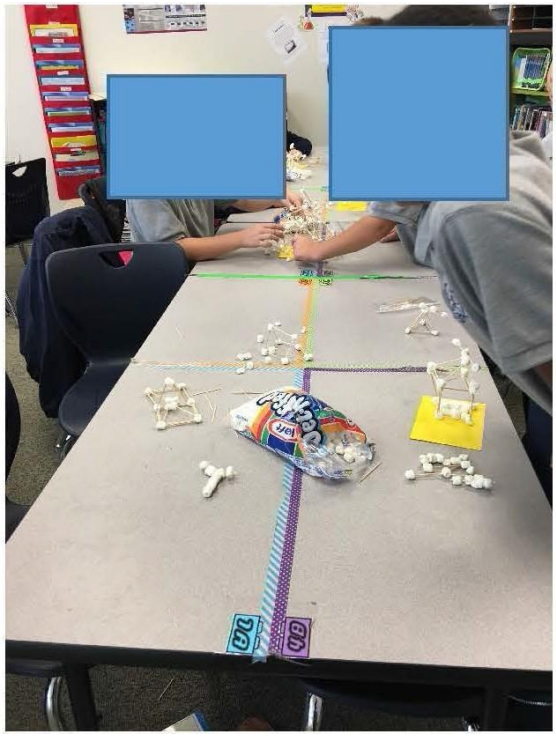
Note: Students faces are covered for privacy.

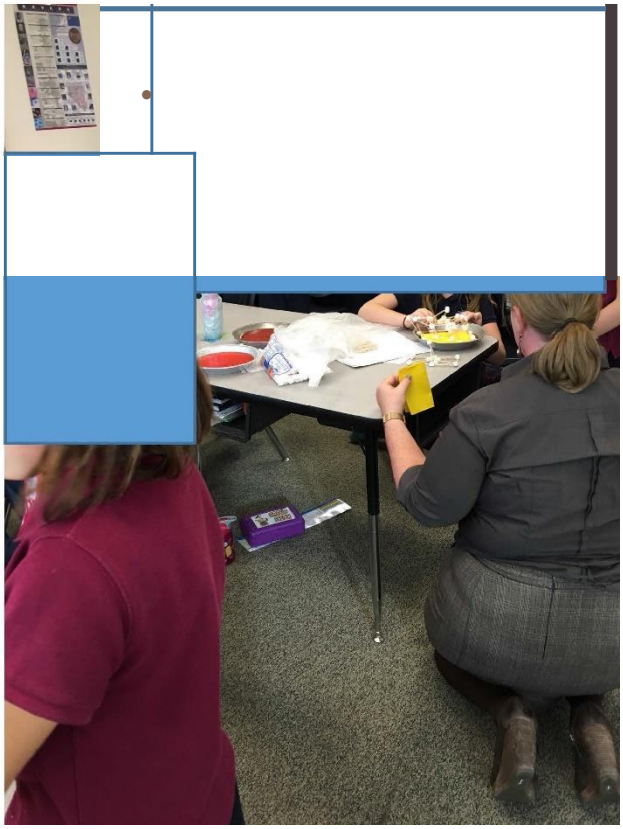


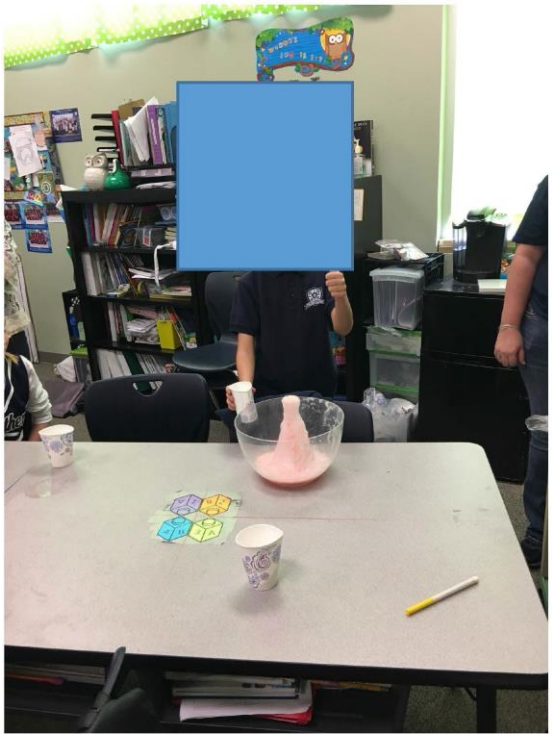






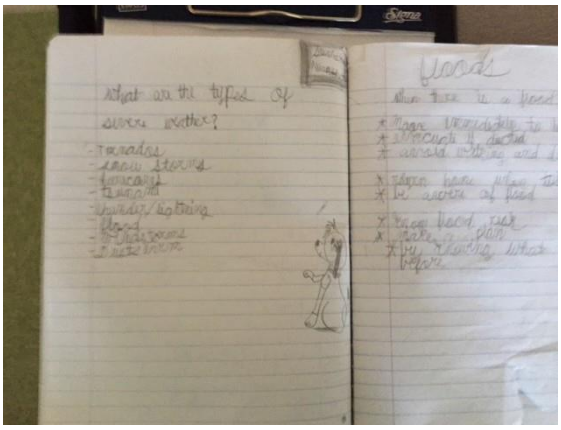


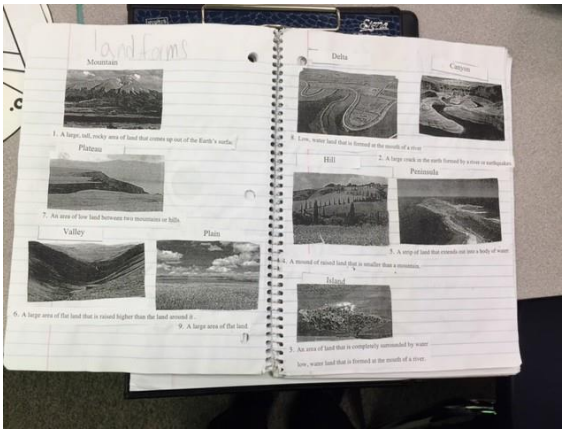


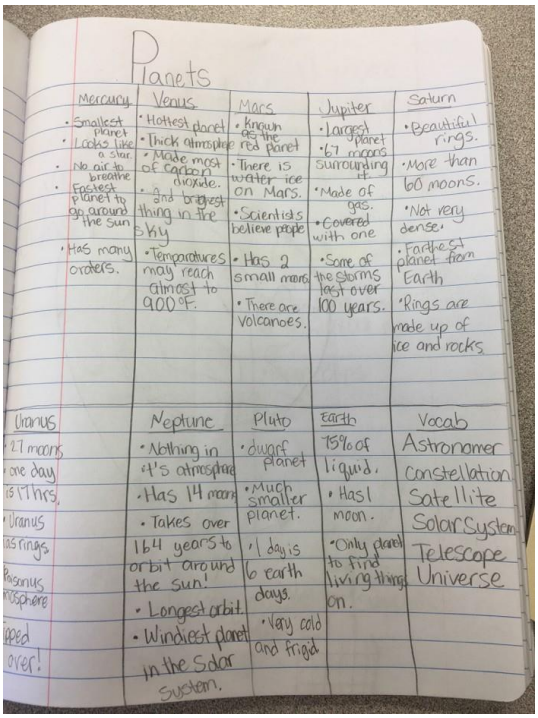


Appendix D
Science Notebooks

St. Rose Campus



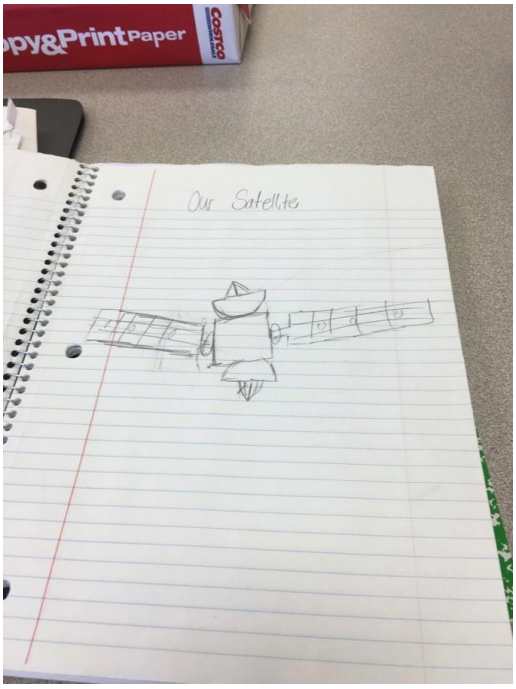


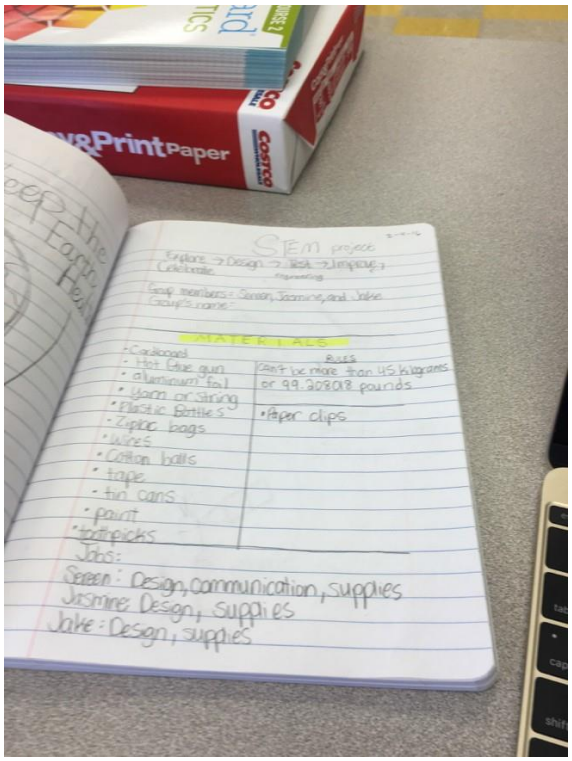


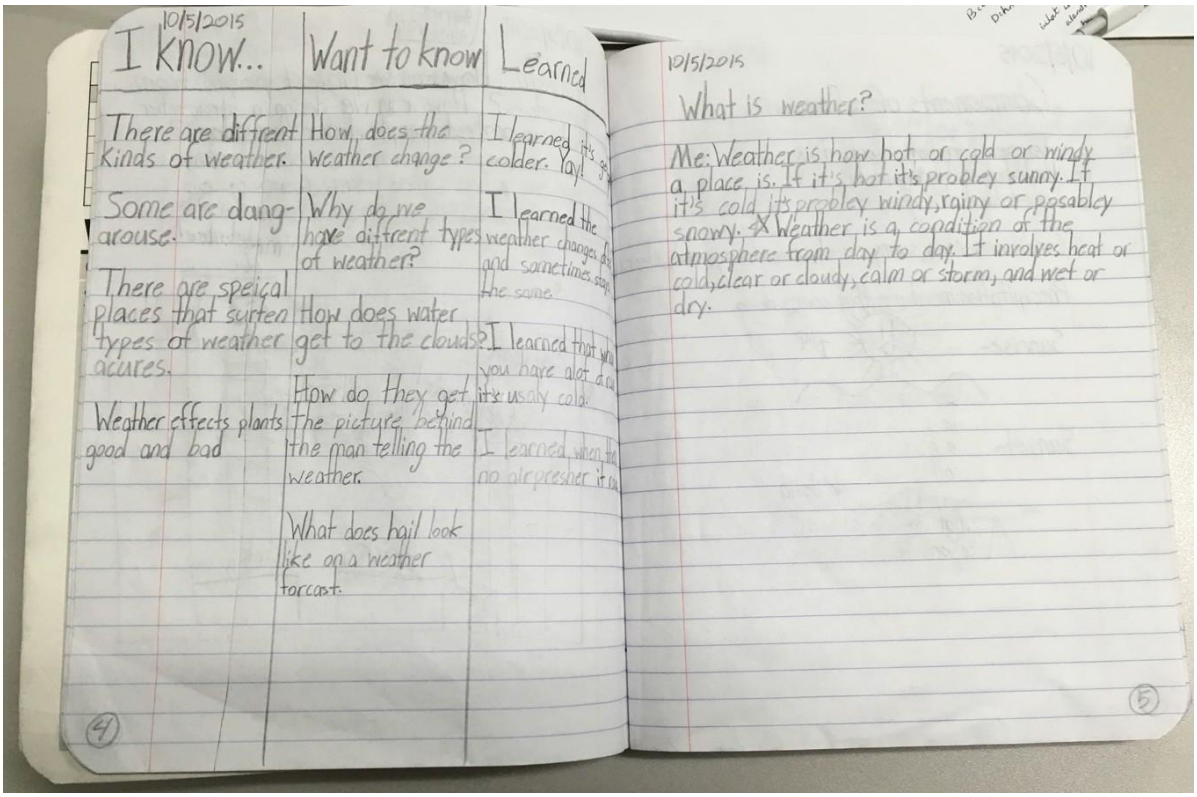
Planets

Mercury	Venus	Mars	Jupiter	Saturn
• Smallest planet • Looks like a star. • No air to breathe • Fastest planet to go around the Sun • Has many craters.	• Hottest planet • Thick atmosphere • Made most of carbon dioxide. • 3rd brightest thing in the sky • Temperatures may reach almost to 900°F.	• Known as the red planet • There is water ice on Mars. • Scientists believe people • Has 2 small moons • There are volcanoes.	• Largest planet • 67 moons surrounding it. • Made of gas. • Covered with one • Some of the storms last over 100 years.	• Beautiful rings. • More than 60 moons. • Not very dense. • Farthest planet from Earth • Rings are made up of ice and rocks

Uranus	Neptune	Pluto	Earth	Vocab
27 moons one day is 17 hrs. Uranus has rings Uranus atmosphere tipped over!	• Nothing in it's atmosphere • Has 14 moons • Takes over 164 years to orbit around the sun! • Longest orbit. • Windiest planet in the Solar System.	• dwarf planet • Much smaller planet. • 1 day is 6 earth days. • Very cold and frigid	75% of liquid. • Has 1 moon. • Only planet to find living things on.	Astronomer constellation Satellite Solar System Telescope Universe







10/5/2015

I know...	Want to know	Learned
There are different kinds of weather.	How does the weather change?	I learned it's colder. Yay!
Some are dangerouse.	Why do we have different types of weather?	I learned the weather changes a lot and sometimes stays the same.
There are speical places that surfen types of weather acures.	How does water get to the clouds?	I learned that when you have alot of it it's usaly cold.
Weather effects plants good and bad	How do they get the picture behind the man telling the weather.	I learned when the no air presher it is
	What does hail look like on a weather forcast.	

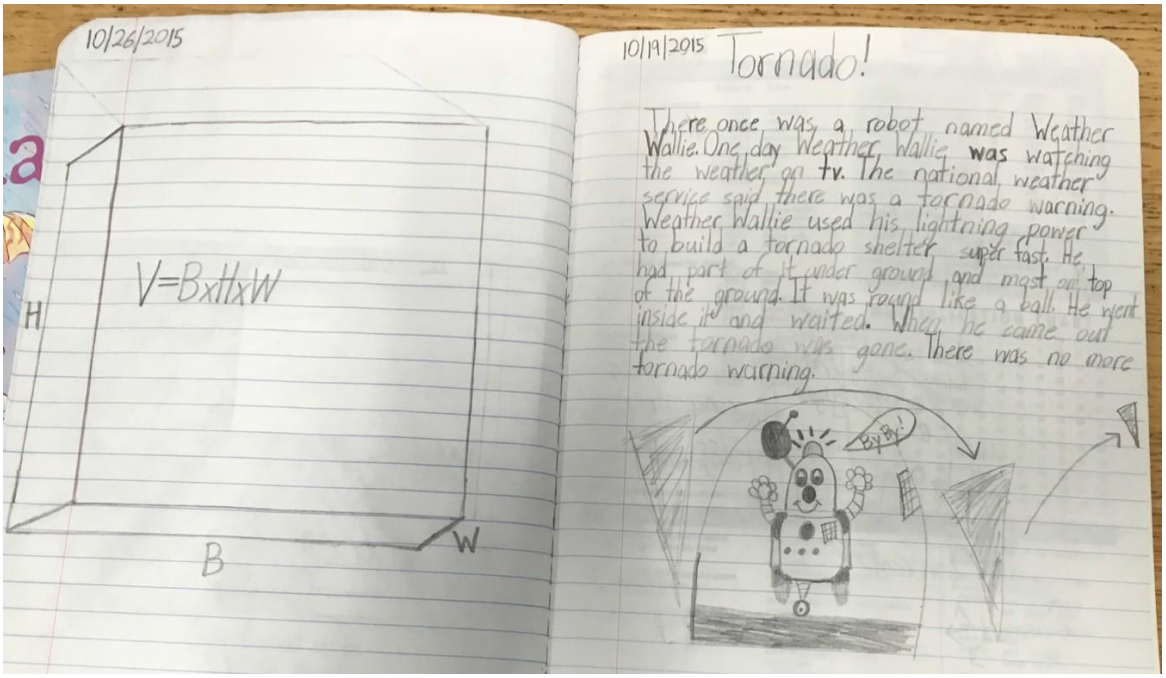
4

10/5/2015

What is weather?

Me: Weather is how hot or cold or windy a place is. If it's hot it's probley sunny. If it's cold it's probley windy, rainy or posably snowy. ☆ Weather is a condition of the atmosphere from day to day. It involves heat or cold, clear or cloudy, calm or storm, and wet or dry.

5



10/26/2015

10/19/2015 Tornado!

There once was a robot named Weather Wallie. One day Weather Wallie was watching the weather on tv. The national weather service said there was a tornado warning. Weather Wallie used his lightning power to build a tornado shelter super fast. He had part of it under ground and most on top of the ground. It was round like a ball. He went inside it and waited. When he came out the tornado was gone. There was no more tornado warning.

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