

Natural Resources are Natural Wonders *Valerie A. Adams 2018*

Abstract

In this unit students will work using some of the latest innovative technology sites. Historical information will be presented in a timeline format that engages the students with origami projects as the motivational associative learning tool. It's all about how learning happens, from the lower level of thinking to applying the complete complex levels of Blooms Taxonomy; the learning process. Students complete research, write in all three rhetorical modes and work cooperatively with hands on projects involving origami to present verbally to others and display within the school building.

As teachers we must demand students' usage of higher level critical thinking skills. This unit challenges students in all content areas, it also gives the teacher flexibility to extend the lessons to fit many theme based objectives. National and State Standards in reading, writing, math, speaking and listening are covered.

With the rapid developments in technology paper will gradually become a thing of the past. The theme of this unit is "Natural Resources are Natural Wonders." Students will discover the chronology of paper and how paper has kept history alive and well for so many people. Students will use origami to build long lasting relationships within the school community as well as awareness of cultural voices. Why origami? For the historical facts of paper folding, along with the mind music useful for relaxation of the brain to focus and complete given tasks. It's an art of pattern design, visual designing, and making decisions. Origami uses math to take the concrete skills to applying analytical processes with hands on intense focusing for accuracy and precision. Students work collectively within cooperative partnerships taking ownership of their learning.

Overview

As a result public education we all have more vested interest in our world today than ever before. Consequently, so do the children, and a majority of the youth are captivated, and their independent cognitive capabilities misplaced, malnourished, sometimes tarnished and/or neglected all due to unsupervised usage of technology. The School District of Philadelphia's data reveals elementary level Mathematics and English Language Arts (ELA) assessments are below the norm. This data as of 2016-17 also reveals the students in the urban community attending the J.H. Taggart K-8 School exhibit underdeveloped skills in those two areas of content as well.

This exceptionally creative hands-on project based curriculum in my opinion is one solution to the problem. Its design uses a strategic process for developing the critical thinking skills of and for our students. Through the use of origami I strongly believe that students can thrive in creativity to become critical thinkers. In many ways a child's creativity speaks volumes about who he or she is.

This unit aids the teacher as a motivational tool used to peak students' interest and allow them to apply their nonverbal creative skills. The teacher can partner students and differentiate for those students unable to master the objectives. The teacher has the ability to share video

viewings with the whole class on how to create all of the tools used in the unit, or students can view the procedures as an independent center activity. The uses of origami are many. Any design thought of outside of this curriculum has probably been done and is available for use on-line. Students should be captivated thinking critically during the time spent working on these projects. Students can experience making their own paper, writing messages then letter-locking to pen pals, even create pop-up cards for the holiday seasons. This curriculum entails reading, writing and mathematic Common Core Standards and associates informative learning with fun for everyone.

Rationale

Students need not be afraid to think for themselves or experiment with learning. The experiences I gained from working in the Origami Engineering class with Professor Cynthia Sung is the pivotal strength of this origami curriculum. A curriculum that is applicable for grades three, four, five and even sixth. Placing origami as the motivational tool in associative learning is a creative way to achieve usefulness of the mechanics of higher order critical thinking skills, and have a curriculum designed with an inquiry-based approach.

Subsequently inquiry facilitates this curriculum. The teacher employs origami to stimulate cognitive curiosity then students encourage their peers as they conduct independent or small group experimental research in the areas being examined.

Students will need to apply the questions “why” and “how” in order to analyze their observations of real-world astonishments, (e.g. the natural phenomena of nature) analyzing through the use of sensory skills applications. This curriculum motivates students to get involved by taking hands-on risk at recreating and constructing what their minds can imagine and their skills can design while the teacher makes informal assessments of the students’ capabilities.

This curriculum includes Common Core Standards involving math concepts such as pattern design, number operations, geometry, and calculations, along with the freedom to express a design using mathematical practices, problem solving and reasoning. Procedurally students will be able to develop opinions and make decisions about their work.

Prioritizing critical thinking skills should always be the end results.

Teaching students how to think critically with the usage of technology is one of the skills this curriculum will help improve. Students will be able to work independently and follow procedures while viewing the instructions required to achieve the task. In my opinion the intriguing advancements that are happening with technology captivates the mind. Whereas young people see only their glamorous results, teachers can see a rapidly advancing system of cyber learning. Amazingly technology is uploading on developing the latest interest, sharing blooming intelligences worldwide, and through experimentations in technology winning everyone to turn over to a new way of learning. Of course curiosity grabs inexperienced minds full of inquiring energy, so as teachers we can allow the hands on, mind focused origami activities to awaken the many new interest students may have. Surely, technology can be a curse and a blessing, so if used as a learning tool to assist in strengthening critical thinking skills technology can be used as the catalysis necessary to teach origami in the classroom. These visual lessons will justifiably hold hostage students’ curious minds.

People are critically thinking about the world of technology or digital reality television shows everyday, so why not use technology as the link to learning. It is obvious students are in need

of sensory pleasing, brain stimulating entertainment which visual media accomplishes. Technology has played a bigger role in our lives, and our skills in critical thinking and analysis have declined, while our visual skills have improved. (Greenfield, P. 2009) So the question we all must ask ourselves “Is technology producing a decline in critical thinking and analysis? (Wolpert, 2009)
If this is so what can we as teachers do to change it?

Students must be allowed to break free of their self-inflicted bondage, be it texting, video games, or any other obsession that limits their ability to learn. Learning is a simple yet complex process. If one never learns the thought processes then thinking is underdeveloped. Learning may be defined as a change in behavior as a result of experience. (Sun. n.d.)
Students need to learn the process in order to bloom and blossom into critical thinkers. This curriculum will allow nature, natural phenomena and critical thinking to occupy a space that is otherwise a disadvantaged world void of learning.

In my origami curriculum students will challenge themselves to unfold a world full of discovery. The literacy content area of study provides students with the historical knowledge of paper. The Sciences examines how our earth supplies the natural resources necessary for survival. Mathematics uses patterns that can be connected to modular origami. Students will become energized with this project-based approach of learning. The enjoyment of working this curriculum is to generate knowledge disguised as fun. The fun is in critically thinking before making tangible decisions. Students will examine various human made structures to reconstruct using origami. Students will formulate ideas to create their own original imagery of the world using hands on learning, in turn strengthening their vigor, confidence and critical thinking skills.

Background

Today origami is not only used with paper but with various organic and inorganic materials in the areas of art, science, mathematics and medicine worldwide. Inherited from the past “Origami” is an original set of line diagrams set on paper then folded into three dimensional objects, then finally transforming it to an overwhelming complicated artistic structure. The name origami comes from the Japanese verb “oru” which means to fold and the Japanese word for paper, “kami”. (Richman-Abdou, 2017) Putting the two together yields the word origami. According to the British Origami Society modern origami was developed in the early 1900s by Akira Yoshizawa who is predominantly believed to be the grandmaster of origami. Akira Yoshizawa created the method of wet folding which involved moistening the paper before folding to give finished models more of a sculpted and three dimensional look. By 1989 he had invented over 50,000 models and published eighteen books. (Lister, D. .n.d.)
Subsequently the advancements have allowed many aspects of the art to remain true to its origin. While the applications have developed along with the applied materials; insights have expanded origami’s useful application of folding, intertwined with technology, then taken to a medical level where patterns of origami are used in saving lives. Moreover folding diagrams also allow scientist to explore the universe and beyond, as well as offering artistic designers the ability to visually please the eye with objects so extraordinary it boggles the mind. People have used the folds of origami to revisit the arts with materials other than paper clearly changing dreams to reality.

Many of our students must start with the knowledge of their history, which will unlock the imaginary gates that invisibly limit the length of their reach for higher order critical thinking. Surely when information is clearly interpreted, then the possibilities of unlocking that unscathed brain space could make applying background knowledge to higher order thinking less challenging. When we teach the value involved in the construction of history, students will inevitably agree how knowing their history can aid in thinking critically. How many young people know paper is a natural resource developed from papyrus which was produced as early as 3000 BCE in Egypt? (History of Paper,(n.d.)

The word paper is derived from papyrus, a plant that was once abundant in Egypt and which was used to produce a thick, paper-like material by the ancient Egyptians, Greeks and Romans. Papyrus, however, is only one of the predecessors of paper that are collectively known by the generic term “tapa” and which were mostly made from the inner bark of the mulberry, fig and daphne trees. (The Early History of Paper,(n.d.) Of all the writing materials mankind has employed down through the ages, paper has become the most widely used around the world. Paper has a long history stretching back to ancient Egypt in the third millennium BC. Although our paper may not be recognizable to the Pharaohs, paper has retained its essential characteristics down through the ages and today's diverse offerings remain as natural, essential and precious as ever.

To begin my compilation of lessons within this curriculum I must first go back to how it all started: “The Chronology of Paper”. Researchers discovered public records had been executed on papyrus and the papyrus plant dates back some 4500 years. In Confucius’ time some 500 B.C. the Chinese were innocent of ink and paper in the proper sense. Hundreds of years later the Romans sent to China a present of 30,000 sheets of brownish paper made from tree bark. (Munsell, J. 1870)

Paper was in high demand and made from various types of plant materials. Letters were strategically locked with the paper it was written on. Folds of creativity occupied the minds of many, and artistic designers used those folds to mastermind the materials. Today in this world of ever changing and advancing technology origami folds are being used in the Earth and Space Sciences to deploy huge satellites and telescopes into space. Engineers are working on Action Origami and mechanisms that create foldable robots so small it’s unbelievable. Foldable and responsive meta-materials are being developed to improve advancements to the medical tools used to save lives. If you never heard of Robert Sabuda, I am sure you have seen pop-up books created by him. Pop-ups are also a creative form of origami that intrigues both the young and old.

In this curriculum you have activities that motivate students by creating origami models, work cooperatively with their peers, evaluate the results and associate their creativity to the lesson’s objectives.

Students have an opportunity to read selective informational text about historians and how materials in nature are engineered in order to become pliable paper useful for advanced developments in the past, present and even the future. Surely origami history is only part of the valuable resources teachers will be able to apply in order to fill an interesting void by stimulating students’ higher learning levels.

National Common Core Standards (PA. Common Core Standards)

- Students will be able to describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. 3.RI.3 (PA. CC.1.2.3.C)
- Students will be able to use information gained from illustrations and the words in a text to demonstrate understanding of a text, the how, when, where, and why key events occur. 3.RI.7 (PA. CC.1.2.3.G)
- Students will be able to compare and contrast the most important points and key details presented in two text on the same topic. 3.RI.9 (PA. CC.1.2.3.I)
- Students will be able to 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. 3.W.10 (PA. CC.1.4.3.X)
- Students will be able to measure areas by counting unit squares. 3.MD.6 (CC.2.4.3.A.5)
- Students will be able to understand that shapes in different categories may share attributes, and that the shared attributes can define a larger category. Recognize rhombuses, rectangles and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories. 3.G.1 (CC.2.3.3.A.1)

Objectives

Teaching historical facts can become tediously boring for young students. This curriculum is one way to peak student interest, give them ownership and flexibility to incorporate their design hints. The element of ownership with design enables students the ability to recall more readily their work and retell in their own words what facts they retained from the information researched or supplied, hence a start to building critical thinkers. In lesson one students will be able to research and collect factual historical data detailing when, where, why and how paper was created in order to design a sheet of paper from natural resources and use it as a framing component for their informative essay. In order to improve fluency of reading, enable students to gather key details, build craft and structure while integrating new knowledge, students will be able to develop tangible timelines of the historical facts of paper and origami in order to examine how the need to supply one resource developed another.

After researching and examining the history of paper students will be able to illustrate the language of paper folding. Students will share read the historical novel “Sadako and the Thousand Paper Cranes” by Eleanor Coerr in order to be given the opportunity to define the symbolic meaning of the paper crane throughout the school in various creative ways and teach other students origami.

Students will also learn that throughout history security has been top priority when sending mail, even today tampering with mail is a federal offense. Hence, the purpose of historical letter-locking. What is letter-locking? Letter-locking refers to the process by which a substrate such as paper, parchment, or papyrus has been folded and secured shut to function as its own envelope. (Dambrogio, J. 2004) Interwoven throughout my curriculum would be letter-locking which will be associated with the Modes of Writing lessons. Thereupon students will be able to share secret messages in their letters with their classmates throughout the school year in order to practice various letter-locking techniques while developing writing standards and language arts grammar skills.

We all know paper does not stretch, and the fibers in paper allow movement in only one direction, so Kirigami gives students the ability to stretch their imagination. Professor Randall Kamien says there is a cousin to origami, its name is kirigami. Kirigami helps solve problems that involve recreating unusual shapes by cutting and pasting the paper. Traditional kirigami is the art of cutting and sometimes folding paper. One familiar example is pop-up cards, but there are many others. We augment this approach by 'mending' the cuts after making them, rejoining a cut edge to a different cut edge, thus fundamentally changing the shape of the paper. (Castle, T.2014)

Students will be able to use kirigami and modular origami in order to construct patterns using geometric shapes. So what does the natural resource paper have to do with it you ask? Everything!

Strategies for ELA along with National Standards addressed

- As students begin this curriculum unit the class will create a timeline of the chronology of paper, making note of the important events involving the transformations of paper and the details that explain how paper has evolved and transformed in its uses. Students will create a sheet of paper from natural resources to be used as a framing element to display an informational writing. 3.RI.3
- To continue motivating students interest in origami everyone will make an origami paper drinking cup as a step to building a peaceful community. Students will chart when and analyze why paper cups came into existence. 3.RI.7
- Students will read about the history of Japan's devastating Atomic bombing in 1945 through the reading of the historical narrative: "The Thousand Paper Cranes". As a symbolic representation of peace in our school students will write a persuasive five paragraph writing to convince all students to assemble two or three paper cranes that will be arranged throughout the school as a representation of peace and unity within and surrounding the school community. 3.RI.7
- Using various shared literacy readings for the third grade class students will illustrate three themes through the use of origami. Students will plan and create origami elements that when assembled will illustrate and represent the sea/ocean, space, and earth existence. For theme 1 students will create an oceanic scene diorama which includes origami sea creatures such as whales, octopus, sharks, boats and other sea/ocean objects. Then theme 2 is space exploration, students will design planet origami using flat folds in order to explore how the folding and packing of large items are made to fit into small spaces. Finally theme 3 in literacy focuses on Immigration. Students will be able to design origami boats as well as exhibit origami kimono fashions to display. 3.RI.9, 3.G.1
- Students will write secret messages in various modes using letter format to pen pals in or outside of the school in order to seal the letters using various styles of letter locking to prevent invasion of privacy. 3.W

Strategies for Math along with National Standards addressed

- Math is known for algorithms, which are useful to decide on ways to solve mathematical equations. In origami there are concepts known as crease patterns, fold pattern and light pattern. These concepts expand on the opportunity to speak to Operations and Algebraic Thinking, and Geometry Standards. These concepts are higher level, yet helpful while identifying arithmetic geometric patterns. Students will compose and

design tessellations from a basic geometric shape and reconstruct the design using the crease, fold and light pattern. 3.G.1

- Also in the Mathematic Common Core Standards vital at the third grade level are Measurement, Data, and Geometry content. These Origami projects definitely address
- 3.G.1, and 3.MD.6 standards with the basic geometric shapes and mathematical attributes. These critical thinking tools of application, analysis, and synthesis allow for informal observations by the teacher, as well as providing students the hands-on project-based functioning along with brain stimulation, necessary to demonstrate and construct examples of diagrams used in origami folding. Students will learn the basic folds in origami (mountain and valley folds), how these folds can be used to create patterns, extraordinary objects, and the application of kirigami which changes the angles hence changing the type of polygon.

Classroom Activities, Resources & Appendices

Differentiation of Origami Lessons

If tailoring lessons for students having difficulty with dexterity, students with Individual Education Plans(IEP), or students incapable of managing the activities then allow them to work within the guidelines of their Individual Education Plans, peer assist or give them simple origami fold diagrams that make-up for those more difficult. As the teacher use your discretion and grade accordingly. Other options are partner grouping, send the instructions home where students have a parent or guardian to assist them with the projects, you may even partner with a higher grade teacher to have a mentor student come in the classroom and assist with the construction of the origami structures.

Lesson One: From Papyrus To Paper To Origami

Common Core Standard:	Objective
Explain how a series of events, concepts, or steps in a procedure is connected within a text, using language that pertains to time, sequence, and cause/effect. CC.1.2.3.C	Students will work in groups to examine and explore a timeline handout of events that detail the development of paper. (See Preface of Chronology of Paper)
Determine the central message, lesson, or moral in literary text; explain how it is conveyed in text. CC.1..3.3.A	Students will partner-read the “Introduction” from the “Chronology of Paper” in order to determine the central message and select key details that supported paper usage then along with selecting 8-10 important key facts.
Conduct short research projects that build knowledge about a topic. CC.1.4.3.V	Student will research the fundamentals of paper making in order to infer the value of recycling paper.

Engage effectively in a range of collaborative discussions on grade level topics and texts, building on others' ideas and expressing their own clearly. CC.1.5.3.A	Students will orally present their findings in an essay to the class. Present the informational essay. <i>Use Vocabulary terms</i>
Write informative / explanatory texts to examine a topic and convey ideas and information clearly. CC.1.4.3.A	Students will be able to write a 3 - 5 paragraph informational essay on the construction and development of paper in order to detail in sequential order a timeline of 8 to 10 key developments of paper's ancient creative usages.
Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly with adequate volume, appropriate pacing, and clear pronunciation. CC.1.5.3.D	Students will be able to analyze the timeline of events in order to research the selected data that documents important periods in the history of paper. This information will be used to reflect on in oral class discussions and supply the informational writing with facts and supported key details.

Today most paper is recycled, yet a large percentage is thrown about haphazardly. The objective of this lesson is that students should learn to value natural resources and consider the end product.

As a whole class students will take a walk within their school's community with the purpose of examining and discussing in detail nature's vital importance to the ecosystem.

On the walking trip each student must list on paper five living and five nonliving objects observed on the walk.

Once everyone returns to class student groups create a list that will be placed around the room for everyone to view and discuss.

The teacher should have students brainstorm meanings of the vocabulary terms: ecosystem, vital, living, nonliving.

In groups or individually students should be able to describe how all living organisms play a momentous part in sustaining life on the planet. Teacher can use the questionnaire in Appendix B as an informal assessment and cooperative group activities with this lesson.

The outcome is that students should be able to select better choices when using paper products and throwing out recyclable materials. This can be measured by having students chart what

they recycled that day for a period of 4-6 weeks. This activity can be conducted each morning when students arrive to class. This on-going lesson / tool should be used to change the behavior of how students view and value natural resources, their community and surrounding.

This lesson can be used within various contents depending on how the teacher would like to approach the standard. For this curriculum the class we will compile a five paragraph informational writing on the chronology of paper.

Students will be able to describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. RI.3.3 Text Analysis. Students will be able to create a timeline of no less than 10 dates starting from the beginning of papyrus to paper until the present time of important detailed facts in order to be explain the importance of natural resources.

Duration - approximately two weeks for each of the following:

20 minutes Shared Reading of the resources

20 minutes of independent center research time

20 minutes of writing center (inclusive of the timeline)

Paper-making project (the number of students determine the time needed, options: have students partner or work as a group)

Two - 30 minute periods and drying time for the handmade paper

Activity: Along with the objectives of this lesson are motivating activities that students will be able to do. On their walk in the community students should be allowed to collect various plant materials (e.g. leaves, flower parts), the natural resources from within the community in order to combine, innovate, and design a handmade sheet of paper.

The students must use their handmade sheet of paper as a display frame for their 3 - 5 paragraph informational essay. The handmade paper should measures larger than 8x11 inches in order to use that constructed sheet of paper as a backing/frame for the writing assignment.

Students should also complete a procedural writing of how their paper was made. This procedural writing should also be attached to the handmade paper and writing assignment for visual display purposes.

Materials for paper-making project:

Dried Plant leaves, water, small blender

Wood and screen for straining (view the youtube instructions for making the deckle)

Heavy objects such as books for weight

Roll of cashier tape for timeline (or other material cut into 3 inch strips then taped horizontally)

- [English & Language Arts / ELA Writing Rubric](#)
<https://www.doe.k12.de.us/site/Default.aspx?PageID=2645>
- Lesson One: Questionnaire/Key terms/ Other Suggestions (see AppendixB)
- Brief History of Origami. <https://origamihistory.wordpress.com>
- <https://origami.me/beginners-guide>
- Chronology of Paper: <http://hdl.handle.net/2027/loc.ark:/13960/t88g9945n>

- 09_actionTimeline of Paper.pdf (see Appendix B)
- How to make Home Made Paper - Youtube
- <https://www.youtube.com/watch?v=fyr24PgpDDs>
- How Ancient Papyrus Was Made | U-M Library
<https://www.lib.umich.edu/papyrology-collection/how-ancient-papyrus-was-made>

Papyrus-Making in Egypt | Essay | Heilbrunn Timeline of Art History ...
https://www.metmuseum.org/toah/hd/pyma/hd_pyma.htm

Lesson Two: An Ocean of Origami

PA Common Core Standard	Objective
Use information gained from text features to demonstrate understanding of a text. CC.1.2.3.G	Students will be able to identify the connection between illustrations and words in a text in order to use information gained from both to demonstrate and understanding of the text.
Write narratives to develop real or imagined experiences or events. CC.1.4.3.M	Students will be able to compose a narrative that includes a narrator and/or characters with events in a logical sequence in order to relay events in a logical sequence.
Write opinion pieces on familiar topics or text. CC.1.4.3.G	Students will be able to compose a piece of writing that provides an argument and explains that argument using facts and /or definitions in an organized way with an introduction and conclusion in order to clearly communicate a written opinion

The objective of this lesson is that students will complete a five-paragraph narrative and opinion writing assignment on life in the waters. The purpose of this lesson is to share with students the value of all life. The Earth is home to all living creatures so students must be taught how to value **more** than just human life. Through the reading of the following narrative and informational texts students will be able to research independently and gather in detail information about the life of 3-5 sea or ocean creatures in order to describe their usefulness in and for the environment. The opinion writing should focus on justifying to their audience why

it is important that people protect the oceans and the wellbeing of all water-loving creatures. Their narrative writing should focus on one or more of the sea creatures as the characters in the writing. The diorama should visual depict a setting including the characters in the narrative.

Duration - approximately two weeks of each of the following:

- 20 minutes Shared Reading
- 20 minutes of independent center
- 20 minutes of writing center

Materials: (Suggested) Shared/Independent Reading Resources

- “Amos and Boris” by William Steig
- “Ocean Sunlight-How Tiny Plants Feed the Seas” by Molly Bang & Penny Chisholm
- “The Fantastic Undersea Life of Jacques Cousteau” by Dan Yaccarino
- “Shark Attack!” by Cathy East Dubowski
- [English & Language Arts / ELA Writing Rubric](#)
<https://www.doe.k12.de.us/site/Default.aspx?PageID=2645>
- Origami paper
- Cardboard box /shoebox (not larger than 24”x12” (1 box per students)
- Markers, paint, crayons
- <https://www.youtube.com/watch?v=zNUG5MpHbyQ> (Origami Ocean Sea Animals)
- [How to Make a Diorama - YouTube](#) https://www.youtube.com/watch?v=_DJKyM3JIAI

Activity: Students will be able to assemble an ocean diorama from cardboard or a shoe box. Students will use their box to create a scenic ocean background for the origami sea creatures it with hold. Allow the students to watch the “YouTube video on How to Make a Diorama” as a class or during center time. Students will construct the 3-5 origami sea creatures that were researched in detail and/or read about in class.

<https://www.youtube.com/watch?v=zNUG5MpHbyQ> (Origami Ocean Sea Animals)

The essential focus and purpose of the writing is to persuade the audience to protect the oceans which intern will protect all life.

The students will design and place their handmade sea creatures throughout the diorama. Alongside the diorama is their 5 paragraph narrative writing to display.

Lesson Three: Origami’s Travels

PA Common Core Standard	Objective
Use information gained from illustrations and the words in a text to demonstrate understanding of a text. CC.1.2.3.G	Students will be able to identify the connection between illustrations and words in a text in order to use information gained from both to demonstrate and understanding of the text.
Explain how specific aspects of a text’s illustrations contribute to what is conveyed by the words in a story (e.g. create mood, emphasize aspects of a character or	Students will be able to identify illustrations that relate to mood, character traits, or setting in order to explain how they contribute to what is conveyed by the

setting). CC1.3.3.G	words in a story.
Write opinion piece on familiar topics or texts. CC.1.4.3.G	Students will be able to compose a piece of writing that provides an argument and explains that argument using facts and/or definitions in an organized way with an introduction and conclusion in order to clearly communicate a written opinion.

The objective of this lesson is that before, during and after reading the texts students will be able to facilitate a peace policy within the school in order to help support a school that accepts each others differences without compromise. Since we all came from a place on this Earth it is vital to remember our pass generations and their dreams of a better future for their families and loved ones. To motivate students have them brainstorm what their parents would like to see them become as an adult. Students will brainstorm three dreams of aspirations and write them on the hull of their origami boats to symbolize their dreams sailing forward into the future. Students will display their origami boats within the classroom as a reminder of their dreams and goals for the future. The origami boats should be hung in the classroom, noticeable by the students, as a reminder of their hard work applied towards achieving their endeavors. Then the whole class should share read “The Thousand Paper Cranes”. If there is not enough books for a whole class set then it is available on the YouTube site listed. Students will be able to brainstorm what guidelines and details should make a peace policy. Students will list their suggestions for a School Peace Policy on a chart to share with others. This can be done during a lunch period where students can present their suggestion and have other school students commit to abiding by the guidelines stated.

Students will also create an Out of This World Origami space station diorama while examining as a class Flat-Folding, Maps, and Satellites. Flat-folding allows large objects to fold and fit into smaller containers/packages then sent to other locations.

Duration - approximately two –three weeks of each of the following:

20 minutes Shared Reading of the following:

“The Thousand Paper Cranes” by Eleanor Coerr

“Grandfather’s Journey” by Allen Say

“Tea with Milk” by Allen Say

“Moonshot” by Brian Floca

“Starry Messenger” by Peter Sis

20 minutes of independent center

20 minutes of writing center

Materials:

- Origami Sheets
- Coloring materials (crayons, color pencils, paint)

- Shoebox or cardboard not to exceed 12x12 inches
- Starry Messenger, Peter Sis,
- Moonshot, Brian Floca
- nylon string
- wire hangers for hanging cranes
- Sadako and the Thousand Paper Cranes, Chapter 1-3 YouTube <https://www.youtube.com/watch?v=rKZLYCck8Nk>
- Sadako and the Thousand Paper Cranes, Chapter 4-6 YouTube <https://www.youtube.com/watch?v=o-N2tBi4aGI>
- Sadako and the Thousand Paper Cranes, Chapter 7-9 YouTube <https://www.youtube.com/watch?v=A94nURpxhFE>
- [Sadako and the Thousand Paper Cranes](https://www.sjbosco.org/wp-content/uploads/2013/08/Sdako-and-the-Thousand-Paper-Cranes-Practice-Questions.pdf) <https://www.sjbosco.org/wp-content/uploads/2013/08/Sdako-and-the-Thousand-Paper-Cranes-Practice-Questions.pdf>
- Planet Origami cosmic paper folding for kids book by Steve and Megumi Biddle ISBN043928523-2
- [English & Language Arts / ELA Writing Rubric](https://www.doe.k12.de.us/site/Default.aspx?PageID=2645) <https://www.doe.k12.de.us/site/Default.aspx?PageID=2645>
- Origami Kimono- Paper Crafts-Paper Kimono-YouTube, https://www.youtube.com/watch?v=ptQXq_iR2GM
- *Hands-on: How To Make a Paper Crane Origami Step by Step Easy-YouTube* – <https://www.youtube.com/watch?v=KfnyopxdJXQ>

Activity: As a class students will read and analyze “The Thousand Paper Cranes” historical narrative. The theme should be “Peaceful Resolutions”. The objective of this lesson is that the third grade students will be able to teach three students from another class how to make an origami paper crane in order to have those students teach three other students. Each student will construct three cranes which will represent that student’s commitment to resolve issues of conflict with peaceful resolutions. Each student in grades 3 to 8 will be expected to make three paper cranes in order for students to hang them around the school building. These hanging cranes will aid in reminding everyone who enters the building the cranes represent a safe and peaceful learning environment. The goal is that students will be able to hang 1000 (plus) origami cranes within the school building in order to express and support the idea of a safe learning environment.

Activity: During the reading of “The Thousand Paper Cranes” students will answer the chapter questions listed on the pdf. After reading as a class or independently “The Thousand Paper Cranes” by Eleanor Coerr, students will be able to write a persuasive argument about the importance of peaceful resolutions. Students will also cite evidence from the reading to support their argument. The writers will share their argument during various lunch periods in order to have the listeners create an origami drinking cup to sip water from promising to commit to peaceful resolutions.

Activity: Students in the third grade class will be able to create a boat of dreams in order to imagine the life of immigrants moving to a new homeland. Students will be able to interview three generations within their family in order to post three dreams for their future on the origami boat constructed. These boats will hang as a symbol of sailing into the future with high endeavors.

Activity: The objective of this activity is that students will be able to enjoyably construct and design an origami Japanese kimono and exhibit it in an origami fashion display bulletin board in order to express the importance of people’s cultural dress. Check out the site to see other beautiful kimono fashions (<https://yourshot.nationalgeographic.com/tags/kimino>).

Activity: The objective of this activity is that students will be able to write an informative essay that specifically details Galileo Galilei, the important astronomer, and a diorama that represents Neil Armstrong, or any other astronomer/astronaut and their courageous and innovative ways to explore the galaxy in order to decide if space travel today is a beneficial options.

Assessment: [Sadako and the Thousand Paper Cranes](#)

<https://www.sjbosco.org/wp-content/uploads/2013/08/Sdako-and-the-Thousand-Paper-Cranes-Practice-Questions.pdf>

Lesson Four: Origami Security

PA Common Core Standard	Objective
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. CC.1.4.3.X	Students will be able to complete specific tasks for an identified purpose for writing in order to complete appropriate portions of the writing process.

The objective of this lesson is that students will be able to write in letter format various informative essays that expresses factual details on the importance of privacy in a world of cyber thief and texting in order to justify why letter locking from the past brought about the evolution of envelopes which are used to secure valuable information. Students will be able to summarize why mail tampering is a federal offense on a poster board or commercial presentation in order to show and represents the respect for others personal business. As a class review what identity thief is and way to avoid being a victim by using the site listed.

The letter-locking technique can be used for future writing assignments such as having students write letters to pen pals within or outside of the school.

Students will use various letter locking techniques to secure their letters/writings. Teachers should make mandatory 3 letterlocking techniques. The letter-locking samples will be exhibited as an attachment to the writing.

Duration: - 1week/or on-going

20 minutes Shared Reading “A Letter To Amy” by Ezra Jack Keats

“Dear Mr. Blueberry” by Simon James

“The Day the Crayons Quit” by Drew Daywalt

“Dear Mrs. LaRue Letters from Obedience School” by Mark Teague

20 minutes of independent center letter-locking formatting

20 minutes of writing center

Materials:

- Origami paper
- Poster board
- Writing paper
- pencils, pens
- *Hands-on:* Try one of the locks at <http://letterlocking.org/categories>
- **Identity Theft | CRIMINAL-FRAUD | Department of Justice**
<https://www.justice.gov/criminal-fraud/identity-theft/identity-theft-and-identity-fraud>
- **English & Language Arts / ELA Writing Rubric**
<https://www.doe.k12.de.us/site/Default.aspx?PageID=2645>

Assessment: Students should complete no less than three letter-locking techniques, then choose one to exhibit alongside their completed writing lesson.

Lesson Five: Origami Movement and the Medicine Ball (Kusudamas)

PA Common Core Standard	Objective
Identify, compare, and classify shapes and their attributes. CC.2.3.3.A.1(3.G.1)	Students will be able to understand that shapes in different categories may share attributes, and that the shared attributes can define a larger category.
Determine the area of a rectangle and apply the concept to multiplication and to addition. CC.2.4.3.A.5(3.MD.6)	Students will be able to count unit squares in order to measure area of a rectangular figure
Solve problems involving perimeters of polygons and distinguish between linear	Students will be able to use the procedure of measurement and apply the concepts of

and area measures.CC.2.4.3.A.6	<p>length and width in order to determine “a unit square”.</p> <p>Students will be able to use the concept of measurement and apply the idea of “a unit square” in order to determine the area of a plane figure.</p>
--------------------------------	---

The objective of this lesson is to teach tessellations using patterns through modular origami. Modular origami is taking multiple pieces of paper, folding them into similar units, and connecting them together. Tessellations are a pattern of geometric shapes without gaps or overlaps.

Students will be able to apply the basic folds in origami (mountain and valley folds) in order to determine how the folds can be used to create patterns. Students will conform the basic three and four sided shapes to design extraordinary tessellations. Students will complete this activity in order to describe the attributes of geometric shapes.

Duration - 1week

45 minutes Shared Reading:

20 minutes of independent center

20 minutes of writing center

Materials:

- Origami paper
- Lunch Bag diagram /Origami Gift Bag- <https://www.youtube.com/watch?v=r2aTXMLPKyk>
- <https://www.youtube.com/watch?v=iduICC8UL-4> (How to make a Kusudama)
- *Hands-on.* Fold a [Miura map](https://www.sciencefriday.com/educational-resources/tessellation-and-miura-folds/) (<https://www.sciencefriday.com/educational-resources/tessellation-and-miura-folds/>)

Activity: Students will be able to compare the fold diagrams in an origami medicine ball to that of geometric shapes in order to complete a Venn Diagram as a reference source. Students will classify the geometric shapes and the attributes in order to illustrate one repeat of a select pattern on graph paper. Students will design a pattern repeat that will build a tessellation design on 0.5 centimeter grid paper. Have students make one of the Kusudama sheets on the graph paper to use as the tessellation design. Students will use a color scheme of two or three colors to support the tessellation on the grid paper. Students will list the attributes that describe the shapes of the origami Kusudama on a separate sheet. Students should include terms such as: line segment, angles, vertices. Student will then be able to determine the perimeter and area of the basic shapes that make up the Kusudama using their graphed design.

Activity: Students will be able to construct an origami lunch bag in order to determine the “unit square” of various polygons. As students fold and unfold the diagram they will be able to use the pattern of shapes to classify the polygons according to the attributes. Students will be able to distinguish between linear and area measurements using the diagram of folded shapes in order to determine the area and perimeter of the shapes.

Assessment:

Students should complete a tessellation by fulfilling the requirements of the activity.

Students should complete one whole Kusudama. This can be done independently or as a group activity of 3 or 4 students.

Students should also complete a Venn Diagram for comparing the fold diagrams to the attributes of the basic geometric shapes of a three or four sided ploygon

Lesson Six: Pop-Up and Away

PA Common Core Standard	Objective
With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, and editing. CC.1.4.3.T	Students will be able to respond to questions from a teacher or peer in order to clarify their written communication. Students will be able to utilize teacher and peer discussions in order to revise written work.

The objective in this lesson is that students will be able to collaborate with their peers and teacher about types of figurative language and special cultural events that are celebrated within the classroom or school in or to create holiday greeting cards with a pop-up element based around the chosen cultural event. Most people love pop-up cards and books. There is something about the ability of an object to surprise the reader as they open the object. Creating a pop-up can take few cuts or several, but whatever the thought pop-up brings both the critical thinking skills and the fun of design. The teacher has an opportunity in this lesson to teach poetry with the use of figurative language. Students can choose to write a sentimental note or a form of poetry that represents the holiday season to the recipient of the card.

Materials:

Origami paper and/or card stock paper

Hands-on: Cut and fold one of the designs

at <http://wp.robertsabuda.com/make-your-own-pop-ups/>

Activity: Students will be able to use various forms of figurative language (e.g. similes, metaphors) in order to construct one or more types (e.g. cinquain, haiku, rhyming, acrostic) of poetry that celebrates a cultural belief. Students will design the pop-up card and include the poem that pertains to the selected cultural event in order to complete and distribute or display the finished card.

Assessment: Students will be able to complete in colorful detail one or more pop-up cards in order to exhibit the ability to write a special form of poetry that includes corrective usage of figurative language in two or more stanzas of the poem. The pop-up card must fold correctly when closed and pop-up when the card is opened. Also have completed the guidelines of a pop-up design stipulated by the teacher.

Appendix A

Hands-On Activities

Hands-on: Origami Diagramming Conventions (Robert Lang, OrigamiUSA 1989-1991)
<http://www.langorigami.com/article/origami-diagramming-conventions>

Hands-on: Try one of the locks at <http://letterlocking.org/categories>

Hands-on: Cut and fold one of the designs <http://wp.robertsabuda.com/make-your-own-pop-ups/>
Software (popupCAD): <http://www.popupcad.org/>

Hands-on: Fold a Miura map -
<https://www.sciencefriday.com/educational-resources/tessellation-and-miura-folds/>

Hands-on: Lunch Bag diagram /Origami Gift Bag -
<https://www.youtube.com/watch?v=r2aTXMLPKyk>

Hands-on: Medicine Ball - <https://www.youtube.com/watch?v=iduICC8UL-4> (How to make a Kusudama)

Hands-on: Origami Kimono- Paper Crafts-Paper Kimono-YouTube,
https://www.youtube.com/watch?v=ptQXq_iR2GM

Hands-on: <https://www.youtube.com/watch?v=zNUG5MpHbyQ> (Origami Ocean Sea Animals)

Hands-on: [How to Make a Diorama - YouTube](https://www.youtube.com/watch?v=_DJKyM3JIAI)
https://www.youtube.com/watch?v=_DJKyM3JIAI

Hands-on: How To Make a Paper Crane Origami Step by Step Easy-YouTube –
<https://www.youtube.com/watch?v=KfnyopxdJXQ>

Appendix B

Assessment Templates / Graphic Organizers

Lesson Questionnaire

Graphic Organizer T-Chart for Main Idea / Supporting Key Details

Graphic Organizer Venn Diagram for Compare and Contrast

Graphic Organizer for letter writing format

Project Rubric: Origami Paper Crane

www2.oberlin.edu/amam/asia/crane/documents/project-rubric.pdf

iRubric:Origami Projects

www.rcampus.com/rubricshowc.cfm?code=R4W783&sp=yes&

English & Language Arts / ELA Writing Rubric

<https://www.doe.k12.de.us/site/Default.aspx?PageID=2645>

09_actionTimeline of Paper.pdf (<http://hdl.handle.net/2027/loc.ark:/13960/t88g9945n>)

Letter Format Graphic Organizer

Friendly Letter Writing Format

The following sections are needed to exhibit a complete friendly letter format:

Heading

Greeting

Body (Details)

Closing

Signature

Graphic Organizer for Friendly Letter Writing

Heading

_____ Greeting

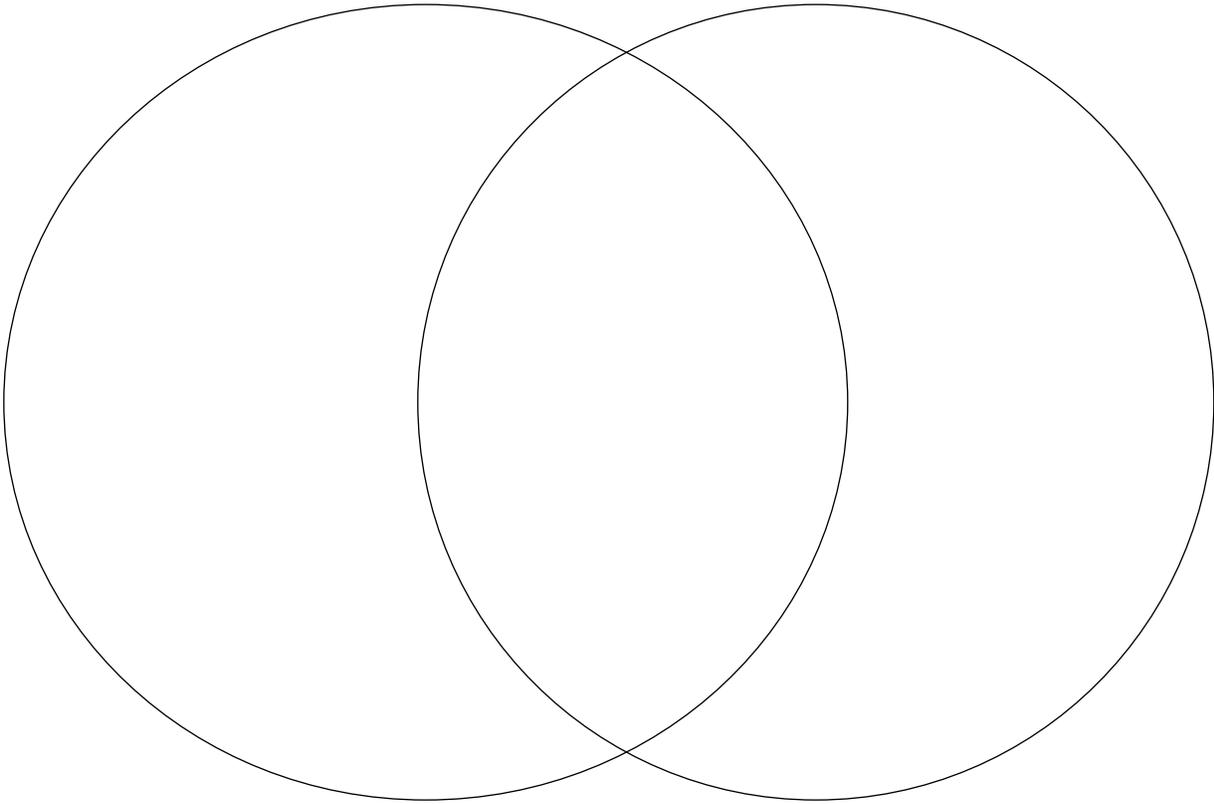
Body _____

Closing _____

Signature _____

Venn Diagram Graphic Organizer

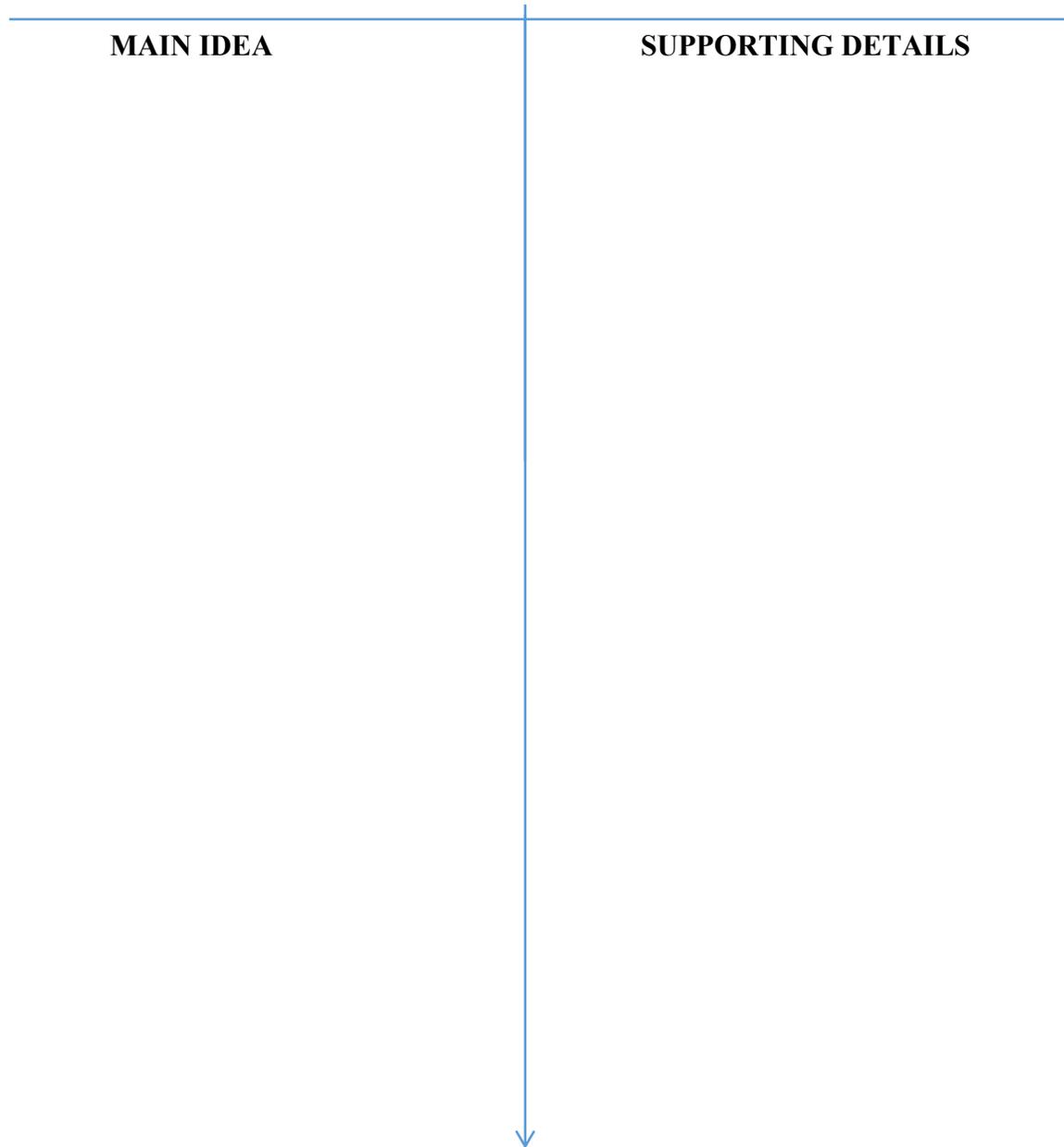
Venn Diagram used for Compare and Contrasting
Origami Fold Diagrams to Attributes of Geometric Shapes (Lesson Five)



T-Chart Graphic Organizer

Use as a tool to list Main Ideas and Supporting Details from readings and text support for writing assignments with evidence.

T – CHART



Lesson One Questionnaire/Vocabulary

Lesson One: From Papyrus To Paper To Origami

Text: Chronology of Paper

Focus: Origin of Paper, Origami to Present

Lesson One: Vocabulary from text: “Chronology of Paper (Introduction)”

Babylonia

babylonian brick

Before Christ(B.C.)

Anno Domini a.d. (Latin meaning “in the year of our Lord) After Christ

Characters (multi meaning term)

manuscript

certified

Abbe Rive

papyrus

Egypt, Egyptian

Rome, Romans

China, Chinese

parchment

incunabula

pellicles

pith

reeds

saturate

fagots

solution

yields

consistence

Lesson One: Questions Round table (Group Discussion)

In small cooperative groups discuss and complete the following:

- a. Explain what is meant by “all materials” in the topic statement of the introduction.
- b. Brain storm types of materials that could possibly have been used.
- c. Gather and list text evidence supporting the types of materials used writing upon before paper.
- d. Create a timeline of events starting with the year 4500 B.C. until the 20th Century, marking 8 to 10 major progress events in the development of paper.

- f. Explain the process of paper making using supporting evidence from the text reading.
- g. Explain the last paragraph in your own words.

Lesson One: Group / Center Project

- a) Group members will brainstorm character traits.
- b) Take the Brainstorm List of character traits a person of that time may have possessed then,
- c) Students will draw a silhouette of a person on chart paper (big enough to write the traits inside and share with the audience).
- d) Group members will use marker, crayons, draw, or write character traits inside of the character silhouette.
- e) Students will collect text evidence that supports the selected traits.
- f) Group members will present their findings to the class.

Appendix C

National - PA. Common Core State Standards

Lesson One

RI.3.3 - CC.1.2.3.C Explain how a series of events, concepts, or steps in a procedure is connected within a text, using language that pertains to time, sequence, and cause/effect.

RL.3.2 - CC.1.3.3.A Determine the central message, lesson, or moral in literary text; explain how it is conveyed in text.

W.3.7 - CC.1.4.3.V Conduct short research projects that build knowledge about a topic.

SL.3.1 - CC.1.5.3.A Engage effectively in a range of collaborative discussions on grade level topics and texts, building on others' ideas and expressing their own clearly.

SL.3.4 - CC.1.5.3.D Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details; speak clearly with adequate volume, appropriate pacing, and clear pronunciation.

CC.W.2 - CC.1.4.3.A Write informative/ explanatory texts to examine a topic and convey ideas and information clearly.

Lesson Two

RI.3.7 - CC.1.2.3.G Use information gained from text features to demonstrate understanding of a text.

CC.W.3 - CC.1.4.3.M Write narratives to develop real or imagined experiences or events.

Lesson Three

RI. 3.7 - CC.1.2.3.G Use information gained from text features to demonstrate understanding of a text.

RL.3.7 - CC.1.3.3.G Explain how specific aspects of a text's illustrations contribute to what is conveyed by the words in a story (e.g.create mood, emphasize aspects of a character or setting).

W.3.1 - CC.1.4.3.G Write opinion pieces on familiar topics or texts.

Lesson Four

W.3.10 - CC.1.4.3.X 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.

Lesson Five

3.G.1 - CC.2.3.3.A.1 Students will be able to understand that shapes in different categories may share attributes, and that the shared attributes can define a larger category.

3.MD.6 - CC.2.4.3.A.5 Determine the area of a rectangle and apply the concept to multiplication and to addition.

Lesson Six

W.3.4 - CC.1.4.3.T With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, and editing.

Appendix D

Citations

Richman-Abdou, K. (2017) Origami: How the Ancient Art of Paper Folding Evolved Over Time and Continues to Inspire. Retrieved from <https://mymodernmet.com/history-of-origami-definition/>

Greenfield, P. (2009, January 29) Is Technology Producing A Decline In Critical Thinking And Analysis <https://www.sciencedaily.com/releases/2009/01/090128092341.htm>

Wolpert, S. (2009, January 27) Is technology producing decline in critical thinking and analysis? <http://newsroom.ucla.edu/releases/is-technology-producing-a-decline-79127>

Sun, C. (n.d.) The Four Stages of Learning. The Learning Process - Oregon.gov www.oregon.gov/oprd/ATV/docs/handout_the_learning_process.pdf

Munsell, J. 1870 A Chronology of Paper and Paper-Making, Fourth Edition
Albany: 82 State Street [Http://hdl.handle.net/2027/loc.ark:/](http://hdl.handle.net/2027/loc.ark:/)

Castle, T., Cho, Y., Gong, X., Jung, E., Sussman, D. M., Yang, S., Kamien, R. D. (2014) Making the Cut: Lattice Kirigami Rules <http://www.physics.upenn.edu/~kamien/kamiengroup/>
Website: <http://scientific-kirigami.blogspot.com/p/welcome.html>

Dambrogio, J., Starza Smith, D., (et al. 2016) (Book Arts 2014) Vol., 5 NO. 2
Article: [Historic Letterlocking: The Art and Security of Letter Writing](#)

Bateman, A. 2002 July, In Book Origami³ pp. 127-127
Article (2D): [Computer Tools and Algorithms for Origami Tessellation Design](#)

Case Paper, (n.d.) [History of Paper | Papyrus - Fourdrinier Machine |](#)
www.casepaper.com/company/paper-history/, History of Paper
<http://www.paperonline.org/history-of-paper/timeline>

Bibliography

Butler, Frank O. 1901 January, The Story of Paper Making

Article: Additive Lattice Kirigami (Castle, Sussman, Tanis & Kamien, Science Advances 2016)
Book Chapter (Theory): Flat Vertex Folds (O'Rourke, How to Fold It 2011)

Website: <http://erikdemaine.org/foldcut/>

Article: Folding and One Straight Cut Suffice (Demaine, Demaine, & Lubiw, SODA 1999)

Article (Applications): A Giant Leap for Space Telescopes (Heller, Science & Technology Review 2003)

Article (3D): A Three-Dimensional Actuated Origami-Inspired Transformable Metamaterial with Multiple Degrees of Freedom (Overvelde, de Jong, Shevchenko, Becerra, Whitesides, Weaver, Hoberman & Bertoldi, Nature 2016)

Book (Treemaker): Origami Design Secrets (Lang, CRC Press 2003, available through Penn Libraries)

Article: Dürer's Unfolding Problem for Convex Polyhedra (Ghomi, Notices of the AMS 2018)
Software: <http://l3d.cs.colorado.edu/~ctg/projects/hypergami/JavaGami.html>

Article: Pop-up book MEMSPreview the document (Whitney, Sreetharan, Ma & Wood, Journal of Micromechanics and Microengineering 2011)

Article (2D): Computer Tools and Algorithms for Origami Tessellation Design (Bateman, Origami3 2002)

Article: Historic Letterlocking: The Art and Security of Letter Writing (Dambrogio, J. Book Arts 2014)

Act for libraries, 2017 The Early History of Paper.

www.actforlibraries.org/the-early-history-of-paper

Source: <http://inventors.about.com/library/inventors/blpapermaking.html>

Gardiner, M. (Feb. 1, 2018) Everything Origami. www.hinkler.com.au/everything-origami