



Curriculum Units by Fellows of the Yale-New Haven Teachers Institute
2022 Volume I: Writing about Nature

Spiral Introspective: Discover Spirals through Art in S.T.E.A.M

Curriculum Unit 22.01.04
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Rationale

Spirals are everywhere in nature just as art is everywhere. The overall goal of this powerful S.T.E.A.M. Spiral unit is to get students to become better observers and thinkers, as well as to open student minds to possibilities of Science, Technology, Engineering, Art, and Math connections through the spiral. I hope students will come to desire learning when they seek independent knowledge of spirals. While engaged in critical inquiry, students will come to see how a spiral is actually all around us! I want students to develop skills in self awareness and students will come to build their self-confidence when identifying which kind of spiral they were internally drawn to investigate and research.

I want my spiral teacher's google slideshow example to inspire students to graphically depict the spiral area of their choosing in an amazing, eye-catching way! Next, I look forward to students using their hands to create an oil pastel composition that also depicts the spiral direction of their choosing. I believe both hands-on activities will deepen the meaning for this new obtained spiral knowledge. In this unit some responsible internet decision making skills will be gained as well. Students will gain some practice in public speaking. Increased listening skills and self control when respecting other student ideas during class oral presentations will be expanded. Students will have an outcome evaluation or rubric of their spiral idea creation as well as a personal reflection on spirals all around us and their google slideshow presentation.

This Spiral unit will also help middle school students with independent self-motivation, impulse control, self-discipline, time management, organizational skills, peer interactions and peer communications skills. This unit has an element of teamwork when the students work together to brainstorm and then each student will independently select a direction to research their chosen spiral. Students use social engagement when they "pair share" or "bounce" their ideas together and begin to build peer partner relationships. After students have selected their spiral to research, students then create a google slideshow and request feedback again from their peers. Lastly students create an oil pastel composition and students will again "pair share" their artistic suggestions for oil pastel student revisions or changes.

On the surface this unit may seem to be solely about art elements, principles, and line creations focused on smudging etc while visually appealing. The reveal is amazing that this oil pastel creation is actually inspired by a deep dive STEAM Spiral unit! I want students to gain an understanding of how professional artists go

about their art creations. Students will see other artists who were “moved” by spirals in their professional art works as well.

The Spiral unit will hopefully be deeper and richer than any Art unit so far this school year due to the multi-content layering S.T.E.A.M. involvement. The goal of this unit is also to allow academic and artistic independence as well as students being able to utilize previous skills taught during this school year and now independently applying them. I am hoping by having the students take control of their own spiral learning directions, that the students will be internally driven by their own inspirations as well as take their learning to a more concrete place of gaining forever knowledge. I am hoping this spiral unit *Spirals in S.T.E.A.M.* will be an introspective experience that students remember. This unit will support students into becoming deeper critical thinkers as well as strong observers of spirals all around them. I want this spiral unit to be self guided instruction, thinking, and investigating the learning process to transform student learners.

I wish to review some technology “rules” when searching the internet. I want to remind students that they could accidentally stumble upon inappropriate or “off” topic information and that students are not to be distracted. Students are to redirect themselves or log out and redirect back to appropriate “on” topic spiral territory.

To inspire art creations I will be providing a list of artists that are associated with Spiral art in case students wish to do a recreation or “in the manner of” that particular artist style: Vincent Van Gogh, Katsushika Hokusai, Charles Alston, Emma Amos, Romare Bearden, Perry Ferguson, Reginald Gammon, Felrath Hines, Alvin Hollingsworth, Norman Lewis, William Majors, Richard Mayhew, Earle Miller, William Pritchard, Merton Simpson, Hale Woodruff, William Yeats, Andy Goldsworthy, Marcel Duchamp, and James Yeargans are just a few that I will include to give the students a variety of inspiration.

School Setting

My unit is part of a study of spirals intended for all grades PreK-8 Art, including a self contained special education classroom at the Nathan Hale School in New Haven. This is a solid S.T.E.A.M. unit. The seven foundations of STEAM (Science, Technology, Engineering, Art, and Math) include: Observation, Creativity, Innovation, Planning, Revision, Collaboration, and Presentation. This Spiral unit touches on all seven foundations. The mixed age group that I am focusing on for this unit will go through all seven foundations. Students will learn about Spirals as an Art term as well as spirals in Nature, Math, and even Psychology. Students will be spiraling upward and downward gaining knowledge on spirals. Students will then see the power of a spiral during the end of the unit Art show when the bulletin boards will display all the Spiral possibilities from all the grade levels. I will be having grades 5-8 as a focus group.

I want the students to have viewed a variety of spirals before they select what spiral direction they choose. For the student who can not pick the direction of their choosing I will be happy to assign a spiral direction in order to have our final share out be more rich or varied in S.T.E.A.M. connections of spirals. Students will have a few days to explore, peer share, and to select their own spiral direction. I want the students to tell me orally their proposed plan so I am fully understanding of their independent direction each student is heading in. I will be teaching approximately 150 plus students in the middle school focus group and over 250 students in the other groups experiencing the spring spiral unit.

While I will be presenting spirals in nature to the entire Nathan Hale student body in the spring, I designed a focus group for this unit of grades 5-8. The middle school has a mixed 5-8 grade age group and I will do a deep dive into spirals with that focus group only. Many 5-8th grade students will present their selected spiral

topic and google slide show to the younger 2-4th grade levels. This mixed middle school age group I see three days a week, with each class an hour or more.

The middle school students range in art abilities as well as have different interest areas, so this Spiral unit will certainly internally motivate each student differently. This S.T.E.A.M. unit is a step into all Nathan Hale students gaining skills into making connections between Science, Technology, Engineering, Art, and Math. I look forward to seeing the students who might weave in Math and working with the golden ratio or fibonacci spiral much like artist Leonardo Da Vinci!

This unit will be taught in the spring after gaining some student rapport as well as students gaining background knowledge in making connections all around us and feeling more comfortable with navigating around the art studio. The spring is also a time of year that all students have some comfort level with working with many different tools and materials throughout the school year as well as knowing clean up protocols. By spring in any given school year the students can better manage independently working aside peers without projects all being the same.

Introduction

The Nathan Hale School middle-school focus group students will be asked some essential questions throughout the unit of study:

Where do we visually see Spirals in Nature naturally?

What role does persistence play in research, revising, refining, designing, developing, and creating work?

How does collaboratively reflecting on an Artwork help us experience it more completely and deeply?

How do collaboration and brainstorming expand the creative design process?

What conditions, attitudes, and behaviors support creativity and innovative thinking?

How does engaging in creating art enrich people's lives?

How does making art attune people to their surroundings in nature?

How does learning about art (lines) impact how we perceive the world moving forward?

The answers to these essential questions will be discussed at wrap up for a closure to the unit in the focus group. The focus group will be table groups for "pair shares" as well. Students will discuss afterwards with the entire class and then break into smaller groups for deeper peer share table discussions of the spiral just as they did when considering their independent google slideshow spiral directions.

I want grades 5-8 to think for themselves, work as independently as possible. I will kick off spirals with peer collaborations that will hopefully generate and internally motivate the students for their own selected spiral direction.

After this brief sharing I will then direct students to the created teachers google slideshow which will be located inside the google classroom. Inside the google classroom students will be able to click a link to my created Google Spiral Slide Show. This safe organized internet exploration will allow students in grades 5-8 to determine where they “spy” spirals in the world and which direction the students are considering. I am super curious to see what direction the students will take. All students at Nathan Hale School will learn eventually that in the natural world, we find spirals EVERYWHERE! Some grade 5-8 students will present their created google slide shows and art compositions to grades 2-4 classes.

Spiral Studies Grades PreK-12

I will be teaching PreK-8th graders, including a self contained special education classroom, and all students will all have a spring spiral experience. Students' eyes will begin to observe the natural world around them from another perspective, maybe even a snail's perspective. I will adapt the study of spirals through art for the PreK-8th grade students I teach at the Nathan Hale School and can be used to teach high school students as well.

Students will see spirals in: DNA double helix, sunflowers, the path of draining water, weather patterns (including hurricanes, tornadoes, etc), vine tendrils, phyllotaxis (the arrangement of leaves on a plant stem), galaxies, the horns and tails of various animals, mollusc shells, the nautilus shell, snail shells, whirlpools, and more.

Students will all create one spiral work of art to display on the bulletin walls of the various spirals everywhere! Students in all grades will participate in a “sit spot”. I am excited to share “sit spot” as a tool to help students learn to stop and pause for either an outdoor experience, or an indoor experience to deepen their natural observational skills. Students will make connections as well as develop their five sense observational skills during this “sit spot” experience.

Spiral Study Grades PreK-1st

PreK-1st students will begin to gain knowledge that spirals are everywhere. Students will create spirals with shaving cream for a spiral sensory experience. Students will use fine motor skills and sensory experience when making shaving cream spirals. PreK-1 will also create Snail compositions and Iguana compositions. Spirals will be introduced to all students by briefly viewing interactive teacher created Google Slide Show and videos embedded within the spiral slideshow. Spiral picture books and *Swirl by Swirl Spirals in Nature* by Joyce Sidman will be shown. Students in lower grades will use tempera and watercolor paint only to make spiral creations.

Spiral Study Grades 2-4

Students in grades 2-4 will view teacher- guided google slideshow to see some teacher-led information on spirals to help students easily navigate later on as a sneak peak of spiral information. If the students can bring chrome books to class then students will have part of a class to navigate my google slide show in pairs. All internet surfing guidelines will be discussed. The 2nd-4th grade group will have “choice” with pencil, crayon, and or tempera paint for their spiral art composition and or direction as well. Students in grades 2-4 will choose where they wish to spiral down or up with their spiral creation! After receiving some language arts

spiral inspirations, 2-4 grade students will create black out poems, shape poems, or short illustrated spiral stories.

Students will read *Swirl by Swirl Spirals in Nature* by Joyce Sidman for inspiration to see an example of how to write a spiral poem. Students will write a creative writing spiral piece. Students will write or give an oral artist statement to respond to their spiral creation. The students will have “choice” again as to which project they wish to work on in class. Some students might wish to create a poem or spiral inspired shape poem and illustrate the poem on the same paper, which is workable as well. I find 2-4 grade students do even better when they have two assignments as it allows students to be on task while waiting for something to dry or when stamina or focus becomes a challenge.

Spiral Study Grades 5-8

This age group is my focus group and I give an in-depth step by step explanation of the spiral S.T.E.A.M. unit in my overview section below. The focus group will be a deep dive learning experience in spirals. Students in the middle school grade levels will use technology and art to articulate their spiral unit both visually with technology and in oil pastel. The students in this age group will gain skills socially and emotionally as well with collaborations and technology independence.

Spiral Study Grades 9-12

For High School students, this spiral unit of study would make a great fall opening assignment to immerse students in S.T.E.A.M connections. Beginning the school year with having students work independently to select the direction in spirals of their choosing will enlighten where the students are. After teaching high school students for over five years I know this unit would make a great opening learning opportunity for students in grades 9-12 and a great way of learning about the new class makeup of students. Teachers can take all focused group plans and modify them accordingly.

Spiral Study Grades 5-8: Overview for Focus Group

I will use Google classroom as a platform to post my teacher created Spiral slideshow for grade 5-8 students. I teach this “focus group” three hours a week. This focus group will have more time and be able to go deeper in their thinking and understanding of spirals. The student google slideshows are a deep dive of spiral inquiry in a direction of the student’s choice. I will also review all internet surfing guidelines with them since students will be navigating on their own.

The Google Slide that I post on google classroom will be given to all 5-8 grade students directly for them to explore.

I will facilitate the grade 5-8 learning process of Google slide options with my slideshow. I will answer any questions on Google slide in order for grade 5-8 students to design their own slideshow and find a spiral topic to “teach” or share or orally present. I will give design instructions on how to insert links, photos, change colors, etc. to make a visually strong slideshow.

Students will read *Swirl by Swirl Spirals in Nature* by Joyce Sidman for inspiration to see an example of how to

write a spiral poem. Students will write a creative writing spiral piece. Students will write or give an oral artist statement to respond to their spiral creation.

After discussing Spirals in nature with all grade levels, the focus group will participate in a lesson on graphic design. During this lesson students will discuss graphic design elements, and principles, lines, shapes, font style, font size, background color, underline links, bold, visually pleasing images, as well as internet concerns or dangers that exist.

Students will pick a direction to follow their own research. Students will create individual three to five minute Google Slide presentations. I want students to consider the visual presentation and aesthetics when designing their own google slideshows. I want students to gain skills in critical thinking of graphic design, layout, cropping photos, font, and complementary color choices during their edit process. Students will experiment with all the google toolbars while simultaneously gaining skills in “seeing” the world around them differently. Students will email me their finished google slide show of their selected spiral topic.

We will be reviewing elements and principles of art in order to make aesthetically pleasing presentations and oil pastel compositions. This focus group will be guided in their oil pastel art techniques. Grades 5th, 6th, 7th, and 8th grade classes will use oil pastels only. Students will create a spiral inspired work of art in oil pastel. During student studio work time students will view spiral inspired TED talks during our class oil pastel work time. Students can complete a brief written assignment for extra credit noting what new knowledge they might have gained from this unit of study. Students can note anything gained from either their peers, TED or TEDx talks, or me. Students can write their opinion of the talk for extra credit as well.

Students will create a title card to their oil composition art work as well. I wish for students to become experts in their selected spiral direction. I want middle school students who feel passionate about their Spirals and the area that they selected to then “teach” or present their spiral topic, for the K-4 Art classes. I wish for all students to gain “observational spiral seeing skills” as well as writing and technology skills through this Art spiral project. I look forward to seeing what the students teach me as they use critical thinking skills, writing communication skills, creativity, and problem solving skills.

Finally we will review the art of public speaking skills including eye contact, poise, not reading out loud the slide content and other public speaking techniques. Students will have nature spiral lens “upgrades”. Lastly, students fill out self evaluation as well as teacher evaluation of the Spiral unit and address why they selected the google slideshow direction that they did.

Spirals in S.T.E.A.M.

Inside the Teacher Google Slideshow students will learn how Spirals connect with the S.T.E.A.M subjects. I want students to keep asking questions - what possible spirals are found in Nature, Technology, Engineering, Art, and Math?

Science Spirals

DNA double helix is like a double spiral staircase. The structure of DNA is a double helix is a double stranded molecule that twists like a spiral staircase. The outsides of the molecule, the railings of the staircase, are

made of deoxyribose sugars alternating with phosphates. This part of the molecule is sometimes called the "backbone". Humans and or designers have looked to nature in order to create a design solution for getting from one level of a house to another.

*I want the students to see this connection as biomimicry.

Whirlpool - the spinning direction of drain water too forms a spiral, mostly by how the water is bumped, sloshed, or distributed when it starts to drain. I am hoping that seeing these at-home toilet bathroom connections triggers all students' brains that spirals are all around us!

Hurricanes - Large forces create spirals.

Vine tendrils are soft spirals in nature.

Galaxies will be introduced since they are twisted collections of stars and gasses. Galaxies have beautiful shapes and spirals are included.

Horns and tails - consider the various animals.

Shells - In snails the long canal spiral protects the snail.

Boat ear moon - a thin, light shell, low-spined, with a voluminous body whorl angled at its base and a shallow suture that becomes deeper as shell.

Technology Spirals

Doppler radar - Students will learn the value of technology craftsmanship when creating technology-based Google Slideshow presentations about spirals. How does technology support our safety regarding spiral tornadoes?

Engineering Spirals

Spiral screws-extractor is itself a coarse-pitched tapered screw thread.

Euler spiral is a curve commonly referred to as spiro, clothoids, or cornu spirals. These types of spirals are often used in railway construction or highway engineering.

Art spirals

Vincent Van Gogh's *The Starry Night* shows swirling structures have turbulent properties matching those observed in the molecular clouds that give birth to stars.

Katsushika Hokusai's *Great Wave* has been a symbol of not just tsunamis, but hurricanes and plane crashes into the sea, all depicting spirals.

I also want students to consider these types of artwork which could be used as an inspiration when they design their own spiral composition art piece.

Math Spirals

Students will see a simple example in the starfish, the body of which actually displays the Fibonacci number five. As well as its regular pentagon shape, the starfish also exhibits the Golden Ratio! – more Math woven into the spiral with Sunflowers.

Sunflowers are more than just beautiful flowers, they're also a mathematical marvel. The pattern of the seeds within a sunflower follows the Fibonacci sequence, of 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144... this spiral links to the M in S.T.E.A.M. The Fibonacci sequence is each number in the sequence is the sum of the previous two numbers. Interesting sunflowers follow this math pattern in nature. I also want to link back to Vincent Van Gogh's obsessions with spirals. At this point in 1888 his spirals are again in his artworks titled *Sunflowers* as well.

Instructional Strategies and Lesson Plans

Each lesson is designed for a forty minute to an hour and a half studio art class. For some lessons, you may find forty minutes is not enough time due to student engagement or clean up delays. For other lessons, you might find your students ready to move on; see lesson seven, which includes multiple back-up plans with language arts assignment, black-out poem, etc.

Lesson one

Students are asked where do we visually see Spirals in Nature naturally?

We have an in class discussion reviewing what students together found about spirals. Students view teacher google slideshow on spirals. I want students to come to the whiteboard screen to find with their own hands the spirals that art contains in a few paintings featured on the smartboard. Vangogh in his *Starry night* painting for example. Print out pages from the *Swirl by Swirl Spirals in Nature* spiral book for students to “eye spy” in small groups. Students have a scavenger hunt where they find evidence of spirals in nature.

Lesson two

Students will learn how to make a google slideshow (inserts, colors, etc.). Students will research Spirals online and create Google Slide shows of their own research findings. Students in small groups will discuss Spiral findings from google slideshow examples and students will use their self direction for their own created slideshow. Students peer share 5-10 minutes about Spirals in Science, Technology, Engineering, Art, and Math. Students will peer share their brainstormed ideas that they are considering.

Lesson three

Students will participate in a “sit spot” activity; this experience will be a final attempt to assist a student who is still struggling to “spy” their own spiral to independently work on. I will create a “sit spot” experience for the students with either a walk outside to find a pleasing “sit spot” or virtually to support the mindful practice of observation with virtual ‘sit spot’. To see patterns and increase observational skills that is my goal during “sit spot”.

Lesson four

Students engage collaboratively in creating an art-making google slide show experience in response to an artistic problem -finding spirals in the world. Students will be able to apply their knowledge of spirals by creating a google slideshow. Students will comprehend that google slides need to be pleasing to the eye since strong aesthetics then creates interest and keeps the attention and focus for the viewer. Students will consider the elements and principles of Art.

Students begin creating spiral google slide shows and spiral composition in class. Slide shows can be done at home for homework as well or in class if they need an art creation break. Students create their own artistic google slideshow. I want the focus group of 5-8 grade students to consider graphic design tips, measurement and having things aligned properly in google slideshow. I want students to be aware of alignment. Alignment ensures an ordered appearance for graphically more pleasing designs. Center, right, or left-aligned text is the most common form of alignment, but you can also go for asymmetrical balance as well.

Lesson five

Students review elements of design as the fundamental aspects of any visual design, focusing on math principles as well as including shape, space, form, and value. Students will review the elements and principles of art, specifically line, spirals, balance, rhythm, pattern, emphasis, contrast, unity and movement. Students take a pretest on prior knowledge of what are lines? Students draw lines on the *A line Can Be a worksheet* (see worksheet in teaching materials). An introduction to creating visual lines as well as the exploration of oil pastel activities will occur using the *A line Can be worksheet*. Today is an oil pastel day of experiencing the material,

Stations are set up for students to experiment with different ways to create colors, layering, line, etc with oil pastel. I will also show how to use oil pastels in a video in the teachers websites section. Students experiment with spirals and oil pastels. Students create contour line drawing/outline of spiral and then using at least three examples of oil pastels to create balance, smudging, layering, color mixing. Students will be able to use oil pastel to smudge and mix color to create a variety of details on their spiral composition and sharing with peers. Some students will begin final spiral composition.

Lesson six

Students combine ideas to generate innovative ideas for art-making after gathering information on spirals. Students get inspired to create their own spiral composition through the study of selected artists: Robert Smithson, Vincent VanGogh, Louise Bourgeois, Katsushika Hokushika and Leonardo Da Vinci. Students review composition principles of art balance, rhythm, pattern, emphasis, contrast, unity and movement before they start sketching or rough draft drawing of spiral composition. Students fall in love with working independently both on oil pastel composition and on google slideshow. Students create an art piece to support their chosen direction of their Spiral choice.

Lesson seven

Student peer “share outs” with peer critique to see what needs work. Finishing touches are to be done both with google slide and with spiral oil composition. Students will participate in creative writings, poetry, blackout poems and spiral shape poems as a pause project or in case some students finish anything early. Students will present Google Slideshows.

Students grade themselves using a rubric and they decide if they need to edit/revise their work.

Unit Rubric Summative Assessment: Rubric of spirals. Closure, post test, feedback, display student work, google slide oral presentations, public speaking.

Other Possible Differentiation/Modification: Flexibility with timelines, provide for artistic choices, utilize google slide show and peer shares/collaborations.

Formative Assessments:

It is very important when assessing the students that the whole child is considered, not just the final spiral product or final google slideshow. The teacher observes all the students throughout all seven lessons. The teacher can assess the individual with the support of pretest spiral and the post test to assess the spiral findings. I encourage student class participation, student responsibility, student clean up, and student individual oral assessments be considered. It is very important to listen to student responses to spirals, especially after viewing google slideshows. Student response to spirals in oil pastel compositions, smudging, layering, and color mixing is just one aspect.

Learning Objectives

Students will gain knowledge of content, methods, practices and life skills:

1. Students will have an increased awareness of the spirals all around us.
2. Students will see how spirals are found in art as well as in nature.
3. Students will collaborate and generate ideas of what spiral direction they are considering.
4. Students will gain spiral vocabulary as well as the knowledge that spirals are everywhere!
5. Students will see how the spiral is used in Art.
6. Through art-making, artists make meaning by investigating and developing awareness of perceptions, knowledge, experiences.
7. Students will demonstrate responding skills by providing authentic evidence of spirals in a selected work of art.
8. Students will be able to identify spirals in nature and lines in nature. Students will be able to distinguish between different types of spirals in nature. Students will observe how spirals are everywhere- they are all around us. Students will increase awareness in lines around them.
9. Creativity and innovative thinking are essential life skills that can be developed.
10. Artists and designers develop excellence through research, practice, constructive critique, reflecting on, revising, refining work over time, and oral critiques.
11. Individual aesthetic and empathetic awareness will be developed through spiral line engagement with art that can lead to understanding and appreciation of self, others, the natural world, and constructed environments.
12. Students will be able to integrate visual spiral lines into their oil pastel compositions.
13. Students learn or navigate online themselves through their own learning of spirals.
14. Students gain critical thinking skills in creating google slide presentations.
15. Students identify and demonstrate diverse methods of artistic investigation to choose an approach for beginning a spiral work of art.

16. Students engage collaboratively in creating an art-making google slide show experience in response to an artistic problem --finding spirals in nature.

Conclusion

The mixed age group middle school students will be taking a deep dive into Spirals. This process will give them great comprehension of how artists brainstorm, research, sketch, edit ideas, and design in order to participate in the art process. Students will see first hand that art making is not just placing lines, colors, shapes, and art materials together; it is a deep reflection process and response process to something else. Students will see that their spiral is connecting to something deeper than what is present on the page. This spiral art unit is an introductory art unit revealing the design art process so students will see through their own trial and errors that rarely is art created for no intended purpose.

I want to close this unit with two personal shares. One regards my son's 10-year-old friend who drowned in a culvert drain due to the fiery spiral waters sucking through the drain. I want students to be mindful that in the summer we all need to be very wise because secret whirlpools can pop up out of the blue after fast summer storms and undertow exists too. I want students to feel the beauty in spirals everywhere while also knowing how spirals can be deadly, especially tornadoes.

I also want to share my art series that I made called the *Manhole Series* which is currently on display at Branford Arts and Cultural Alliance, BACA in Branford. This Manhole series is a visual invitation into the inspection chamber, which is a small covered opening in the floor, pavement, or other surface that allows a person to enter. This is a special opening into a city street leading to the sewer line. While this is not a spiral it is a single pipe that transports all from inside your home to the main that's underneath the street. If you follow the vertical hole in the ground to the underground sewer pipeline you could see if there is any leakage or blockage in the underground sewer pipeline—much gratitude exists for the “the sanitary worker” who goes down for cleaning or tending to any repairs. I want the students to gain that art often allows another perspective and while it is not a spiral on the surface the water spirals within the pipe slush underground.

Appendix on Implementing District Standards and State Art Standards

Science:

K-LS1-1 Cross cutting concepts

HS-LS4-1 Patterns

Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.

Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.

Technology:

1.4 Innovative Designer

Students use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions

1.6 Creative Communicator

Students communicate clearly and express themselves creatively for a variety of purposes using the platforms, tools, styles, formats and digital media appropriate to their goals.

Art:

VA: Cr1 Generate and conceptualize artistic ideas and work.

VA:Cr1.1.2 Brainstorm collaboratively multiple approaches to an art or design problem.

VA:Cr3.1.2 Discuss and reflect with peers about choices made in creating artwork.

VACr3 Refine and Complete artistic work

VA:Re7.1.2 Perceive and describe aesthetic characteristics of one's natural world and constructed environments.

VA:Cr1.1.4a Students brainstorm multiple approaches or directions to a creative slideshow art or design problem-

VA:Cr1.1.3a Students Elaborate on an imaginative idea.

VA:Cr1.2.2a Students make art or design with various materials and tools to explore personal interests, questions, and curiosity with spirals-

VA:Cr2.3.7a Students apply visual organizational strategies to design and produce a work of art, design, or media that clearly communicates information or ideas-

VA:Cr3.1.7a Students participate in a brief oral critique as a verbal artist statement "walking" me through their research and design art process. Reflect on and explain important information about personal artwork in an artist statement or another format.

VA:Cr2.1.8a Students demonstrate willingness to experiment, innovate, and take risks to pursue ideas, forms, and meanings that emerge in the process of artmaking or designing-

Math:

CCSS.MATH.CONTENT.6.EE.B.7

Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p , q and x are all nonnegative rational numbers. (Fibonacci spiral and golden ratio spiral)

CCSS.MATH.CONTENT.6.EE.B.6

Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.

Resources

Videos, teacher example spiral slideshow, Websites:

Robert Smithson = <https://www.youtube.com/watch?v=v-N3vbH52bQ>

Vincent Vangogh = <https://www.vincentvangogh.org/starry-night.jsp>

Louise Bourgeois = <https://www.tate.org.uk/art/artists/louise-bourgeois-2351>

Katsushika Hokusai = <https://www.youtube.com/watch?v=8z9zRbwh43I>

Leonardo Da Vinci = <https://www.youtube.com/watch?v=jxKYFBtdsqU>

Swirl by Swirl Spirals in Nature by Joyce Sidman pictures by Beth Krommes = https://www.google.com/search?gs_ssp=ejzj4tFP1zc0SioyMs9NNzZg9FloLs8sylFlqoQyigsyixJzihUy8xTyEktKi1IBdDQXw&q=swirl+by+swirl+spirals+in+nature&oq=swirl+by+swirl&aqs=chrome..69i57j46i512j0i512i3j69i64i3.8947j0j7&sourceid=chrome&ie=UTF-8&safe=active&ssui=on

How to draw a fibonacci spiral = https://www.google.com/search?q=how+to+draw+a+spiral+composition&oq=how+to+draw+a+spiral+composition&aqs=chrome..69i57j69i64i2.11554j0j7&sourceid=chrome&ie=UTF-8&safe=active&ssui=on#kpvallbx=__FGzYtyIKcLYptQP8aW2qAl42

How to use oil pastels = <https://www.youtube.com/watch?v=jm6wo-8rJD0>

Understanding different types of spirals = <https://www.youtube.com/watch?v=ewLFSlyBjK0>

Sit spot activity = <https://www.youtube.com/watch?v=DIL4wxaEiPs>

Teacher created google slideshow = https://docs.google.com/presentation/d/1q0Z2EBWtP-OHCAP4uD_9xJuVtoNT3ac7Ke37XW1nn1o/edit#slide=id.g11f992eeec0_0_3

8 basic design principles = <https://www.adobe.com/express/learn/blog/8-basic-design-principles-to-help-you-create-better-graphics>

Double Helix = <https://www.google.com/search?q=dna+spiral&oq=dna+spiral&aqs=chrome..69i57j0i512i6j0i22i30i3.5214j0j7&sourceid=chrome&ie=UTF-8>

Rabbits fibonacci =

<https://www.google.com/search?q=bunnies+in+fibonacci&aq=chrome..69i57j33i160l4.6547j0j7&sourceid=chrome&ie=UTF-8>

Galaxies =

<https://www.google.com/search?q=galaxies+spiral&aq=chrome.2.69i57j0i15i22i30j0i22i30l4j0i390.9539j0j7&sourceid=chrome&ie=UTF-8>

<https://www.google.com/search?q=spirals+vangogh&aq=chrome..69i57j0i8i13i30j0i390l4.6080j0j7&sourceid=chrome&ie=UTF-8>

Teacher googlespiral slide show =

https://docs.google.com/presentation/d/1q0Z2EBWtP-OHC4p4uD_9xJuVtoNT3ac7Ke37XW1nn1o/edit#slide=id.p

Vine tendrils

<https://www.google.com/search?q=vine+tendrils+spirals&aq=chrome..69i57j33i10i160l2.8865j0j7&sourceid=chrome&ie=UTF-8>

Readings for students and teachers

Arthur, Alex. *Shell : Eyewitness Books* . New York: Doris Kindersley Publishing, 2013. This book looks at the amazing world of shells and the complex and beautiful world of these creatures.

Cook, Theodore Andrea. *The curves of Life*. New York: Dover Publications, 1979. Discovering the Curves of Sea shells.

Cosgrove, Brian. *Weather: Eyewitness Books*. New York: Alfred A. Knopf, 1991. Discover the World's Weather - Why it Rains, How Clouds Form, and Where you Might See a Tornado.

Dance, S. Peter *Shells: The Visual Guide to More Than 500 Species of Shells from Around the World*. New York: Doris Kindersley Publishing, 1992.

Faust, Barbara. *Smithsonian Flora: Inside the Secret World of Plants*. London: DK/ Penguin Random House, 2018. Flora unveils the exquisite beauty, diversity, and purpose of every type of plant, from the root to tip.

Israel, Nico. *Spirals : The Whirled Image in Twentieth- Century Literature and Art*. New York: Columbia University Press, 2015. Nico Israel argues that spirals illuminate the torsions of history and geopolitics with modernity.

Packham, Chris. *Smithsonian Zoology: Inside the Secret World of Animals*. London: DK/ Penguin Random House, 2019. Zoology Reveals the Incredible Anatomy, Behavior and Beauty of Every Type of Creature, from Hair to Scale, Whisker to Tail.

Sidman, Joyce. *Swirl by Swirl : Spirals in Nature*. New York : Houghton Mifflin Harcourt Publishing, 2011.

Children's picture book about Spirals in Nature.

Teaching Materials/ Worksheets / Handouts/ Vocabulary -below

Vocabulary

Line- a long, narrow mark or band.

Spiral -winding in a continuous and gradually widening (or tightening) curve, either around a central point on a flat plane or about an axis so as to form a spiral

Fibonacci spiral- a set of numbers that starts with a one or a zero, followed by a one, and proceeds based on the rule that each number

Logarithmic spiral-a spiral curve such that radii drawn from its pole or eye at equal angles with each other are in continual proportion.

Eye spy - I spy with my little eye something that has a spiral in it- an observer finds patterns in nature..

Natural spirals - The physical world and everything in it (such as plants, animals, mountains, oceans, stars, etc.) that is not made by people can include spirals. examples : Snail, shells, flower petals, pine cones, snakes, storms, DNA, curly hair, even galaxies.

Sit spot -A sit spot is simply a favorite place in nature (or looking out a window at nature) that is visited regularly to cultivate awareness, expand senses and study patterns of local plants, birds, trees, and animals. The practice supports mindfulness, builds routine and increases

Name: _____
 grade: _____
 Date: _____

Grade Level:
 Unit: Spiral

Spiral Rubric

	Not Yet 1 Point	Emerging 2 Point	On Target 3 Points	Exceeds Expectations 4 Points
Respond Students will be able to define line and spirals as well as identify examples of each in Nature. (pre/post assessment)	Student is not able to identify examples of line and visual spiral *0-4 correct on pre/post assessment	Student can identify - at least one spiral in nature and *5-9 were correct on pre/post assessment	Student is able to identify 5 or more examples of spirals in the world and are able to identify the terms. *10-13 correct on pre/post assessment	Student is able to identify 7 or more examples of spirals in the world and are able to identify the terms. *10-13 correct on pre/post assessment

Create Students will be able to apply their knowledge of visual spirals when they create a spiral composition	Student created a spiral google slide show based on showing 0-1 examples of visual spirals	Student created a spiral google slide show based on showing 1-2 examples of visual spirals	Student created a google slide show of at least 2 slides and used at least 2 visuals and no link to show their selected spiral.	Student created a google slide show of at least 3 slides and used at least 3 visuals and one link to depict their selected spiral.
Create Students will be able to demonstrate their knowledge of spiral by creating a google slide show Students will be able to demonstrate presenting skills oral presentation of google slide	Student did not yet consider the edges of the page when designing and creating their oil pastel spiral composition.	Student considered 2 edges of the page when designing and creating their oil pastel spiral composition.	Student considered 3 edges of the full page when designing and creating their oil pastel spiral composition.	Student considered all four edges of the full page when designing and creating their oil pastel spiral composition.
Create Students will be able to use elements and principles of design when creating their own spiral creation.	The student is still trying to create a composition.	The student created a composition of a spiral and is still considering what direction to research.	student created a composition of a spiral in a differing direction of the researched area of spirals.	Student created a composition that depicts exactly their selected researched area of spirals.
Respond Students will use oil pastels in a painterly manner using layering, smudging and color mixing techniques	Student created a spiral composition using another media. (unless student has sensory issues)	Student created a spiral composition using at least one different oil pastel technique: smudging, layering, scratching and color mixing with the oil pastels.	Student created a spiral composition using at least two different oil pastel techniques: smudging, layering, scratching and color mixing with the oil pastels.	Student created a spiral composition using at least three different oil pastel techniques: smudging, layering, scratching and color mixing with the oil pastels.

NAME

GRADE

DATE

A LINE CAN BEworksheet

TEACHER EXAMPLE a line can be dotted -----

1. A LINE CAN BE _____
2. A LINE CAN BE _____

3. ___ A LINE CAN BE _____
4. ___ A LINE CAN BE _____
5. ___ A LINE CAN BE _____
6. ___ A LINE CAN BE _____
7. ___ A LINE CAN BE _____
8. ___ A LINE CAN BE _____
9. ___ A LINE CAN BE _____
10. ___ A LINE CAN BE _____

Each line is worth 1 point - you got this!!!!

In the space below and on the back on this sheet create sketch for your spiral composition :

___ Grade spiral Unit Pre/Post Assessment

Name: _____ Date: _____

Directions: Define each word the best you can and give an example of how it is used in art. Each question is worth 1 point.

1. What is a line?

2. Please show at least 6 different ways A line can be?

3. What is a spiral ?

4. How or where can spirals be found in nature list ways ?

5. What is an example of a visual spiral movement in art ?

6. What is an example of someone having spiraling thoughts?

7. How can the word spiral be used when thinking about weather?

8. Where are spirals found in or under the water?

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