Blue Swallow Farm Foundation

LESSON PLAN

Title:	Patterns in Nature
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Grade:	1-3	Subject:	Literacy, Science, Math, Art	Time:	60 min.

Background Information and Student's Prior Knowledge

This lesson is intended to help students transfer their knowledge of patterns recognize patterns in nature and begin to see the interconnectedness of living things and think more critically about the role they play in the environment. Students should have prior knowledge and mastery of simple repeating and growing patterns in math as a foundation for the more abstract concept of repeating and growing patterns in nature. Students may have prior knowledge of observing specimens and using a nature journal.

This lesson can be completed as a 60 min. lesson with follow-up work for the remainder of the week, or two 30-min. lessons over 2 days with follow-up work for the remainder of the week.

Standards: Next Generation Science Standards

1.A.2.a. Represent and analyze growing patterns using symbols, shapes, designs, or pictures (Assessment limit: Start at the beginning, show at least 3 levels but no more than 5 levels, and ask for the next level).

1.A.2.b. Represent and analyze repeating patterns using symbols, shapes, designs, or pictures (Assessment limit: Use no more than 4 objects in the core of the pattern).

Essential Questions

What purpose do spirals in nature and other patterns serve?

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Learning Objectives

Students will identify spiral patterns and their purposes.
Students will apply their knowledge of numerical repeating and growing patterns to repeating and growing patterns in nature.
Students will observe and illustrate specimens and draw conclusions about the purpose their patterns serve.

Supporting Materials and Resources

- Sidman, J. (2018). *Swirl by swirl: Spirals in nature*. Houghton Mifflin Harcourt.
- or video of book: https://www.youtube.com/watch?v=oX3zsTYTn5Y
- Rubric (included with lesson plan)
- Nature journals
- Pencils
- Ruler (students can measure the specimen or use it to determine if something is a growing pattern
- Magnifying glasses

Vocabulary

- Specimen – something you collect for observation.
- Repeating pattern – a pattern where elements repeat again and again.
- Growing pattern – a pattern where elements expand as they progress or get bigger.
- Spiral – a curving line that begins at the center and grows as it moves outward.
- Adaptation – a change that an organism goes through to help it better function in its environment.
- Protection – a defense an organism develops to survive.
- Spatial organization – the way something is arranged to fit in a space.
- Movement-change of place or position

Safety Considerations

- Canvas the area in advance to be sure there are no risks such as poisonous plants, needles, etc.
- Backpack with first aid for taking students outside.
- Consider having a supporting staff member for extra eyes/hands.
- Consider if any students might attempt to leave the designated area. Provide additional support.

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	TEACHER	STUDENT
Lesson delivery (5Es model) • ENGAGEMENT • EXPLORATION • EXPLANATION • ELABORATION • EVALUATION	**Engagement (20 min.):** The teacher will present specimens to students in the classroom environment which contain spiral patterns. Some examples of specimens are a sunflower, snail shell, fiddlehead, pinecone, spiderweb preserved on paper, and images of a tornado and galaxy. The teacher will then write student observations on the board using a Notice/Wonder chart. **Exploration (30 min.):** The teacher will read "Swirl by Swirl" or play it (video provided). Teacher will then take students outside to explore, providing them with supplies for nature journaling such as journal, pencil, ruler, magnifying glass, and clipboard. **Explanation (10 min.):** Teacher determines if they would like to remain outside or return inside. Teacher facilitates group discussion about findings and then asks the question, ""What purpose do spirals in nature and other patterns serve?" The teacher will then read the information at the back of *Swirl by Swirl* and ask the students again what the purpose of spirals are.	**Engagement (20 min.):** In groups, students will examine natural specimens containing spiral patterns, without having been told about the patterns. Students will make observations and inquire about the specimens using a "I Notice, I Wonder" chart as a class. **Exploration (30 min.):** After reading the book *Swirl by Swirl* and identifying the spiral pattern, as well as repeating and growing patterns, students will go outside and discover more patterns in nature. In their nature journal they will draw what they see and identify it as repeating or growing. For example, tree bark repeats and the veins on a leaf may grow. **Explanation (10 min.):** Upon meeting together outside or back inside, students will explain what specimens they identified and what patterns they noticed. Students will then answer, "What purpose do spirals in nature and other patterns serve?" Students can draw conclusions based on their observations. After reading, students will infer the purposes of spirals.

	Elaboration (2-3 days following): The teacher will instruct students on the art project that follows, explaining each necessary element and presenting the rubric. The teacher will spend a few minutes with students looking at the style of Beth Krommes' art (illustrator of *Swirl by Swirl*). **Evaluate:** The teacher will evaluate student understanding using the rubric for four elements: specimen, pattern identification, purpose of pattern, and creativity.	**Elaboration (2-3 days following):** Students will choose one specimen that was collected or provided for observation (There should be many options available of each type of pattern.). They will determine if it has a repeating or growing pattern and the purpose it serves – is it for protection, an adaptation, spatial organization, or power (ex. tornado)? Students will design and illustrate a drawing of the specimen in the style of the illustrator Beth Krommes. **Evaluate:** Students will present their work in a gallery walk. They should have a description under their piece explaining the pattern and purpose, as well as artistic elements from the story such as cross hatching. Students will be assessed on their final piece using a rubric. They can fill out graphic organizers to document each other's work during the walk or just enjoy and give positive feedback. "I like the way ____ used crosshatching on the ____."

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Formative and Summative Assessments

Formative: Pre-assessment on mathematical patterns
Notice/Wonder
Nature journal
Discussion

Summative: Artwork and Gallery Walk Rubric

Suggested accommodations for special education/504 students

1:1 support if needed
List of vocabulary words and/or word bank with photo examples
Choice of a few specimens to study, pre-selected
Checklist of tasks for each phase of the lesson with or without pictures
Sentence stems for discussion
Extra wait time for discussion

Suggested accommodations for English language learners

List of vocabulary words and/or word bank with photo examples (native language to English translation if needed)
Checklist of tasks for each phase of the lesson with or without pictures
Sentence stems for discussion
Extra wait time for discussion

Suggested accommodations for highly able/gifted and talented students

Additional report with artwork
Support with additional resources/books to further knowledge on patterns and adaptations
Project-based learning opportunities for extension

References

Merriam-Webster, Incorporated (2023). https://www.merriam-webster.com

Sidman, J. (2018). *Swirl by swirl: Spirals in nature*. Houghton Mifflin Harcourt.