

Title: Concept Development Unit: **Growing and Repeating Patterns through Manipulatives - *Cuisen-Art***

Brief Overview:

This unit is designed to help students develop pattern recognition and comprehension skills across a broad range of applications. After exploring, identifying and creating a variety of patterns with Cuisenaire® rods, each student will create an individual mosaic displaying growing or repeating patterns.

NCTM Content Standard

Algebra: understand patterns, relations and functions

Grade/Level:

Grades two and three

Duration/Length:

Approximately four one-hour sessions

Prerequisite Knowledge:

Students should have working knowledge of the concepts of growing and repeating patterns.

Student Outcomes:

- Students will identify, describe, extend and create repeating and growing patterns.
- Students will use pattern recognition as a tool for conceptualization and prediction strategies.
- Students will analyze change as an aspect of patterning.
- Students will represent and analyze repeating and growing patterns using symbols, shapes, designs or pictures.
- Students will algebraically represent, model, analyze, or solve mathematical or real-world problems involving patterns

Materials and Resources:

- Cuisenaire® colored rods
- Teacher resource pages

- Paper/pencil
- Xylophones, mallets, drums, and other musical instruments
- Art prints
- Video recorder
- Glue
- Scissors
- Pebbles
- Markers
- Colored tiles
- Buttons, shells, beads, etc.
- Cardboard
- Wire
- Paint
- KWL chart

Development/Procedures:

Lesson 1 — Introduction to Patterns

(allow one to two days)

Pre-assessment — Facilitate students' prior knowledge of growing and repeating patterns by completing a KWL chart. Discuss examples of patterns in other media (e.g. art, music, speech, food, sports, and video games).

Launch —

- Position students in a circle.
- Introduce and model a rhythm pattern name game.
- Begin clapping with students to maintain a steady beat.
- Student will say his/her name within four beats.
- Students may choose to spread out his/her name over the four beats or make it quick, using only one, two or three beats.
- The student's name becomes the rhythm. After each student says his/her name, the class repeats the rhythm pattern and the next student begins. The beat should remain constant.

Teacher Facilitation —Discuss how different forms of art can not only enhance the beauty of the environment in our classroom, but can also help us prepare our minds for learning. Ask for student's feedback regarding the subject matter of mosaics. What is a mosaic? Where do we find them? Why do people create them? Show pictures of mosaics around the world.

Define repeating and growing patterns and provide examples of readily recognizable patterns familiar to the students, such as natural growth (plants), textiles, building finishes or music. Display the art prints for students to view. Select one print for class

to observe and ask each student to identify any patterns in the print and to determine the type of growing or repeating pattern. Students can select an art print to describe, analyze and identify patterns in the print. Students will share their observations in a class discussion.

Student Application —

- Give students Cuisenaire® rods.
- Ask students to create a repeating pattern using the rods.
- Students will identify the core of the pattern and its terms.
- Students will name and describe their pattern.
- Then ask a partner or peer to extend another's repeating pattern.
- Students will share and record cores for patterns on the board or on chart paper (ABC, AAB, AB, AABC). Students will challenge themselves to create another repeating pattern that is not listed on the chart.
- Students will name, describe, and identify its core and terms.
- Choose another student to extend this pattern.
- Students will share and add cores for the patterns on the chart.
- Students will record the patterns on paper for future use.

Embedded Assessment- Complete teacher checklist (Teacher Resource Sheet 1).

Reteaching/ Extension — For homework, the students will identify and draw repeating patterns outside of school.

Lesson 2-

Pre-assessment- Show examples and non-examples of repeating patterns. Students will respond showing yes or no by raising hands or nodding.

Launch — Students will continue the name rhythm pattern game, clapping the beat and saying their names in rhythm. Students will repeat each name and its rhythm while maintaining the beat. Encourage students to say their names in different ways from the day before.

Teacher Facilitation- Show an art print with a growing pattern. Review the concept of growing patterns. Resources for finding growing and repeating patterns in art can be found at the following websites:

- www.ArtByMath.com
- www.Artseek.com

Student Application-

- Students will construct a growing pattern using the Cuisenaire® rods.
- Another student will extend that pattern and describe it.
- Students will create a pictorial representation of his/her own pattern and name it.
- Create yet another growing pattern.
- Another student will extend that pattern.

Embedded Assessment — Students will complete (Student Resource Sheet 1) a brief constructed response, demonstrating their understanding of repeating and growing patterns.

Lesson 3 —

Pre-assessment — Complete (Student Resource Sheet 2) to show your understanding of the concepts presented thus far.

Launch — Students will continue the name rhythm pattern game, clapping the beat and saying their names in rhythm. Students will repeat each name and its rhythm while maintaining the beat. Encourage students to say their names in different ways from the day before.

Teacher Facilitation — Discuss activities and exercises from previous day. Refer to KWL chart. Review and add new information. Be sure to include key vocabulary. (core, terms, symbolic, represent, repeating, growing, pattern)

Student Application –

- Present an art print showing an example of a repeating pattern and ask students to identify its core and its terms. (Refer to art websites for examples).
- Write the core of the pattern on the board.
- While carefully observing the pattern in the print, teacher will encourage students to represent that pattern in a different way. For example, if the print shows a bridge with varying lengths of planks displaying an **ABBA** pattern, students may choose to represent the pattern with sounds.
- **A** represents a shorter sound, while **B** is represented by a longer sound because the **B** planks are of greater length. Another student may choose to use movement to represent the core, a clap to represent the **A** and a circular arm movement to represent the **B**. Similarly, the terms of the pattern illustrate a shorter more staccato representation for **A** and a longer more legato representation for **B** as this directly relates to the planks on the bridge in the art print. (The musical term staccato refers to notes that are played in a short and detached style. The musical term legato refers to notes that are smooth, longer and drawn out.)

Encourage students to represent the **ABBA** pattern relating to the art print. Using xylophones and mallets or any object that can be used to make sound, students will work

as partners to create and represent the bridge pattern using the **ABBA** core as described above. Upon agreement of the pattern composition, students will play their compositions for the rest of the class.

Students will write to explain the connection between the actual pattern in the art print and the musical representation on the xylophone.

Present another art print showing an example of a growing pattern and ask students to represent this pattern using music, movement or some other medium. Students will work as partners to complete this task. When all partners are satisfied with their compositions, they will perform for the group. Students will discuss representations of the growing pattern.

How were the representations different?

How did you feel as you were composing?

How did you and your partner agree on the final composition?

Did you have any problems as you were collaborating? Explain.

Students will then represent their growing pattern visually on paper.

Individual students will select one of their two patterns, growing or repeating, constructed in the previous lesson. Each pattern should already be recorded on paper.

Using xylophones, drums, triangles, assorted musical instruments or movement, students will compose their representation of the visual pattern. Students will perform for the class and discuss correlations between the visual representation and the musical/movement representation.

Embedded Assessment- Record all representations on a video recorder for students to critique their own work and the work of their peers. Students will discuss what makes it good and what could make it better, always referring to the understanding of patterns and how the actual visual pattern representation and musical/movement representation are directly connected.

Reteaching/ Extension — For homework, send home a visual pattern from the original student compositions, growing and repeating, and ask students to represent the pattern in a different way, explaining how the two are directly related.

Lesson 4 —

Pre-assessment — Share and explain homework assignment from the night before. Each student should be able to describe how the homework representation shows the visual representation given by the teacher.

Launch — Once again, play the name rhythm pattern game, encouraging the students to challenge themselves to say their names in a way no one else has before. They should be very comfortable with this game and want to take risks.

Teacher Facilitation —

- Now that students are familiar with growing patterns, repeating patterns and the vocabulary, they are ready to extend their knowledge base and challenge their own thinking to produce an original piece of art, a mosaic to represent their understanding of patterning.
- Set out stones, beads, buttons, shells, tiles and assorted objects used in creating a mosaic and distribute cardboard squares to all students.

Student Application —

- Students will paint individual pieces of cardboard with tempera paint.
- While the paint is drying, students can use other materials to recreate the pattern they have identified, drawn, and represented in music or movement.
- Students will first create the pattern on the floor or on a desk/table and then transfer the pattern to the cardboard.
- Glue mosaic pieces to cardboard.
- Students will observe and write about their mosaic in journals or on notebook paper.
- Encourage students to write about the process of creating the mosaic as well as the actual piece of art work.
- The next day students will share and talk about their mosaic patterns. Students will put their mosaics together using wire and hang the group mosaic in the classroom for display.

Embedded Assessment — Students will answer questions to demonstrate understanding of the concepts of growing and repeating patterns and to show their thinking while working through the process of creating an original artwork.

1. Identify similar patterns in the mosaics.
2. What problems did you have while working through this process?
3. What did you learn from this experience?
4. How can you tell you were successful in creating your mosaic?
5. Identify growing patterns.
6. Identify repeating patterns. Name the core and terms.

7. Look at the mosaic from different perspectives. Stand in different places in the room. Discuss what you notice.

Summative Assessment: Students will complete (Student Resource Sheet 3).

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Pattern Assessment

Part A

Draw a repeating pattern.

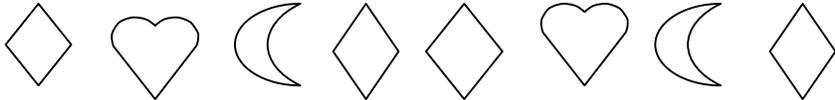
Draw a growing pattern.

Part B

Use what you know about growing and repeating patterns to explain how y patterns grow and repeat. Explain the basic pattern components.

Pre-assessment

Extend the pattern by drawing the next two terms in the pattern:



Extend the g-r-o-w-i-n-g..... pattern by two terms.



Summative Assessment

Part A

What is the difference between a growing and repeating pattern? Explain and draw an example.

Part B

Use what you know about patterns to justify why your answer is correct.
