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Grade Level: 2	Author Contact: hcyw@stu.ca , hdgxz@stu.ca , hdfbm@stu.ca , hcxvl@stu.ca
Time Required: 30 minutes	Instructional Groupings: Class divided in three sections
Outcomes and Standards NCTM Content Standards: Algebra Process Standards: Be able to sort, classify, and order objects by size, number, and other properties; recognize, describe, and extend patterns such as sequences of sounds and shapes or simple numeric patterns and translate from one representation to another and analyze how both repeating and growing patterns are generated.	
NB Mathematics Curriculum Grade Two GCO: Patterns and Relations (PR): Use patterns to describe the world and solve problems SCO: PR1: Demonstrate an understanding of repeating patterns (three to five elements): by <ul style="list-style-type: none"> • describing • extending • comparing • creating patterns using manipulatives, diagrams, sounds and actions (numbers to 100) [C, CN, PS, R, V, ME]	
Overview This lesson is designed to get the students actively involved in learning about patterns. Starting with a kinesthetic activity as a review and some hands on activities this lesson has been created to reach the diverse learning needs of a wide range of students.	
Purpose / Objective The purpose of this lesson is for all students to be able to recognize, identify and complete a pattern.	
Materials & Preparation <ul style="list-style-type: none"> • Manipulatives • Smartboard • 3 Activity sheets (1 for each tier) • Journal Sheets • Whiteboard and Whiteboard Markers 	

Differentiation Strategies

- The process and content of this lesson will be differentiated by applying a tiered lesson approach. The warm-up will encompass the entire class but then the class will be divided into three working groups. Each group will be created based on the educational needs of the students. These groups will be predetermined based on a pre- assessment from the previous day's lessons and journal entries on patterns. The first tier will work at the most basic level by applying what the class has been learning- this group is made up to the lower performing students. Tier II includes the students who are performing at grade-level; they are working towards achieving the curriculum goal. The final tier includes the higher achieving/enriched students in the class.
- The students working in Tier I are encouraged to work in pairs. Students in other tiers are also encouraged to collaborate with each other and help each other work through problems.
- The activity sheets for the first tier provide prompts for the responses.
- Students in all Tiers will keep a Math journal to record what they have learned, an example of it, and how they feel about it.
- This lesson will appeal to a variety of different learning styles. Visual learners will be able to see the patterns they create, and then draw it on the paper. With the use of manipulatives, the opening active exercise, and exploring around the school, there are activities for the bodily-kinesthetic learners. With activities that involve students both working by themselves or in pairs, interpersonal and intrapersonal intelligences will feel comfortable with the lesson. By completing incomplete patterns, logical-mathematical learners will be challenged to analyze and solve the problems on the activity sheet. Students more inclined to a naturalist intelligence will appreciate the patterns found in nature, and those in the third tier can even go outside the school to find their patterns.
- The product of this lesson is also differentiated because students in the Tier 1 group will only master describing and recognizing a pattern today, while some of their peers will be introduced to more complex concepts on this day.
- At the end of the lesson each tier will explain to their peers which aspect of patterns they worked on this day. This serves three purposes:
 1. Ensuring that students understood what they learned well enough to explain it.
 2. It allows those in the lower tiers to be introduced to the concepts that are coming and students will learn from their peers
 3. Another reason for the quick presentations at the end is to make all the students feel included. If someone is not comfortable presenting, just one person can present on behalf of the whole group, but everyone is encouraged to "show off" the patterns they created or discovered.

Grouping Strategies

- All students will complete the warm up activity together.
- The class will then be divided into 3 predetermined working groups.
- Students will reconvene at the end of the lesson to present what aspect of patterns they learned/worked on today.

Know-Understand-Do

- Students will know how to identify a simple pattern (ABAB, ABBABB etc).
- They will understand that a pattern is something that repeats (colour, shape, letter, number etc).
- All students will create (or find) a pattern.

Activities and Procedures (see Smartboard attachment for the lesson example)

Warm up: (Bodily Kinesthetic)

Full class activity

- Get students to form a line, letter them ABABAB...etc. until you reach the end of the line
- Have all of the A's do a Jumping Jack
- Have all of the B's spin in a circle
- Get students to go down the line saying what letter they are (no actions).
- Each student should say their letter and do the appropriate action (A's do Jumping Jacks, and B's spin in a circle)
- Once they return to their seats, ask students if they know what they just created. Most students should be able to recognize that they just created a pattern, like the ones they have been working on in class the last few days.
- Show students a few examples of patterns on the whiteboard/SmartBoard as a review of patterns and to get students of mindset of thinking about patterns.
 - Review with students that the activity they just did was creating a ABAB pattern. Show them different examples of ABCABC, ABBABB, AABAAB, etc. patterns on the SmartBoard and get them identify each pattern. After introducing each new sequence, have students create one in their notebooks following that sequence. Have one student volunteer to share their pattern with the class on the SmartBoard.

Tiered Lesson:

The class will then be divided into three groups. The groups will be predetermined by the teacher based on the students knowledge and understanding of patterns. Tier 1 will be made up of the students who are still struggling with the concept (they will review basic material), the Tier 2 group will include students who are meeting NCTM and curriculum standards, while Tier 3 will be designed for the advanced students who need a bit more of a challenge to meet their learning needs.

Tier 1 group (see Appendix A to view activity sheet)

- In order to practice recognizing patterns:
 - Students will be given an activity sheet with a series of patterns. They must identify why each questions is or is not a pattern (see activity sheet at the end of the lesson plan).
- To practice recognizing and creating patterns: (Bodily Kinesthetic, Spatial, Logical/ Mathematic)
 - Students will work with manipulatives to make their own patterns. Each student should have his or her own set of manipulatives to work with.
 - They should draw each pattern they create on a piece of paper. They may work in pairs for this activity. It is important that they colour each pattern they create.
 - Using 10 circular manipulatives (which are red on one side and white on the other), students will try to create as many different patterns as they can.
 - After creating as many patterns as they can with the manipulatives they will pair up with another individual or group to compare the patterns they discovered.
 - If students missed a pattern they should add it to their list.
- Students must now complete their journal entry for the day (Verbal Linguistic, Spatial). Please see 'Assessment' for more details. They should be able to describe that they made patterns, draw an example of one these patterns, and then circle the emotion that best describes how they are feeling with their understanding of the concept.
- They will place the journal sheet in their duotang
- Now the Tier 1 group must briefly discuss what they learned today (Interpersonal) so they can explain it to their classmates. They should be able to explain what a pattern is.

Tier 2 Group (see Appendix B to view activity sheet)

- To practice creating patterns: (Bodily Kinesthetic, Spatial, Interpersonal or Intrapersonal, Logical/Mathematic).
 - Using a multitude of manipulatives (such as 2-D shapes or interlocking cubes) students will create at least 2 different patterns individually or in pairs. For example they should not do two ABABABAB patterns. Each pattern should have at least 8 elements in it.
 - Students should draw their pattern on a sheet of paper.
 - Instruct students to share their patterns with the person next to them.
- To practice completing patterns, students will be given an activity sheet to continue a pattern that has been started, predicting the next three items that will come next^o in a given sequence. They are allowed to use manipulatives for assistance.
- Student must now complete their journal entry for the day (Verbal/Linguistic). They should be able to explain how they completed patterns. Please see 'Assessment' for more details.
- They will place the journal sheet in their duotang
- Now the Tier 2 group must briefly gather and discuss what they learned today so they can explain it to their classmates. They should be able to explain how to complete a pattern.

Tier 3 Group (See Appendix C to view activity sheet)

- To practice finding patterns: (Bodily Kinesthetic, Spatial, Logical/Mathematic, Interpersonal).
 - They will be given a double-sided activity sheet asking them to find patterns around the school. Only one pair of students will be doing this part of the activity at a time. When the first pair returns to the classroom, the next pair goes, and so on. Remind students of appropriate behaviour in the hallways and that are students in other classes working and cannot be disrupted. Monitor these students to make sure they are returning in a timely fashion and all pairs are getting a chance to go.
 - They will walk around the school in pairs looking for patterns
 - When they find a pattern they will copy it down onto their activity sheet
- To practice completing patterns
 - On the reverse of the activity sheet used for finding patterns they complete the pattern by drawing the missing parts
 - They are to look at the patterns and find out what is missing and fill it in
- Students will complete their journal entry (Verbal Linguistic, Spatial). Ask each student to fill out what they learned (how to locate patterns and complete

<p>patterns), draw an example of a pattern from the school, and how they feel about what they learned</p> <ul style="list-style-type: none"> • They will place the journal sheet into their journal duotang
<p>Follow up</p> <p>Ask for at least two volunteers from every group to show off what they did, to present on behalf of their group. Everyone is encouraged to present, but if someone is not comfortable with presenting, they will not be made to. Hopefully, as these students that are more hesitant to present watch as their peers show off their patterns, they will also want to take part, and show off they patterns that they created or found.</p>
<p>Post – Assessment (see Appendix D for journal template and example)</p> <p>The main assessment tool will be the math journals that students write in at the end of the lesson. These math journals include three main parts: “Today I learned...” “An example is...,” and “How I feel about this...”. In the first part students will describe what it is they learned, for example “Today I learned ... how to make patterns using shapes” or “Today I learned ... how to recognize patterns around my school.” In the second column students will draw an example of the pattern they made or found in the lesson. In the final column, students will describe how they feel with the concept they learned today: happy, confused, or don’t understand. These three emotions will be represented with three different smiley faces, so students that may have a hard time describing how they are feeling just have to circle which smiley face best represents their feelings about the day’s lesson. If students are feeling confused about something, bored with the activity, or completely lost, they may also add these comments here. These journals stay in the classroom, and should be read at the end of each lesson by the teacher in order to become aware of where each student stands in terms of understanding.</p> <p>Student activity sheets will also be collected and used to asses student understanding of concepts. Summative assessment comes from both the activity sheets and the journals. The student’s ability to complete the activities and ability to explain what they have learned in the journals will be used for evaluation. The formative assessment comes from the student’s representation of how they feel about what they have learned. It provides an understanding of where everyone is in the class, and it allows all students to undergo the same types of assessment.</p>
<p>Lesson Plan Assessment</p> <p>Questions to consider:</p> <ol style="list-style-type: none"> 1. Was our lesson plan effective? 2. Did students achieve outcomes? 3. What improvements can we make? 4. What should we take into consideration when making changes?

Resources

Dodge. J. (2005). *Differentiation in Action*. New York: Scholastic.

National Council of Teachers of Mathematics. (2012). *Algebra*. Retrieved from <http://www.nctm.org/standards/content.aspx?id=312>

New Brunswick Department of Education. (2008) *New Brunswick Grade 1 Mathematics Curriculum Guide* (Title Code: 844390). Retrieved from <https://portal.nbed.nb.ca/>

Wormeli. R. PowerPoint presentation in class.