

Patterns, Patterns Everywhere!!

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Background:

I am a Kindergarten teacher and have been teaching for 10 years. About three years ago, my school system adopted a math program called Investigations. It is a hands-on approach to teaching math concepts. It is also a spiraling program. What students learn in each grade follows them to the next. This program offers a hands-on approach of why they do what they do in math. It is also integrates other studies in order to show how math is part of every aspect of their learning process.

In particular, the Investigations program teaches the mathematical concept of patterns in a way that stretches across the curriculum. *“Investigations is based on experience from research and practice, including field testing that involved documentations of thousands of hours in classrooms, observations of students, input from teachers, and analysis of student work. As a result, the curriculum addresses the learning needs of real students in a wide range of classrooms and communities. The investigations are carefully designed to invite all students into mathematics-girls and boys; members of diverse cultural, ethnic, and language groups; and students with a wide variety of strengths, needs, and interests.”* (Investigations) This unit will reach all of my students throughout the activities and will engage them at their various levels.

My school is made up of a very diverse group. The children who enter Kindergarten arrive from a variety of backgrounds, which must be kept in mind in my planning and teaching. I have students coming from pre-schools that are academically based. Others come from preschools where there are very little academics and more play. I also have only a few students without any background of preschool and are home schooled. It is important that this unit engages and educates all the students, regardless of their educational background. I also have two EC (Exceptional Children) students, who are pulled out for up to 2 hours every day. It is important that their work is modified to suit their needs and meet the goals of their IEPs (Individualized Education Plan) .As I walk through my lessons, I will give suggestions for modifications when needed.

As it is clear from the title, this unit will explore patterns in our world. Why patterns for my students? Patterns engage and excite. Patterns can be used for educational purpose but also to entertain while teaching. Kindergartners need hands on exposure to academics. They need to see what they are learning and put into practice to get a better understanding of the concept. Through entertaining with patterns, everyone can participate and think deeper about creating their own patterns. Patterns transfer deeper mathematical concepts as student’s progress through their education. For example, patterns lead to algebraic thinking.

A major challenge inherent in this unit is time. Teaching Kindergarten gives me a limited amount of time to assess what my students know, teach them patterns, and delve into the activities. Over the next few months I will not only teach about patterns but I will encourage my students to see patterns in everything we do. This is a challenge because some of my students have no knowledge of patterns. I will ask them to go from recognizing patterns, creating simple and complex patterns, to creating patterns in dance and movement. Our end of the year activity for the parents will be a dance based on patterns. In order to meet that goal, it will be important to create lessons that expose the students to various patterns and at the same time meet the varied needs of all my students.

The Kindergarten classroom is a natural place to discuss patterns in song, counting, numbers, the calendar and time. This short list alone reflects how patterns are truly all around us. The students will become accustomed to seeing patterns throughout our learning. Patterns are truly everywhere and can be integrated in every subject area. Patterns are used to teach and to entertain. Students can create patterns in math, in movement and dance, in literature, in nature. By the end of this unit, my students will be able to observe patterns all around. Going on a nature walk, they will be able to say, "I see a pattern in this flower" or "I see a pattern in the cycle of seasons." Patterns are fun and engaging. They are also all around us!!!

Content Knowledge Background:

The students differ in their knowledge of patterns. Though they might have heard of a pattern before, not all the students can create, recognize, or extend a pattern. Kindergarten students come from different places of prior education. Some of the students come in with a range of knowledge about patterns. They understand how to form a pattern and how to form both simple and complex patterns. Some students come in with no knowledge whatsoever about patterns. They are unsure of how to create patterns or can't even recognize a pattern. It is important to get all of these students to understand what a pattern is, how to create one, and what part repeats to form the pattern.

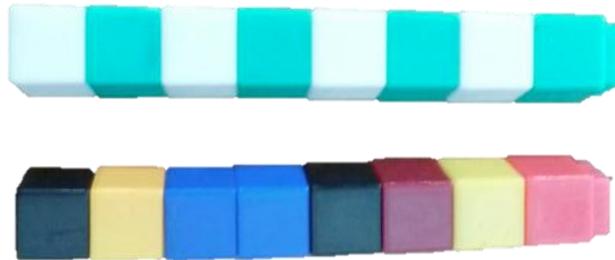
Introduction:

Patterns appear across all studies and can be simple and complex. Patterns are the building blocks for many concepts taught in math. Patterns can be found in math, literature, science, and history. Teachers might use math to teach a lesson in Art or PE and certainly in Music. Through a simple line dance, a pattern is used to show the steps of the dance. Patterns are used in planting a garden and tending the garden. Patterns appear in history through its cycles. Patterns can help us predict and give us a way to organize information. When students see and understand patterns, they can find them anywhere. It is rewarding as a teacher to see how children experience patterns and apply them to real life. As they walk in hallways, learn new concepts, read books, observe nature, they will scream "I see a pattern" and you will know "they got it!"

Patterns are a huge concept for Elementary students. It is the root of many future

concepts. As such, it is important that the students understand patterns at a young age. As mentioned, kindergarteners arrive with varied exposure to patterns. So, teachers must assess their students' knowledge about patterns. Can they recognize a pattern? Can they create a pattern? If so, can they do simple and/or complex patterns? Do they understand what part of the pattern is repeating itself? This is a hard concept. Even students with previous knowledge don't always understand the part of the pattern that is repeating itself. So, our first goal is to see who knows patterns and if the students understand how to single out the part of the pattern that is repeating.

To get a better understanding of where the students are, I do a mini-assessment. In my assessment, I create 2 unifix cube "trains" as seen below. A student is asked which "train" has a pattern. If the student can tell me which "train" is a pattern, I have him/her create a "train" pattern. If the student cannot, we review patterns and talk about what a pattern is and how the "train" that is a pattern is one.



After the students get a basic idea of what patterns are and can identify them, I do a whole group lesson talking about the part of the pattern that is repeating itself. This would be a whole group lesson in not only reviewing patterns but also pointing out the part or parts of a pattern that are repeating. Patterns are a series of objects repeating themselves. It is important for the students to identify what part of the pattern is repeating. For example, in the image above, the part in the pattern train that is repeating is the white and then turquoise cubes. We could create a similar pattern in movement. The class could clap, snap, clap, snap. After mastering the pattern, I would note that the part that is repeating is the snap, clap. It is important for the students to understand this concept, so they can see such repetition in more complex patterns." *The concept of a repeating pattern and how a pattern is extended or continued can be introduced to the full class in several ways. One possibility is to draw simple shaped patterns on the board and extend them in a class discussion. Oral patterns can be joined in by all children.* (Elementary and Middle School Mathematics Teaching Developmentally). I find discussing repeating patterns is needed as an entire class. In my unit you will see how I then take it to from whole group to partners. Now, we are ready to move on!!! Let's find patterns everywhere!!!

My students have been assessed and I now know their knowledge of patterns. We are ready to move. My students have varying understanding of this concept. Throughout my lessons, I will show how to modify for the struggling students and excite the high flyers. It is important to reach all of the students based on their academic needs.

A goal for our school system is to move the students into the 21st Century and apply concepts taught in the classroom to everyday life. Patterns can be applied to everyday life. Patterns can be used in “teachable” moments but they are also used in activities such as dance and movement. A line dance, such as the electric slide, is a dance created using a pattern. A garden can use a pattern. A gardener, when creating a vegetable garden, would use a pattern in creating the rows.....seeds, dirt, seeds, dirt. Patterns are found in the water cycle or cycle of seasons. In Social Studies, the students will notice patterns in history and in cycles of life. In Literature, we will read books that involve patterns. In books such as Laura Numeroff’s If You Give a Mouse a Cookie or any of her other books, the students will observe how the actions repeat themselves in go in a cycle. My lessons will show how patterns can be applied throughout the curriculum. I will show how patterns are integrated in Science, Social Studies, Literature, and of course math. By the end of the year, the students will observe patterns and will be able to point them out and say “I see a pattern!”

The objective of this unit is to show that patterns are everywhere and they can be entertaining and engaging. It is important to start off explaining patterns, what is a pattern, can the students identify, create, and continue patterns. Once the students get a grasp on students then the fun can begin!

One of the consistent activities we do in Kindergarten is Calendar Time and that is where patterns can be brought in by doing math and science. Every day, we count how many days we have been in school. Not only do the students observe that we write the numbers in a color pattern but we also observe patterns in the numbers themselves (i.e....skip counting, or simply counting by 1’s). On the weather board, we talk about seasons. Seasons are a repetitive cycle thus creating a pattern. We talk about how seasons repeat themselves year after year. As do our Days of the Week and Months of the year, they repeat themselves. Calendar is a great opportunity to delve into patterns and explain repetition and cycles.

Patterns are everywhere. Patterns can be integrated in all studies. One of the earliest activities is tying patterns into Literature. After reading Laura Numeroff’s If You Take A Mouse to School, the students and I talk about how the book is a cycle and repeats itself thus creating a pattern. This can be relayed in all of Laura Numeroff’s Literature (If You Give a Mouse a Cookie, If You Give A Pig A Pancake, etc.....).

We will also learn patterns in math. Once establishing what a pattern is and getting a clear assessment of where my students are, we are ready to move on. Now can come the entertaining part.....movement. I love to dance and sing and incorporate it wherever I can in my lessons. This is a clear moment to engage my students and “entertain with patterns.” Dance. In Calendar, we do a song called the Months of the Year Macarena. It is repetitive and the students catch on quickly. We sing a song as we do the dance. (<http://www.youtube.com/watch?v=8Qx9JM1L94c>). The students, being youngsters of the 21st Century, know line dances. An objective in this unit is to create a line dance with my students. Together we will work together to create a line dance which incorporates patterns. We will do several dances together which are created through

patterns.

Patterns are integrated in Science and Social Studies. In Science, we will discuss cycles in nature and life cycles. In the fall, we make our annual visit to a Pumpkin Fall. Prior to our field trip, we do a lot of research and discussion on pumpkins. After reading books on pumpkins, we discuss the life cycle of a pumpkin. The students will see the final cycle of the pumpkin at the farm by seeing the full grown pumpkin. In the spring, we plant pumpkin seeds, which illustrate the beginning of the pumpkin cycle, the seed. The students will be able to observe how this life cycle repeats itself thus creating a pumpkin. Science also offers other opportunities for teaching patterns. In our animal unit, we study snakes and we will look at patterns on snake skins. After studying patterns on snakes, the students will create pattern snakes using pattern block cut outs. The students will be able to make correlations with math and real life.

In Social Studies, we do a unit on Native Americans during Thanksgiving. It also fits into our Social Studies curriculum of Culture. We will create a Native American village by creating pattern teepees. We will look at books and pictures of various Native American homes and how they are decorated. The students will create their own teepee using pattern blocks.

Patterns are everywhere! They can be integrated across the curriculum and used throughout the year. My unit will show how I use patterns throughout the year to engage and entertain my students.

Rational:

“This unit raises students’ awareness of pattern and regularity. Much of mathematics is about noticing and describing patterns and regularities that occur in the relationships among mathematical objects-numbers and shapes, for example. Once students begin looking for and expecting patterns in mathematics, they become alert to regularities that can help them understand important mathematical relationships.” (Investigations)

According to our standards, patterns are needed to move forward in other math concepts. They are an important component of our math program and the concept of patterns appears across the board in all studies. *“This unit raises student’s awareness of pattern and regularity. Much of mathematics is about noticing and describing patterns and regularities that occur in the relationships among mathematical objects-numbers and shapes, for example. Once students begin looking for and expecting patterns in mathematics, they become alert to regularities that can help them understand important mathematical relationships.” (Investigations)* Students must be able to identify patterns, create patterns, extend patterns, and recognize what part of the pattern is repeating itself. In all studies, patterns are integrated. In Literature, students can identify patterns. In science, patterns are found in cycles of nature. In Social Studies, patterns are found in History. Physical Education teachers use patterns to teach games or dances. In music,

teachers use patterns to teach notes. In art, patterns are used in projects and drawings. Patterns are the building block for other math concepts but also used all areas of education.

Did you know Fibonacci discovered patterns? He discovered it in nature, in the reproduction of rabbits. I won't have a need to bring that up to Kindergartners. However, he discovered patterns and how patterns are found in Nature. Fibonacci's pattern follows a rule: Add the last two numbers in the current list to find the next number in the list

The list starts with 0 and 1. To get the next number, you take the two most recent and add them. So, the next number is $0 + 1 = 1$. Our list is now 0, 1, 1. The 2 most recent numbers are now 1 and 1, so the next number is $1 + 1 = 2$. Continuing this pattern leads to the sequence 0, 1, 1, 2, 3, 5, 8, and so forth. While beyond the scope of my class, this is an infinite sequence of numbers.

Fibonacci's pattern can be found in nature too. If you look at pine cones and count the number of spirals directed counterclockwise versus clockwise, you will find 2 adjacent numbers in the Fibonacci sequence, such as 3 and 5 or 5 and 8. Count carefully as it can be tricky! You can find Fibonacci numbers in the spirals of daisies or even a pineapple. Patterns are truly everywhere!!

Like I said, I would not mention the reproduction of rabbits to Kindergartners; however, I would allow students to attempt the pattern. I have several high flyers, who are adding, and can create a pattern using Fibonacci's theory up to 5 and even to 10 with some students. Using the theory of the pine cones and flowers, I am tying the history of patterns into Science. I will be teaching patterns in our Science unit and the students will keep pattern journals throughout the year to record patterns in the classroom and in our environment.

Fibonacci theory of pattern gives theory that patterns are in everything. They exist in nature but are brought into dance, literature, math, song. He was the "father" of patterns and he brought so much knowledge of patterns and how they are found in all we do and what we see.

In math, patterns are the building block for many other concepts. Without the knowledge of patterns, it is hard to move onto other concepts. In Kindergarten, so much of their curriculum is based on patterns. Numbers are a series of patterns. When we count, the students observe patterns in the numbers. They observe it in skip counting by 2's, 5's, and 10's even counting by 1's. Counting by 1's, the students observe how the numbers are written (teens, 20's, etc.....). Noticing the patterns in numbers helps the students become more aware of what comes next in counting. It also helps as they begin writing their numbers.

Ex.	1	2	3	4	5	6	7	8	9	10
	11	12	13	14	15	16	17	18	19	20
	21	22	23	24	25	26	27	28	29	30

31 32 33 34 35 36 37 38 39 40, etc.....

In a hundred's chart, the students will see the patterns in the numbers they are writing. We will talk about the place value and how they can use that pattern to determine what number comes next. Numbers (recognition and written expression) can be a hard concept for students and by noticing that there is a pattern to writing numbers in order, it makes it a bit easier. After observing the number chart and how numbers are written, then you can move on to greater than and less than in numbers. By having that knowledge, the students can move onto harder concepts in number sequence.

Patterns vary in math. The students learn simple basic color or shape patterns. They learn ABA and ABC patterns. As they become more familiar with the basic patterns, then we can move to movement patterns. The movement patterns are engaging and allow the children to be creative. Having a child think of a movement pattern and then have the class follow him/her is engaging and fun. This is also a great opportunity to incorporate song. Singing Head, Shoulders, Knees and Toes shows patterns in movement and gets the students moving. The song keeps repeating itself and it shows the students the repeating part of the patterns.

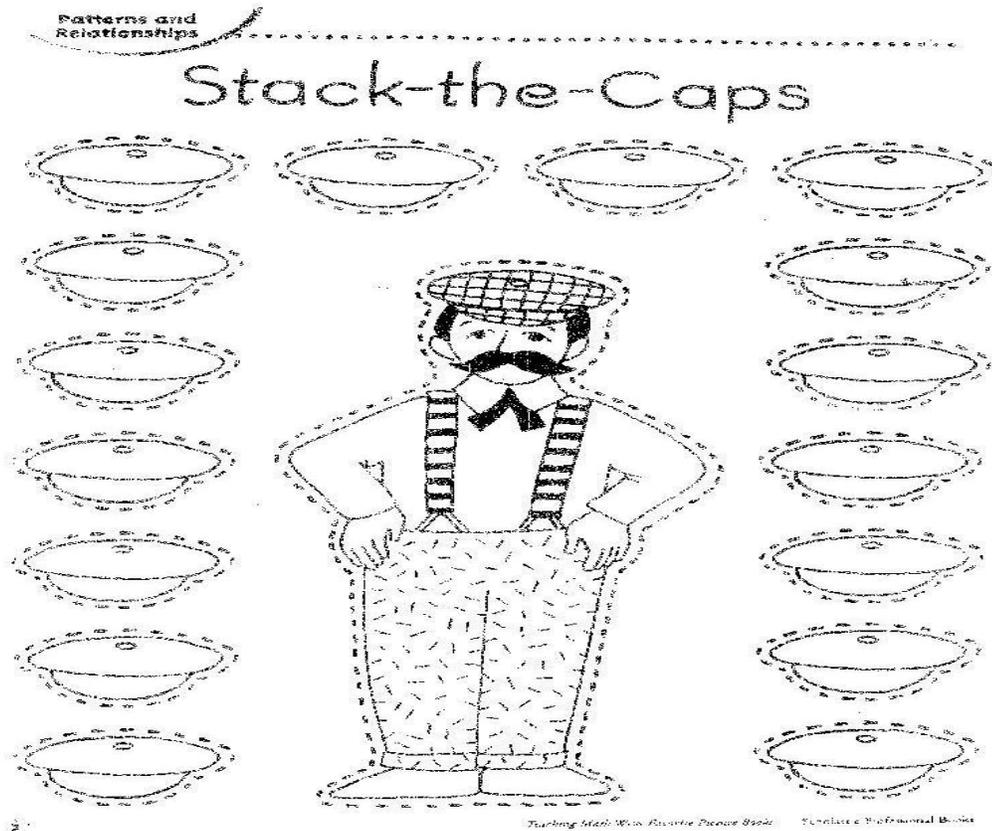
Patterns are the building block for other math concepts too. The concept of time is based on patterns because it involves skip counting by 5's. The hours repeat themselves every 12 hours. Though in my school district we don't focus on time in Kindergarten, it is always inserted either in a "teachable moment."

Look at dance. Dances are usually based on a series of repeating actions. The Electric Slide is based on a series of repeating moves. Think of children's songs or dance moves. Most students know the song "Head, Shoulders, Knees, and Toes." The song is repetitive and brings in song and movement. The students repeat the same movement thus creating a pattern. During calendar time, the students sing a song called the Months of the Year Macarena. The students do the Macarena while singing the song on the months of the year (insert song). These songs and dances contain patterns. *"At first glance it might seem that mathematics, that realm of rationality, and dance, that art of physical and emotional expression, have little in common. In our own experience as dancers and mathematicians, however, the two subjects are inextricably linked. When we choreograph a new dance or investigate a mathematical problem we are doing much the same thing: creatively exploring patterns in space and time with an eye toward aesthetic potential."* (Math Dance with Dr. Schaffer and Mr. Stern) Through dance, the students are not only creating patterns but they are creating them using creativity and exploration.

Think of Literature, many children's books incorporate patterns or cycles. As I read books to the students, we look for patterns and identify what part is repeating. The pattern might be visual or it might be the writing style that offers the concept of a pattern. The students love Laura Numroff's books (If You Give A Mouse A Cookie, If You Give A Moose A Muffin, etc.....). The books are based on a cycle and continue to repeat itself over and over again. Though the pattern isn't visual, the students can identify that everything repeats itself and is a cycle. Another book that has patterns is (or it can be a

song) is Where Going On A Bear Hunt. The book repeats the same verse over and over again: “We are going on a bear hunt. We’re going to catch a big one. What a beautiful day! We’re not scared.” Then the characters find an obstacle and then it is back to the refrain. It repeats itself.

Another great book to read is Caps for Sale. After reading the book, the children complete a worksheet with the peddler and his hats. The children must create a color pattern using his hats. They can use the same patterns in the book or create one of their own. This is a great assessment at the beginning of the year to see who knows simple and complex patterns. You might have children trying to challenge themselves using very complex patterns (3 or more colors). However, you must remind them to have a repeating part of the pattern.



We have seen patterns in math, literacy, and even play. How about Social Studies and Science?! Patterns are there too!!! Patterns are everywhere in Science. Go outside and look at the spirals on a pine cone or the petal pattern on a flower. Think of the water cycle or the seasons of the year! In science, the students study about seasons. The seasons of a year are in a cycle thus repeating themselves. In Science, the students might notice patterns in the weather such as rain bringing out a rainbow or how sometimes natural disasters occur after a specific weather pattern. We are growing a vegetable garden in science; the students plant the seeds in a patten using dirt, seed, dirt, and seed. Using patterns in science is showing the students how to apply patterns to everyday life. In my science lesson, the students will study the life cycle of a pumpkin and visit a pumpkin

farm. In the spring, they will plant pumpkin seeds and will observe the first stage in the pumpkin life cycle. Patterns are everywhere!

In Social Studies, patterns can be integrated. In the unit about animals and exploring where and why, I read a book, As the Crow Flies, and ask the students to create a pattern using the illustrations out of the book. For example, the students can draw a windmill, 2 horses, windmill, and then repeat the pattern over again. There are other images from the book too. This lesson integrates literature and math with Social Studies. As the year progress, we will go into the unit Reading Maps. After reading Hello Ocean, the students can take our class seashells and arrange them in patterns. They can arrange them in small groups which incorporates cooperative learning. In one of my lessons, the students will create a Native American village creating pattern teepees. Patterns are everywhere.

In my unit, you will see how patterns are incorporated across our curriculum. You will see how patterns can be taught in all areas and how you can modify them to engage and entertain all of your students. According to Kathy Richardson, “The search for patterns is an important tool for learning, because it helps us see relationships and make connections.” In my lessons, the students will be able to find patterns and make real life connections.

Lesson One: What is a Pattern?

Some of my students still don't understand patterns. They might be able to identify a pattern but they are not sure what makes a pattern. If I lay out 2 unifix cubes towers, one being a pattern and the other not being a pattern, my students can identify the pattern tower but not explain why it's a pattern. Now, I need to identify the parts of a pattern and what makes it a pattern.

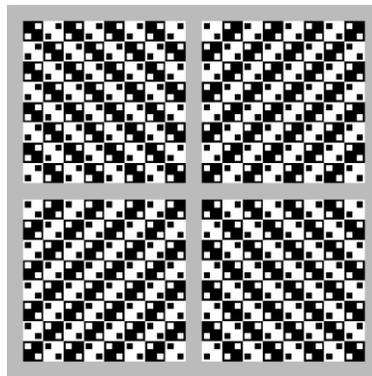
In my class, we do a lot of group discussion. My students and I sit in a circle, where I show several “pattern towers” made of unifix cubes. As a class, we identify which “towers” are patterns. Right now, I am only focused on color patterns. I either use AB or ABC patterns. As we advance into patterns, we will do more complex patterns. I ask the students in the towers that are patterns, what part is repeating? This is a really important part of patterns because students don't understand that a pattern repeats itself and they need to be able to identify what part is repeating. Investigations does a wonderful job in providing techniques and strategies to delve into the concept of repeating patterns. The pattern activities in Investigations states that the activities for repeating patterns, “*focus student's attention on analyzing the structure of repeating pattern by identifying the units of the pattern- the part of the patterns that repeats over and over.*”(Investigations)

As we work together, the students are able to identify patterns and identify the repeating part of the pattern. I have two children in EC (Exceptional Children) and they are not ready for anything bigger than an AB pattern. My assistant pulls the two students and works with them in a small group. Their first activity is simply to see a pattern and discuss what makes it a pattern. Too many patterns introduced to them at one time is too much information. These two students need only to talk about one pattern tower at a time.

We have discussed and identified. Now, I have my students create their own patterns, sticking only to an AB or ABC pattern. They must tell me what part of the pattern is repeating. I take one of their patterns add another color and ask “Is this still a pattern? Why or why not?” The discussion part is important. I am looking for the students to use key words such as “repeating,” “pattern,”

After identifying patterns, the students will partner up to extend each other’s patterns. One partner will create a pattern and the other partner will extend it. This activity promotes dialogue with the partners and use of vocabulary. As I facilitate, I will ask the partners extending the patterns, what part is repeating? This will take over a week. Some students will catch onto patterns right away and will be able to identify the repeating part of a pattern. As far as my EC children, my assistant and I will work with them throughout the year on patterns. Lessons and activities in patterns will be modified for them to help to help them grasp the idea of patterns.

As we come back as a class, I will show patterns and we will again discuss the part repeating. Now, we will bring it to other types of patterns. I will pull out shape patterns and we will do movement patterns. The students will now see a variety of patterns. With the movement patterns, one student will create a movement pattern and the other students will copy the pattern. The children will have the chance to create and copy a pattern. In order to expose the students to various types of patterns, I will give them an optical illusion and see if any of the students can identify the pattern.



Do your eyes hurt? Can you find the pattern? This can get the students to think outside the box. I would bring up this optical illusion and a simple pattern tower and have the students look at the two and discuss how they are both patterns. Patterns are beyond a patter train.

Now we need to bring patterns to the classroom. A great place to expose students to patterns, where they will see them daily, is in calendar time. The students will see days of the week, months of the year, how many days we have been in school, weather, and seasons. Patterns are found in all of these places. As the students recite the days of the week, we will talk about how the days of the week repeat themselves thus creating a pattern. As we recite the months of the year and sing our months of the year song, we will

talk about how the months repeat themselves thus creating a pattern. Every day, we write how many days we have been in school. Not only do I write the days of the week in a red, green, red pattern but we discuss how the order of numbers is in a pattern. We skip count by 2's, 5's and 10's which shows patterns in counting. As we talk about our weather section, we talk about seasons and how seasons are a cycle or pattern because they repeat. Calendar time is a great place to talk patterns. It exposes the students to various patterns and how patterns are extended beyond "towers" and "trains."

We know patterns or at least we have discussed patterns. Calendar time is throughout the year and as we get further in writing how many days we have been in school, the students will really be able to see patterns in the number writing.

Lesson Two: Pattern Journals

Now, the students have patterns. They are going to make pattern journals. The students will use these books throughout the year to create and copy patterns. They will create their own patterns or they might see a pattern on an "observation" walk and draw in their pattern books. These books will be tools to remind the students of patterns.

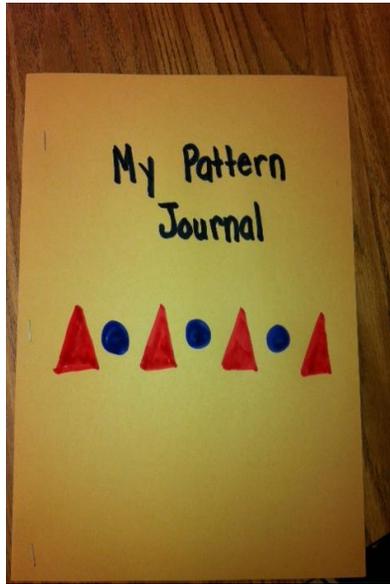
I will introduce the pattern books in group time. As a group we will review patterns and the various types of patterns. We will talk about patterns and how patterns are a series of repeating objects. After our group discussion, the students will go back to their seats to create their first pattern in their books. The patterns books will be available during center time in math.

The pattern journals are a great way to engage the students but also to get them to see patterns everywhere. They won't be limited on just color patterns. During an "observation walk," they might see patterns on a wall or in decorations in a room or a poster. They might observe patterns in a book I am reading or in another lesson. For the high flyers, they might see patterns in number writing or as we begin addition. They might see it in writing simple words or in a song and dance. The pattern books are a good tool to encourage the students to see patterns outside of a color or movement pattern. As they begin to write, they can write why and how something is a pattern. The ideas for a pattern journal are limitless and can range based on the needs of each student. The journals will help the students make real-life connections using patterns and will encourage them to discover patterns throughout their environment.

For my two EC students or the students, who are struggling with patterns, the journals are a great source to help reinforce the concept of patterns. The journals will allow these students to show their knowledge of patterns and if they stick to very basic color patterns, they are still expressing their knowledge of patterns. To help encourage them to find more complex patterns, I would partner them up and see as partners, can they find patterns in the building or outside. Can they discover a pattern in literature or in a science lesson?

The journals will help me assess if my students understand patterns. Can they take a

pattern they see in their environment and translate it on paper? Can they create their own pattern? This will be a great tool to see where they are on the concept of patterns. The journals will be used throughout the year and will be a year-long assessment of the student's knowledge of patterns and their ability to make connections which is our ultimate goal in everything we teach.



The above picture is a journal I created for my students. Have the students create their own pattern on the front of the journal.

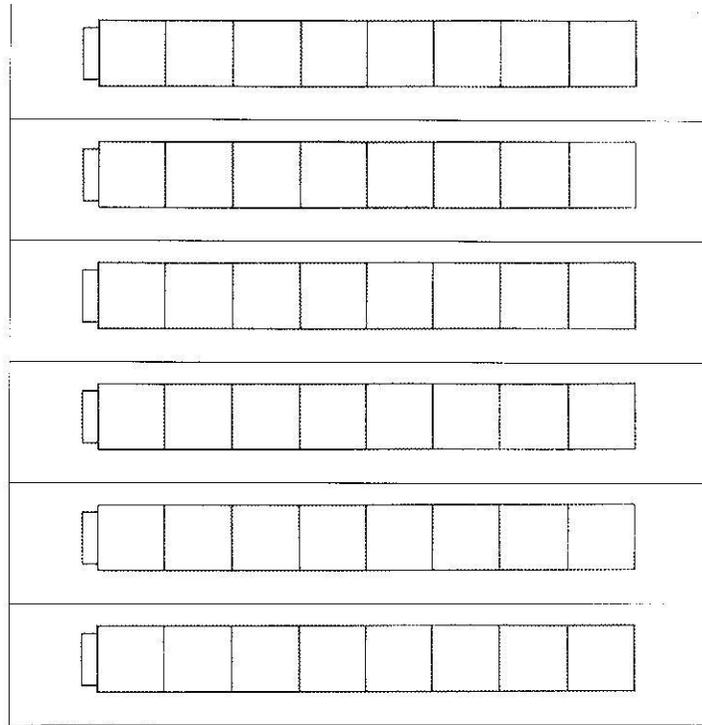
The next two lessons have to do with recognizing what makes a pattern and recognizing the parts that repeat.

Lesson 3&4: Name that pattern!!

In order for the students to continue on their pattern journey, they need to have a firm grasp on the repeating part of a pattern. These two lessons will reinforce what a pattern is, why, and what part is creating the pattern. It is essential that the students can recognize what part of the pattern is repeating itself.

The first part of the lesson is the students must create pattern towers. They use unifix cubes to create these patterns. The patterns may vary. They can be AB or ABC patterns. The children create. After creating their tower and having it checked, they will record their pattern on a worksheet. The worksheet will have blank unifix cubes and the students must transfer their pattern to the worksheet. This lesson will take a day. My EC students will work either with me or my assistant to create their patterns. Though they might be able to create a simple AB pattern, transferring it to the worksheet will be difficult. We will encourage the children to say it out loud as they color in the unifix cubes.

The next figure is the unifix worksheet for the pattern towers.



Day 2 is the name that pattern portion. The students will receive their colored worksheets back and their pattern tower. In the first part of the activity, the students will break their tower into parts.....the repeating parts. Depending on how many colors they used,

their parts will vary. Once they understand how to break their towers, they are ready to move to the worksheet.

They will cut their worksheet into the repeating patterns. The students will need to look to see how they broke their tower up to see where to cut on their worksheet. Once they cut their parts out, they can break into partners to put the repeating parts back together to create a full pattern. Over the next few days, the students can exchange their broken patterns with other students and put the units together to create the pattern tower.



For students, who are still having trouble grasping patterns, this will really help with how a pattern is created and what makes a pattern. The hardest part for Kindergartners is understanding the parts of a pattern and what is repeating. These two lessons are a great assessment to see if students understand patterns and if they can identify the repeating part of a pattern.

To assess if the students understand repeating patterns, I would want to see do they understand what part is repeating? Can they break patterns into parts? Can they reconstruct the pattern once they have cut it apart?

Patterns are everywhere. Because this unit on patterns will spread throughout the year, the next two lessons will integrate Literature and Science.

Lesson Four: Growing Pumpkins is a pattern

This lesson will take place in the fall, during pumpkin season. My students go to a pumpkin farm every fall. As we approach this field trip, we talk a lot about pumpkins. We read books on pumpkins and look at pictures of pumpkins.

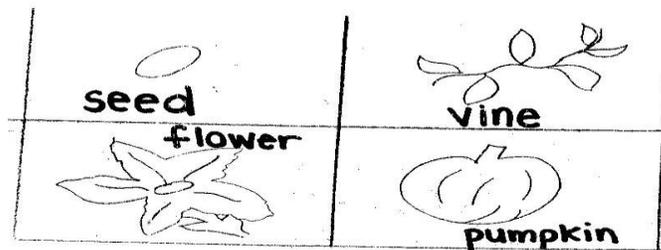
Patterns repeat themselves. Well, the life cycle of a pumpkin is a pattern because it repeats itself. It starts off as a seed, a vine, a yellow flower, and ultimately a pumpkin. This lesson will integrate literature and science as we explore the life cycle of a pumpkin.

I will begin the less by reading a book. I will read It's Pumpkin Time! by Zoe Hall. The book has a great lesson on how pumpkins grow and the life cycle of a pumpkin. As I read the story, we discuss how the life cycle of a pumpkin is a pattern. Some of the students will already know because they know a cycle is a pattern because it repeats itself. We discuss other cycles in Science too.....seasons, a tree during the seasons, weather, etc..... I want the students to recognize that patterns are not just in math and if something repeats itself, then it's a pattern.

After reading and discussing It's Pumpkin Time!, the students will create a pumpkin book with pictures illustrating the life cycle of a pumpkin. The book is shaped like a pumpkin and the illustrations show a seed, a vine, a yellow flower, and a pumpkin.



This Figure shows the pumpkin Book.



This is the worksheet to go into the pumpkin book.

The pumpkin book shows a cycle and it will show how cycles repeat themselves thus

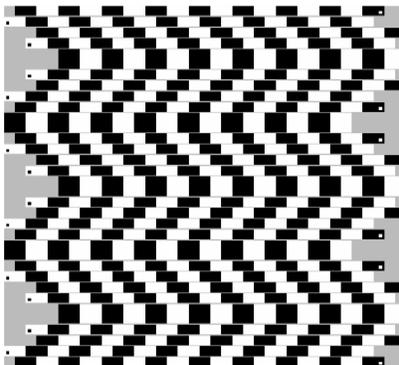
creating a pattern. This lesson integrates other studies which is important for the students to see how patterns are everywhere.

We also have a pumpkin garden outside the classroom. So, not only do the students create these books but they get to cycle live and in action. At the beginning of the school year, the yellow flowers are slowly becoming green pumpkins. At the time we do this activity, the pumpkins are orange. In the spring, I read It's Pumpkin Time! again as we plant the seeds for the next year's pumpkins. Also, the very act of gardening and planting the pumpkin seeds is a pattern.....seed, dirt, seed, dirt and the spacing of the dirt and seeds. It is something to point out to the students or see if they notice the pattern. It's a very hands-on activity and the students are able to observe the cycle of the pumpkin life.

Lesson 5

Another way to integrate literature and science into patterns is having the students create snake patterns using shape cut outs. This lesson would only take a day; however, you could extend it to two days depending on your class makeup. Instead of showing snake patterns and delving right into the lesson, you could show the snake patterns one day and discuss why they are patterns and do the independent activity the following day. As we begin this lesson, I show pictures of snakes in various books. We discuss how snakes have patterns on their skin. Many of the multi-color snakes have patterns on their skin. We will identify some of the patterns and what part of the pattern is repeating itself. Looking at the snake skins is fun and will give the students the challenge to identify various patterns.

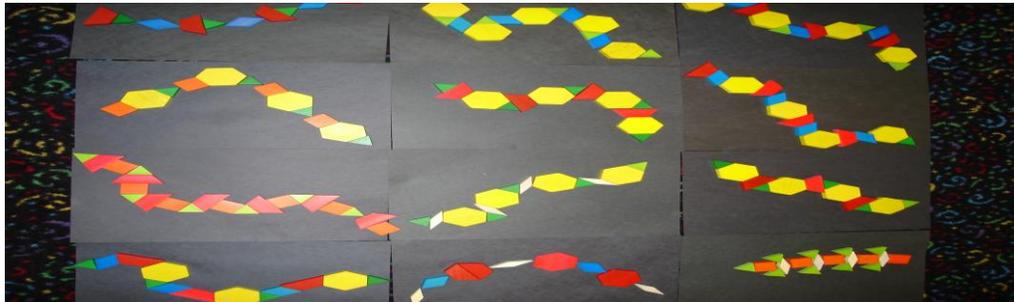
A fun way to “trick” the student’s mind is showing them an optical illusion of a snake. It is interesting to see if the students observe a pattern and are able to identify how it’s a pattern. It might take awhile for the students to notice if it is a pattern or not. Below is an optical illusion to show the students. See if you can find a pattern!! It’s a snake pattern. This would be a fun illusion to show the students and together they could add the tongues to the snakes.



After looking at the books and discussing the various snake patterns, the students will

create their own snake patterns using cut out shapes. The students will get sentence strips and create a snake using pattern block cut outs. The students will need to place the pattern block cut outs first to be checked. Once the pattern has been checked, they may glue.

This activity offers another way to assess my student's knowledge of patterns. Can they make a pattern? Are they able to describe their pattern? Are they able to accurately glue their pattern down after placing the pattern blocks? This lesson will reach every range of learner. My high flyers can challenge themselves by placing the pattern blocks in a pattern by using various directions of the pattern blocks. For my students, struggling with patterns, the hands on of creating and gluing the pattern will give them the exposure they need to create the patterns. I will also encourage them as they are gluing their pattern to say it aloud. When the students say their patterns aloud, they are able to accurately create a pattern.



This lesson provides real life experiences to help students with patterns and how you would use your knowledge of snake patterns to identify a snake. After the patterns are finished, we would do a "snake hunt" and walk around the classroom observing the various snake patterns. It's good to have the students observe each other's patterns to see how patterns can be varied. We will also observe if any of the pattern block snakes look like any of the snakes we saw in the books.

This next lesson integrates Social Studies. Patterns are everywhere!! This lesson is a Thanksgiving lesson thus it should be taught in the fall around Thanksgiving. This lesson will take 1-2 days, depending on your class.

Lesson 6: Teepee Patterns

We all live in different types of homes. During Thanksgiving, it's a great time to teach about different Native American homes and show pictures to illustrate these homes. During this unit, the students will be exploring the homes of Native Americans and the early homes of the Pilgrims. We will discuss how the teepees were made and the designs used to create the teepees. We will look at pictures of teepees and look for patterns on the teepees.

For our math activity, the students will create a pattern block teepee. The students will have a teepee cut out with 3 lines on it. The students will create 3 different pattern block

patterns on each line. The students will create the patterns first, have them checked, and then Transfer them to the teepee.



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After the teepees are finished, we will hang them in the classroom and create a Native American village. It will be finished just in time for our Thanksgiving Dessert with parents. This brings a real life aspect into the project and coincides with our unit in Social Studies on **Family, Friends, and Me** and **In Town**. It not only teaches about history but leads into discussion about different types of homes while exposing the students to patterns in real life situations.

The next unit is music and dance. This is an exciting unit because it shows the students how patterns are incorporated in favorite dances and songs. This part of the unit involves math through the arts and exposes the students to the joy of learning math. “When one participates in a performance or visual arts event, it is usually as a passive observer. For example, although we attend concerts and view museum exhibitions, most of are seldom given the opportunity to participate actively in the creative and recreative arts process. Moreover, it is very rare to encounter mathematics or mathematical concepts in an artistic venue.” (David K. Masunaga, Math Dance with Dr. Schaffer and Mr. Stern) This unit is important because it involves the students in the arts and in creativity of producing something that involves math and the arts.

Lesson 6 Fun with Patterns’

This lesson takes place throughout the year and involves both music and dance. It is exposing students to patterns in musical lyrics and dance. It will take place in various special area classes as well. In Music, the music teacher will teach patterns through his Common Core standards in song and dance. In PE, our PE teacher will teach patterns through line dancing. I will also expose the students to patterns through dance and song

and will take that knowledge into the following lesson.

Every morning in Calendar, the students sing songs on days of the week and months of the year. A favorite song on the months of the year is the months of the year Macarena. We discuss how this song is a pattern because it is repetitive. This song is fun because it involves both song and dance. We will also discuss other songs and dance that involves patterns, i.e..... **Head, Shoulders, Knees, and Toes, The Electric Slide** (you be surprised how many of your students will know this line dance), **The Cupid Shuffle, The Macarena, and many more.** We will also talk about how songs have choruses and they repeat themselves thus creating a pattern.

The great thing about Kindergartners is they are active. This is a great way to involve movement while teaching patterns. To encourage students to be creative, I will appoint leaders to lead the class in a pattern and the rest of the class must follow the pattern. In the beginning, the patterns will be simple such as clap, snap, clap, snap. Some students might do an ABC pattern or add double of one movement such as clap, clap, tap head, clap, clap. As we do this activity several times, we will move to dance moves. I will divide the class into several small groups and appoint a leader. The leader must create a dance involving several dance moves. It will be very simple and the rest of the group will follow the leader in the dance movements. This is the lead in to our next lesson.

Lesson 7 Create a Pattern Dance

This lesson can take place whenever you feel your class is ready. This will be my first year doing a pattern dance and now that I know my class, we will do this lesson towards the end of the year. On the last day of school, I have an end of the year celebration, where my students sing songs with some dances involved. This year, my students will show their masterpiece to parents and family members.

We have seen patterns everywhere. We have talked about patterns in songs and dance. The students have created their own movement and dance patterns. They have worked together in small groups to create simple dance/movement patterns now we are going to move in a whole group. You might have guessed it.....our class will create a dance for the finality of our pattern units. This will also be a great activity to end the year.

As a class, we will work together to create a dance that must involve patterns. My students are good at collaborating so I know this lesson will bring a lot of ideas and suggestions. Since the students have learned some line dancing in PE and dances and songs in Music, I will encourage them to take some of those ideas to incorporate in our dance. Before bringing them together whole class, I will once again break them into small groups and they will work together to create a dance. Before breaking into groups, the students will be given guidelines: 1. They must listen to each other. 2. Their dance must be a pattern (we will review patterns before breaking into groups). 3. The patterns must be such that they are easy to follow. 4. They must have fun with it!! Each group will show their dance. During this time, my assistant and I will facilitate and help the groups. This is such a great way to utilize cooperative groups. After a year of doing

Investigations, where so many lessons are in either partners or cooperative learning groups, the students will know how to listen to each other.

The cooperative groups will take one day. The next day we will come together and the groups will perform their dances once again with my help and the help of my assistant. We will work together as a class to create a dance. We will incorporate the small group's patterns in our dance. We will also take patterns from other famous dances to create our pattern dance. After creating our dance, we will set it to a song. As a class we will pick out a song to accompany our dance to give it more value. After completing our dance, we will practice it daily. On the day of our Kindergarten Celebration on the last day of school, the students will perform their dance. I will also tape the dance during the practices and burn it on a cd to give to parents. This will also be a great way to show the parents how the student's knowledge of patterns has come together through dance.

Dance and song gives value to our lessons. It exposes the students to real life experiences. As they go forward, they will be able to observe patterns in favorite songs and dance. Through dance and song, the students have a way to express themselves and to learn from each other. My school is very diverse and through dance and music the students can teach each other about their different cultures. "In musical rhythms. The mathematics of rhythm can be complex, and the ways of rhythms are use vary considerably from culture to culture; learning about rhythm is a wonderful way to expand one's appreciation for other cultures." (Math Dance with Dr. Schaffer and Mr. Stern)

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