

## PATTERNS EVERYWHERE (LEVEL 3)

<b>Description</b>	In this project, learners will understand how patterns help us make sense of the very complex world and transform information and data into meaning. Learners will visually represent different patterns around them.
<b>Leading Question</b>	How can patterns help us make sense of our world?
<b>Total Time Required</b>	4 hours across 5 days
<b>Supplies Required</b>	Paper, colors, acrylic paint or something that could leave a colorful trace on paper when learners use their fingers to draw
<b>Learning Outcomes</b>	<ul style="list-style-type: none"> <li>- Identify different kinds of patterns on daily life</li> <li>- Exemplify how meaning is connected to patterns</li> <li>- Differentiate between data and information, and meaning</li> </ul>
<b>Inspiration</b>	<ul style="list-style-type: none"> <li>• Arvind Ranganathan</li> <li>• Patterns Book</li> <li>• <a href="https://artplusmarketing.com/using-patterns-to-make-sense-of-your-world-d8034650bd98">https://artplusmarketing.com/using-patterns-to-make-sense-of-your-world-d8034650bd98</a></li> <li>• <a href="https://www.mathnasium.com/examples-of-the-golden-ratio-in-nature">https://www.mathnasium.com/examples-of-the-golden-ratio-in-nature</a></li> </ul>
<b>Previous Learning</b>	None

## DAY 1

Today, you will be learning about patterns.

<b>Suggested Duration</b>	<b>Activity and Description</b>
<b>10 minutes</b>	Patterns are things—numbers, shapes, images— <b>that repeat in a logical way.</b> Patterns play essential roles in nature, music, dance, art, visualization, number, measurement, games & puzzles, knots, and even history and politics! For example, every day, the sun comes out, then it leaves and the moon comes out. Or, for example, we follow the same path to go to the grocery store everyday. Also, the week has always the same number of days, and we work for some and rest for others.

	Try to come up with definitions and a few examples.					
<b>10 minutes (Set-up) 10 minute reflection everyday.</b>	Begin Day 1 by setting up some sheets of paper as a diary to keep track and notes of the following things:					
		Day 1	Day 2	Day 3	Day 4	Day 5
	Did I lose my temper today? If I did, when did it happen? What happened before that? What happened after?					
	Did I have nighttime fears or nightmares? What did I do during the day that day? When did I have my last meal?					
	Did I wake up rested today? What time did I go to bed the night before?					
	Another behavior or reaction that they would like to pay attention to					
Another behavior or reaction that						

	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%; padding: 5px;">they would like to pay attention to</td> <td style="width: 12.5%;"></td> <td style="width: 12.5%;"></td> <td style="width: 12.5%;"></td> <td style="width: 12.5%;"></td> <td style="width: 12.5%;"></td> </tr> </table> <p>Pay attention throughout the day and see if there is another behavior that we have not thought about, but that you would like to investigate.</p>	they would like to pay attention to					
they would like to pay attention to							
<p><b>At least 30 minutes</b></p>	<p><b>The Pattern Detective</b></p> <p>The purpose of this activity is for you to think about your own relationship to your life in terms of patterns. It is also a chance for you to share more about yourself!</p> <p>Go around your house and/or neighborhood/school/class and find examples of 10 patterns. For instance, “How does your family usually spend time during the week?,” “How does your body move when you dance?,” “How do the phone or waking up alarm ring?,” “What does school, a class or homework feel like?,” “How do the tiles in your kitchen look like?,” “What do plant leaves or branches look like?,” “What does the inside of a fruit look like?,” etc.</p> <p>Spend some time really searching so you are able to find diverse examples with rich and different attributes - a mixture of patterns that are beautiful, surprising, complex, curious, multifaceted, mathematical, and artistic, and that come from many different areas.</p> <p>For each of these 10 patterns provide:</p> <ol style="list-style-type: none"> <li>a. A brief description of the pattern itself: what are its main features- colors, shape, timing, etc.), where it arises, where did you find it, what does it remind you of, etc.</li> <li>b. A brief description of why you found this pattern compelling enough to include it in your collection.</li> <li>c. A visual image, sample, or rendering of the pattern. For this, you can use pencil, colors, or you can also use small stones, beans, sticks, whatever you are able to find.</li> <li>d. A name, one that you think is appropriately descriptive</li> </ol> <p>Remember that not all patterns are directly observable. For example, we can see the symmetry in a fruit (if you cut it in half, then both halves probably look the same), or we can see how tiles are arranged in the floor, but there are things that we can not “see”. For example, we only see a pattern of day and night, after we have observed several days and nights. Or, for instance, one way to “see” patterns in music is when we represent them with our bodies when we dance.</p>						

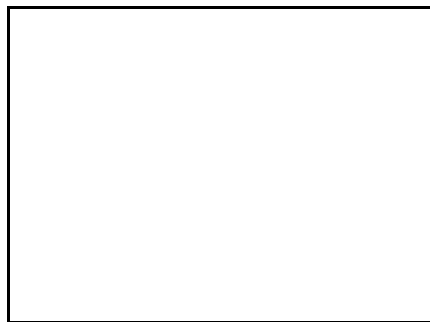
Challenge: Try to also look for these kinds of patterns, and think about ways of “seeing” or representing things that we can’t usually see.

You can use this format to note their observations (although you can also be creative regarding how to show and arrange your observations)

Pattern #1

Name: \_\_\_\_\_

Visual representation:



Main features:

- 
- 
- 

What does it remind me of?

Why do I find it compelling?

	<div style="border: 1px solid black; height: 30px; margin-bottom: 10px;"></div> <p><b>Feedback.</b> There are no right or wrong answers here! But it is still important to reflect on your work. Show your list to a peer (who has also done the exercise) or to a family member, who will look closely at what you wrote. Comment on each other’s work using these prompts:</p> <ul style="list-style-type: none"> <li>● <b>CLARIFY:</b> Are there ideas that the learner shared that need to be clarified or explained a little bit more?</li> <li>● <b>CONNECT:</b> Can you identify a connection with the patterns or the ideas that the learner shared? Explain what that connection is. For example, the pattern might remind you of a place you’ve been or your experience might be connected to one of the parts of the system that the learner identified.</li> <li>● <b>NEW IDEAS:</b> Did the learners’ analysis of the patterns extend your thinking about patterns or give you a new perspective on something? If so, share how.</li> </ul>
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## DAY 2

Today you will begin to explore less observable patterns with routines, routes, sounds, music, movement, and their bodies. You will also explore ways of representing patterns.

Suggested Duration	Activity and Description
15 minutes	<p><b>Music and Patterns.</b></p> <p>After setting up your diary, think about ways of understanding music and how it is related to patterns. Create your own movement and sound pattern taking into account the following keys:</p> <p style="margin-left: 40px;">A = (snap your fingers) B= (clap your hands) C= (stomp your feet) D= (slap in thighs)</p> <p>Create your own keys and movements (and to make more than 4 keys as well). The activity can be made as complex as you are willing to do it. Example: if the keys are B,B,D,A,C,C,B,B,D,A,C,C, these movements should be: Clap, clap, slap in thighs, snap, stomp, stomp....</p>

	<p>The <b>choreography(s)</b> - sequence of movements- that you create should be at least 25 keys long (i.e. it should contain 25 individual letter keys such as A, B, C etc.).</p> <p>Explore more intentionally different types of patterns. For example, creating a “symmetric” pattern (e.g. BBDA ADBB) or a “cluster” pattern (e.g. BBBBBD ACD), What would a “spiral” look like when it comes to choreography? (Again, there is no right or wrong answer or correct interpretation of the type pattern. These names and ideas should just be scaffolds for the students to explore).</p>
<p><b>30 minutes</b></p>	<p>Rehearse the choreography until you know it by heart. You are also welcome to use background music, and explore how different songs lend themselves naturally to certain sequences (this might be another way to understand the idea of rhythm).</p> <p>If possible, you can ask somebody else at home to recreate the pattern with you. If you are in a classroom or in a group setting, you are encouraged to take turns and do each other’s choreography as a group, or create patterns to challenge others (it can be like a dance contest).</p>
<p><b>10 minutes</b></p>	<p>Dancing, music, and rhythm are the results of sounds and tones that repeat themselves in different order. These are also patterns that are present in many of our lives! Reflect on how we don’t actually see some patterns, like music, but that we can find ways to represent them.</p> <p>Also, spend some time thinking about how patterns are not only there: we don’t only find them, we can also create them!</p> <p>Brainstorm what are other types of patterns (e.g. patterns in time - routines; patterns in how you get from one place to another- routes; patterns in how the school year is set up, etc.)</p>
<p><b>25 minutes (Optional)</b></p>	<p><b>Enrichment Activity (WhatsApp-Dependent)</b></p> <p>Copy the following images on a sheet of paper and Invite take a look at them:</p> <p>What do you see?</p> <p>Describe the images in detail (e.g. “I see some symbols that look like the letter e” or “I see that those symbols appear in the first image and then again in the last one”)</p>

	<p>What do they think is going on here? - Come up with all sorts of ideas (e.g. “It looks like what someone who is learning to write will write,” “they look like letters in another language”, etc.)</p> <p>What do you wonder about these patterns?</p> <p>Write down your answers to the three questions.</p> <p>The images represent a song! Play the song:</p> <ul style="list-style-type: none"> <li>● If video is available, watch this video: <a href="https://www.youtube.com/watch?v=MWbzRP5gJw4">//www.youtube.com/watch?v=MWbzRP5gJw4</a></li> <li>● You can also view it via WhatsApp in the following voice note: <a href="https://voca.ro/1dnr91Bu64wi">https://voca.ro/1dnr91Bu64wi</a></li> </ul> <p>Try to follow with your fingers the patterns in the images that you just saw. The images represent the rhythms of the song in different ways. Someone “translated” the patterns of rhythm to something that we can see. This is called a <b>Musicgram</b> and is very similar to how musicians “write” music.</p> <p>Create your own “Musicgram” for your favorite song in a sheet of paper! The musicgram needs to have the following characteristics:</p> <ul style="list-style-type: none"> <li>● “Translating” one minute of a song</li> <li>● Visually, a “reader” should be able to differentiate between the “chorus” and the rest of the song</li> <li>● There should be at least 5 different signs</li> </ul>
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## DAY 3

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Today, we will be learning about how to use patterns.

Suggested Duration	Activity and Description
5 minutes	Vision involves identifying patterns, like combining pixels. Somehow we organize the flickering map of brightness and color into surfaces, textures,

	<p>shapes and objects embedded in a three-dimensional space. This was the inspiration for a drawing technique called pointillism. Famous painters, such as Georges Pierre Seurat and Vincent van Gogh used this technique. And it is also used in computers and screens.</p> <p>Let's see how this works.</p>
<b>10 minutes</b>	<p>Decide on a design they would like to paint. You can try drawing a simple landscape or a portrait.</p> <p>Sketch that design with pencil.</p>
<b>20 minutes</b>	<p>Decide on the colors that their design will have. So, for instance, you will use green for the stem of the flower, and pink for the flower.</p> <p>Instead of filling the white space with traces, leave marks with a q-tip (if unavailable, you can use their fingers, but ideally you would use something with a finer tip) until most of the space has been filled. You can explore with leaving darker and lighter marks with the same color and/or combining two similar colors/two shades of the same color for the same part of the drawing.</p>
<b>10 minutes</b>	<p>After they have finished, let the paint dry, and do this exercise ("Zoom in" Thinking Routine). Use your own drawing and ask the questions to a family member:</p> <ul style="list-style-type: none"> <li>● Make a tiny hole in a sheet of paper and place it on top of their drawing. Ask: What do you see or notice? What is your hypothesis or interpretation of what this might be based on what you see or notice?</li> <li>● Use the same sheet of paper, but make the hole a bit larger. Ask: what new things do you see or notice? How does this change your hypothesis or interpretation?</li> <li>● Finally, without the paper, ask: What do you see or notice? What is your hypothesis or interpretation of what this might be based on what you see or notice?</li> </ul>
<b>10 minutes</b>	<p>This process of "zooming out" that you just did with their drawings is called "<b>abstraction</b>" and patterns help us do this.</p> <p>An abstraction involves the synthesis of particular facts or data into one general theory or picture about something. Abstraction is the opposite of specification or staying at the level of the details. Patterns help us move away from specifics to understand what is repeating and in what way. Without patterns, we would not be able to understand what we see around us!</p> <p>What kind of things do you think we can do with patterns when we understand them this way? Think for a few minutes, and write down your ideas. If in a classroom setting, share the ideas with everyone and write them on the board.</p>



## DAY 4

Today you will begin to learn about a more “mathematical” exploration of patterns and learn about sequences.

Suggested Duration	Activity and Description
20 minutes	<p>Here are some examples of patterns in math:</p> <p>1 0 1 0 1 0 1 0 1 0 1 0 1..... What number comes next?</p> <p>How about this one:</p> <p>1 3 5 7 9 11.... What number comes next? How do you know what number comes next?</p> <p>There is a rule that can help you find the following number. In this case, the rule is adding “2” to the previous number.</p> <p>Let’s try another one:</p> <p>3 6 9 12 15..... What number comes next? How do you know? (In this case, the rule is that all these numbers are the multiples of three, ordered from the smallest to the largest)</p> <p>9 18 27 36 45..... What number comes next? How do you know? (In this case, these are the multiples of 9)</p>
15 minutes	<p>Design your own sequences starting with number 1 and based on a rule (at least five). They can come up with this rule combining addition, subtraction, and multiplication. For example, “the next number will be the previous number times 3, minus 1 (The sequence would be: 1 2 5 14 )”</p> <p>You can challenge family members or peers to guess the following number in the sequence.</p>
20 minutes	<p>Extra challenge: Finally, consider the following numbers:</p> <p>0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, ....</p> <p>Can you predict what number comes next?</p>

	<p>This is called the Fibonacci sequence. Each number is the sum of the two numbers that precede it. Double check this pattern. It's a simple pattern, but it appears to be a kind of built-in numbering system to the universe.</p> <p>Create your own dance choreography using the Fibonacci sequence e.g. blank (0), tap (1), tap (1), snap (2)... or make up your own dance choreography based on the sequences that you came up with.</p>						
<p><b>10 minutes</b></p>	<p>Here are some examples of things where we can also find the Fibonacci sequence:</p> <ol style="list-style-type: none"> <li>a. The number of petals in a flower consistently follows the Fibonacci sequence. Famous examples include the lily, which has three petals, buttercups, which have five (pictured at left), the chicory's 21, the daisy's 34, and so on.</li> <li>b. The Fibonacci sequence can also be seen in the way tree branches form or split. A main trunk will grow until it produces a branch, which creates two growth points. Then, one of the new stems branches into two, while the other one lies dormant. This pattern of branching is repeated for each of the new stems. Root systems and even algae exhibit this pattern.</li> <li>c. The head of a flower is also subject to Fibonacci processes. Typically, seeds are produced at the center, and then migrate towards the outside to fill all the space. Sunflowers provide a great example of these spiraling patterns. The seed heads are so tightly packed that the total number can get quite high — as many as 144 or more. And when counting these spirals, the total tends to match a Fibonacci number.</li> </ol>						
<p><b>20 minutes</b></p>	<p>Now, let's see an interesting pattern that emerges when we divide each term of the Fibonacci sequence by the term before it. Do this with at least 10 consecutive terms (Learners can practice division by doing this by hand). Learners may complete this table by themselves:</p> <table border="1" data-bbox="467 1617 1276 1766"> <thead> <tr> <th data-bbox="467 1617 810 1766">Terms in Fibonacci sequence</th> <th data-bbox="810 1617 1013 1766">Previous Term</th> <th data-bbox="1013 1617 1276 1766">Ratio</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	Terms in Fibonacci sequence	Previous Term	Ratio			
Terms in Fibonacci sequence	Previous Term	Ratio					

	1	1	1
	2	1	2
	3	2	1.5
	5	3	
	8	5	
<b>5 minutes</b>	<p>What do you notice? (Input: the ratios should be approaching the number 1.6666).</p> <p>This number, 1.6666 is called <i>phi</i>, and is also very present in nature.</p> <p>For example, this shape, a rectangle in which the ratio of the sides a/b is equal to phi (draw this rectangle), can result in a nesting process that can be repeated into infinity — and which takes on the form of a spiral. It's called the logarithmic spiral, and it abounds in nature! See natural examples below - spiral seashell, hurricane, and our galaxy, the Milky Way.</p>		

	If possible, go around and try to find flowers, cones, trees, ferns, shells, or objects that follow the Fibonacci sequence.
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## DAY 5

Today you will learn that patterns can be changed!

Suggested Duration	Activity and Description
<b>1 hour</b>	<p>Awareness of the basic patterns that exist in our world will help you see what’s happening around you in a different light.</p> <p>For example, if we know that two things have been happening together in the past, we might be able to predict what will happen in the future. For example, if we see that whenever there are clouds, it is likely that it will rain, then we can expect that, if we see clouds, it is going to rain. This approach is the foundation of almost every discipline, including architecture, design, math, and science.</p> <p>But, most importantly, having an understanding of what might happen in a situation may give you the opportunity to create a different outcome than what you have seen before.</p> <p>Throughout the week, we have been keeping track of some behaviors in our diaries. Take a look at them and try to observe some emerging patterns.</p> <p>Write down three patterns that you believe are emerging from your observations following this structure:</p> <p>“When I _____, then _____ happened.”</p> <p>For example, you can say something like “When I ate chips late at night, then I had nightmares.”</p> <p>Are there “good” or “bad” patterns or habits?</p> <p>Let’s “Zoom out.” Think about the same pattern in the context of a month, and in the context of a year. Is this something that you might be able to observe over the course of this time?</p> <p>Brainstorm some ideas to break or enhance each of three patterns that you identified.</p>

	<p>Make a poster to remind themselves of how to break those. They can use some of the patterns that they observed on day one or pointillism to design their posters.</p>
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## ASSESSMENT CRITERIA

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### Final products:

- List of patterns:
  - Learners presents a complete list of 10 patterns
  - Each item in the list includes:
    - A brief description
    - A brief description of why they found this pattern compelling enough to include it in the collection.
    - A visual image, sample, or rendering of the pattern.
    - A name, one that you think is appropriately descriptive
- Choreography. Learners are able to create and follow a choreography build with four simple steps.
- Musicgram (optional):
  - Learners creatively “translate” from sound to paper one minute of their favorite song. The musicgram includes:
    - At least 5 different signs
- Posters with three suggestions to improve their habits
  - Learners are able to identify three behaviors or reactions that they would like to observe based on some examples
  - Learners are able to keep track of their behaviors over a week
  - Learners are able to identify five patterns of behavior during the week.
  - Learners brainstorm three concrete and actionable ideas to improve their habits

Learners design a creative poster to remind themselves about their ideas to break their negative patterns of behavior.