



ABOUT THE MATH: WHAT IS MY PATTERN?

If you watch and listen to how students interact with the pattern blocks, you can learn a lot about what they know and what they are ready to learn. Once you see what they can do, you can help them take the next step in their learning. In this game, children practice:

- Building a mathematical habit of mind around pattern and structure
- Recognizing, duplicating, and extending simple repeating patterns (including in songs, movement, and stories)
- Creating repeating patterns through repetition of a unit (with objects and in movement)
- Recognizing and copying other structures that repeat with regularity such as growing patterns and symmetrical designs.

Mathematicians say that mathematics is the study of pattern—of patterns and structure in numbers, and patterns and structure in geometry. Seeing pattern and structure in the world around us is a key mathematical habit of mind and one that children are developing from the first days of life. Children are naturally attuned to patterns because it allows them to predict what will come next and make sense of their world. The preschool day tends to follow a predictable pattern that repeats everyday—such as breakfast, circle, small group, outdoor, free play, lunch, nap, etc. Drop-off routines often follow a pattern everyday—hug goodbye to parent, hang up backpack and jacket, wash hands, play. When we see patterns we are able to predict—to count on things happening—and feel more secure and confident. Noticing these routines and patterns in everyday life helps prepare children to notice other patterns. Many stories, dances, and chants follow a predictable pattern. “Five Little Monkeys” follow a pattern where the words repeat but the number of monkeys decreases by one each time. “Head, Shoulders, Knees, and Toes” follows a pattern that speeds up as you go. Dancing or movement patterns such as *clap, clap, stomp, clap, clap, stomp* also help children build an understanding of pattern that includes the kinesthetic. As you engage children in these everyday activities, help them notice the pattern and describe it in words.

In mathematics, patterns are more than a beautiful design (though they are often that too), patterns follow a predictable rule and that rule allows us to predict what will come next. There are many kinds of patterns and ways to express them. The most common in preschool classrooms are repeating patterns. But some children will also be interested in symmetrical and growing patterns. We will describe each briefly.

Repeating patterns. Repeating patterns are the ones we tend to think of first when we think of patterns. They contain a segment that continually repeats such as the stripes in the American flag: red, white, red, white, red, white.... The pattern blocks below make a repeating

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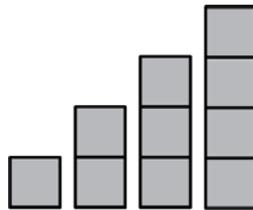
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pattern: square, trapezoid, square, trapezoid, square ... The unit of repeat is "square, trapezoid".



Growing patterns. Growing patterns increase or decrease by a constant amount. The block towers below increase by one each time. They are a plus-one growing pattern. Our number system is a plus-one growing pattern too: 1, 2, 3, 4, 5. Each unit grows bigger by one.



Symmetrical patterns. Symmetrical patterns have segments that repeat but instead of repeating in a line, the segments are the same when flipped, folded, or rotated. Butterflies have mirror symmetry—the butterfly wings match when folded along a line through the middle of the butterfly. Snowflakes have mirror symmetry and rotational symmetry. The segments of a snowflake match when folded and the design looks the same when you turn or rotate it. There is symmetry in artwork, in buildings, in nature, and even in people and animals (our bodies are symmetrical if you draw a line down the middle—two ears, two arms, two legs, etc.)



Concentric patterns. Concentric patterns have circles or rings that grow from a common center like the ripples in the water or the circles that surround the bullseye on archery target.



Children usually go through a progression in their understanding of pattern. It begins with recognizing patterns in songs, poems, dances, art, and on their clothes. Encourage them



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to notice these patterns and talk about them about the patterns. As they gain more practice they will be able to copy patterns that they see, then find something that is missing from a pattern, then extend a simple pattern and create their own patterns. Later they can identify and copy the 'unit' ABAB by creating a pattern like: hexagon, rhombus, hexagon, rhombus. As you and the children are building patterns ask them: *What comes next? How do you know?*



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Progression of Geometry and Pattern Concepts from 3- to 6-Years-Old (End of Kindergarten)

The lines between columns are intentionally fuzzy because the age is approximate. This progression is not to be used as an assessment or checklist, or to judge whether a child is ready to transition to Kindergarten. They represent expectations for children, but each child will reach these indicators at their own pace and their own way. These are meant to help you know what to expect; what learning may come first and what learning may come next for most children.

	@3 years old	@4 years old	@5 years old	@6 years old (end of Kindergarten)
Sequential Repeating Patterns	<ul style="list-style-type: none"> Recognizes patterns on clothes and in the world May copy simple repeating patterns 	<ul style="list-style-type: none"> Recognizes patterns. Copies simple repeating patterns (AB, AAB) May be able to say what is missing from a pattern with at least 3 iterations of the repeating unit May be able to extend a simple repeating pattern May create simple repeating patterns (e.g. square, circle, square, circle,..) 	<ul style="list-style-type: none"> Recognizes, copies, and creates simple repeating patterns (e.g. square, circle, square, circle,..) Can extend a pattern Can identify what is missing from a pattern with at least 3 iterations of the repeating unit 	<ul style="list-style-type: none"> Recognizes, duplicates, extends, and creates sequential repeating patterns of increasing complexity). Can predict what comes next.
Growing Patterns			<ul style="list-style-type: none"> Can recognize growing patterns 	<ul style="list-style-type: none"> Can recognize, extend, and create growing patterns. Can predict what comes next





BOOK LINKS

A-B-A-B-A-A Book of Pattern Play by Brian P. Cleary

This book helps children understand what a pattern is with fun rhyming text and lots of visual illustrations: "It's sort of an arrangement of colors, shapes, or things, in a way that is predictable as in the row of rings. See the colors? Green, red, gold then green, red, gold green, red. Once you catch on, you can guess exactly what's ahead." The end of the book includes skip counting by 2s, 5s, 10s—an idea you can expose them to now and help them be ready for it in kindergarten.

Pattern Bugs by Trudy Harris

This fun book emphasizes patterns through repeated words and sounds that are complemented by the repeating patterns in the illustrations and around the border of the pages. There are many patterns that children can identify on each page. They range from patterns by color, by shape, by size, and by number, including combinations of these attributes. You can challenge children to say the pattern name (AB or AAB) when they recognize a pattern.

Pattern Fish by Trudy Harris

Similar to *Pattern Bugs* and by the same author, this book describes groups of fish by their bobbing, gliding, and swishing movements. There are patterns everywhere—in the color of the fish, the background, the text, and the borders. You can challenge children to say the pattern name (AB or AAB) when they recognize a pattern.

I See a Pattern Here Pattern by Bruce Goldstone

While using this book as a read aloud would be hard for most preschoolers, you can still use the fabulous pictures and talk about the patterns with your children. This is a great text for explaining patterns and the terms that mathematicians use to describe patterns.

Pattern (Math Counts) by Henry Pluckrose

A great book to get children thinking about the patterns they see in the world around them. Each page has a picture of a different pattern found in the world. You can use one or two pages a day and set the book out for children to explore on their own.

I See Patterns by Susan Ring

This book has beautiful pictures from nature of patterns on animals, in the sand, on a butterfly, on the land, on flags, on seashells, and on a bee.

Five Little Monkeys by Eileen Christelow

This fun popular book and song can be used to teach pattern, counting backwards, knowing one less, and understanding cardinality. For pattern, you can draw kids





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attention to the lines of the song that repeat each time and see if they know what changes—there is one less monkey jumping (rather than a growing pattern, it's a shrinking pattern). To practice the pairs that make 5, you can ask children how many monkeys *are not* jumping (if 3 are jumping, 2 are not jumping).





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