Copy My Pattern

YOUNG MATHEMATICIANS

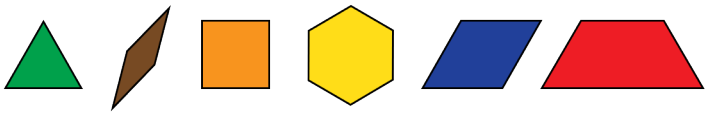
Players 2-6 | Ages 2+ | 5-10 min

GOAL

To recognize a shape pattern and copy it.

MATERIALS

Pattern blocks or paper shape cut-outs.



Any pattern templates

VOCABULARY

Pattern
Repeat
Square
Triangle

QUESTIONS

Do you see a pattern?
What pattern do you see?
What part of the pattern repeats?

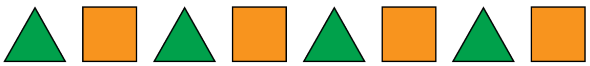
HOW TO PLAY

1. Choose a pattern template or create your own simple repeating pattern (e.g., circle, square, circle, square).

2. Place the rest of the pattern blocks or other materials you are using in a pile.

3. Place your pattern down in front of children. If necessary, tape your template or pattern pieces to a surface to prevent sliding.

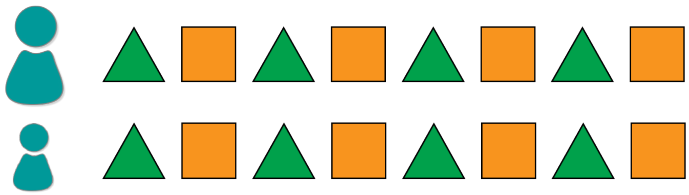
   Say, "Here is my pattern! Let's say the pattern together."



   Together, chant, "triangle, square, triangle, square, triangle, square, triangle, square." Point to each shape as you say its name.

   Say, "Now it's your turn. Can you copy my pattern? Use this pile of shapes to copy my pattern."

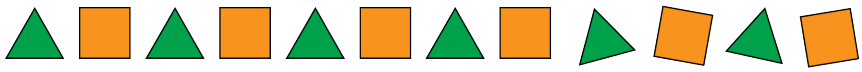
   Wait for children to copy your pattern. If needed, allow them to put their pattern directly underneath yours, matching the shapes with 1:1 correspondence.



   Say, "Yes, you copied my pattern!" Chant the pattern together, pointing to each shape as you say its name.

   Continue playing with different patterns. When children are ready, have them choose a pattern template or make their own pattern for others to copy.

   Variation: Have children extend your pattern! Allow them to build onto your pattern instead of copying it:



TIPS FOR PLAYING

- Many stories, dances, and chants follow a predictable pattern. "Five Little Monkeys" follows 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 through movement. As you engage children in these everyday activities, help them notice the pattern and describe it in words.

WHAT CHILDREN ARE LEARNING

- Children may begin to understand that patterns are made up of repeating units, but it may take more time for them to be able to consistently identify the repeating unit or to create their own patterns. With time and experience, children will be able to see the underlying mathematical structure in patterns and can use symbols such as letters to represent the structure of the pattern.

- Notice whether children use the same repeating unit for their whole design. If they do change the pattern part way through, you can say you noticed that they started a new pattern and talk about how it's different.

MATH TOPICS

Patterns and Structure | Sorting and Attributes | Shapes and Geometry

VIDEO

Watch Game Video

View the QR code in your smartphone's camera app or QR code reader to watch a video that shows how to play Copy My Pattern.

EDC Education Development Center

www.ym.edc.org

Dance Patterns

YOUNG MATHEMATICIANS

Players 2-6 | Ages 3+ | 5-10 min

GOAL

To recognize a pattern and predict what comes next.

MATERIALS

Bodies

VOCABULARY

Pattern
Repeat
Before
After

QUESTIONS

What was the pattern I made?
How did you know what came next?

HOW TO PLAY

1. Choose an area where children can move around freely.

2. Begin doing a simple movement pattern, such as: stomp, clap, stomp, clap, stomp, clap.

Have children join in making the movements as soon as they recognize the pattern.

Once most children have joined in, say, “freeze!” and have children freeze in place.

Ask, “What movement comes next?” Wait for children to say or demonstrate the next movement in the pattern.

Continue to play using different movement patterns. You can include: touching your toes, touching your head, reaching your hands in the air, putting your hands on your hips, and jumping on one foot or two feet!

TIPS FOR PLAYING

- For a higher challenge, make a “mistake” (e.g., stomp, clap, stomp, clap, stomp, stomp). See if children catch your mistake and ask them to correct it!

WHAT CHILDREN ARE LEARNING

- This game is a great way for children to get up and move, and to experience patterns by sight, sound, and feel!

- When you ask, "what comes next?", you are helping children recognize a pattern's repeating unit. For example, if they say that 'clap' comes next because the pattern goes "stomp, clap, stomp, clap, stomp, clap," they've recognized that the pattern's repeating unit is "stomp, clap."

MATH TOPICS

Patterns and Structure

VIDEO

Watch Game Video

View the QR code in your smartphone's camera app or QR code reader to watch a video that shows how to play Dance Patterns.

Caterpillars and Crafts

YOUNG MATHEMATICIANS

Players 2-6 | Ages 4+ | 10-15 min

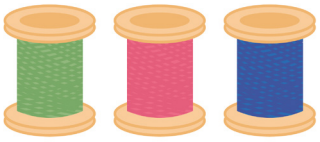
GOAL

To create a pattern.

MATERIALS

Stringing beads

Pipe cleaners, yarn, or string



VOCABULARY

Pattern
Beside
Between
Shop
Repeat

QUESTIONS

What pattern do you see?
What comes next? How do you know?
Can you tell me about the pattern you made?

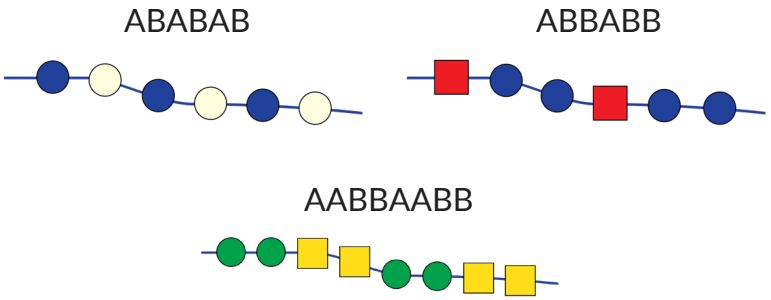
HOW TO PLAY

1. Set up a “Caterpillars and Crafts Shop” by putting all the materials on a table or other flat surface.

2. Using the stringing beads and pipe cleaners, yarn, or string,

make several examples of AB, ABB, and AABB patterns for children to copy. Make more complex patterns as children are ready.

3. Say, "We are going to make caterpillars and crafts to sell to our customers at our shop!" Show children the AB, ABB, and AABB patterns that you made.



Say, "Can you use these materials to copy the patterns that I made? We will sell your patterns at the shop."

Have children make new crafts by copying the patterns. Once children are ready, have them design their own bead patterns to sell to customers at the Caterpillars and Crafts Shop.

Variation: Make growing patterns and symmetrical patterns for children to copy. To learn more about patterns, watch our Intro to Patterns video, available using the QR Code on the next page or by visiting www.ym.edc.org.

TIPS FOR PLAYING

- Many stories, dances, and chants follow a predictable pattern. "Five Little Monkeys" follows 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 through movement. As you engage children in these everyday activities, help them notice the pattern and describe it in words.

WHAT CHILDREN ARE LEARNING

- Copying patterns helps children understand what patterns are. It also helps them identify and understand a pattern's repeating unit.

- Children may begin to understand that patterns are made up of repeating units, but it may take more time for them to be able to consistently identify a pattern's repeating unit or create their own patterns. With time and experience, children will be able to see the underlying mathematical structure in patterns. For example, with support, they will start to see that a caterpillar with "blue, red, green, blue, red, green" is just like a bracelet's pattern of "purple, yellow, black, purple, yellow, black," because they can both be labeled ABC patterns.

MATH TOPICS

Patterns and Structure | Sorting and Attributes

VIDEO

Watch Game Video

View the QR code in your smartphone's camera app or QR code reader to watch a video that shows how to play Caterpillars and Crafts.

Watch the Intro to Patterns Video

View the QR code in your smartphone's camera app or QR code reader to watch a video with more information on playing with patterns.

EDC Education Development Center

www.ym.edc.org

What's Missing?

YOUNG MATHEMATICIANS

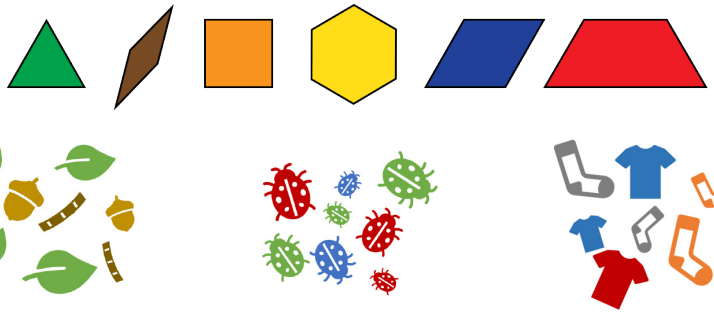
Players 1-4 | Ages 4+ | 5-10 min

GOAL

To fill a pattern's missing piece.

MATERIALS

Any materials you have enough of to make a pattern.



VOCABULARY

Pattern: a design that repeats in a predictable way so that you know what comes next

Missing

Repeat

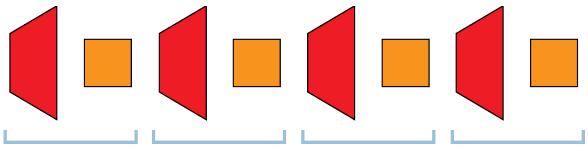
QUESTIONS

What is repeating in this pattern?

How did you know what was missing?

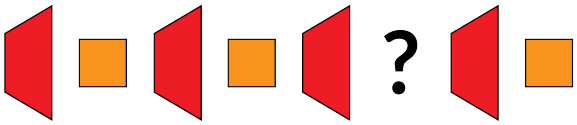
HOW TO PLAY

1. Create a pattern that is long enough to have at least three repeating units.



2. Together, chant the items' names out loud, pointing to each item as you say its name.

3. Say, "Close your eyes. I'm going to make a small change in the pattern." Then cover or remove one of the pieces from the pattern.



4. “Now, open your eyes. Can you find what’s missing from my pattern?”

5. Once children identify the missing piece, you can ask, “How did you know that was the missing piece?”

TIPS FOR PLAYING

- Make your pattern long enough so that children can recognize the pattern's repeating unit. About three repeating units is enough, but feel free to make it longer.

- For an extra challenge, you can remove more than one piece from the pattern. For example, you can remove the second trapezoid and the third square. When children have to figure out several missing pieces, they're getting more practice noticing a pattern's underlying structure.

WHAT CHILDREN ARE LEARNING

- Asking children how they figured out the missing pieces helps you learn about the strategies they are using and how they’re beginning to understand pattern structure.

- Ask children to not only solve a problem, but also to explain how they solved it. This helps them practice their mathematical thinking and helps build their language skills.

MATH TOPICS

Patterns and Structure

VIDEO

Watch Game Video

View the QR code in your smartphone's camera app or QR code reader to watch a video that shows how to play What's Missing.

EDC Education Development Center

www.ym.edc.org

Extend the Pattern

YOUNG MATHEMATICIANS

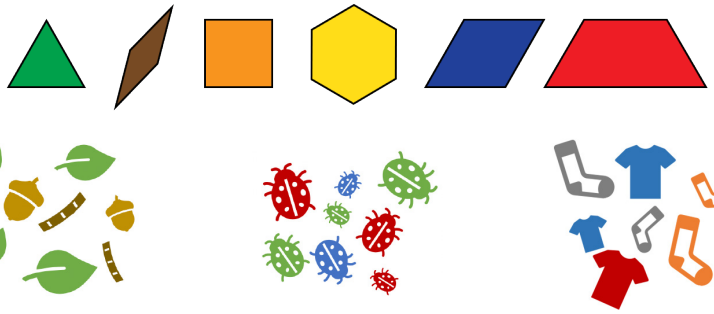
Players 1-4 | Ages 4+ | 5-10 min

GOAL

To extend a pattern.

MATERIALS

Any materials you have enough of to make a pattern



VOCABULARY

Pattern: a design that repeats in a predictable way so that you know what comes next.

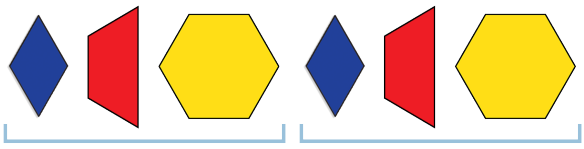
QUESTIONS

How do you know what comes next?

What is repeating in this pattern?

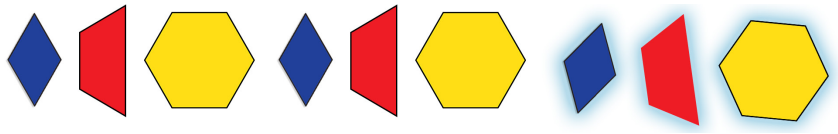
HOW TO PLAY

1. Create a pattern with at least two repeating units.



2. Then say, "I started this pattern. Can you continue it? Can you extend the pattern?" And see if they're able to figure out what comes next.

3. Sometimes it's helpful to chant the pattern out loud. For example, "Blue, red, yellow, blue, red, yellow, blue...red! Yellow!" or "Rhombus, trapezoid, hexagon, rhombus, trapezoid, hexagon, rhombus...trapezoid! Hexagon!"



TIPS FOR PLAYING

- Children love to make really, really long patterns. Be sure to leave enough space for their patterns to grow longer!

WHAT CHILDREN ARE LEARNING

- As children continue the pattern, watch to see if they're able to recognize the pattern's repeating unit. This shows that they're figuring out what's repeating in the pattern.

What is a repeating unit? Patterns repeat in predictable ways. One type of pattern is the "red, white" pattern of stripes on the United States flag: red, white, red, white, red, white... In this case the repeating unit is "red, white." A repeating unit is the part of the pattern that repeats over and over again.

MATH TOPICS

Patterns and Structure

VIDEO

Watch Game Video

View the QR code in your smartphone's camera app or QR code reader to watch a video that shows how to play Extend the Pattern.

Same Rule, Different Stuff

YOUNG MATHEMATICIANS

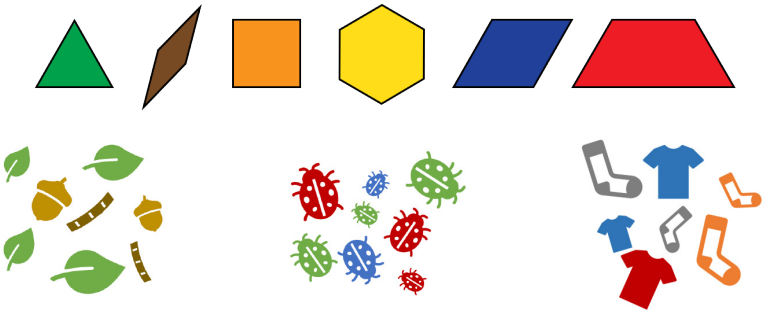
Players 1-4 | Ages 5+ | 5-10 min

GOAL

Copy a pattern using different materials.

MATERIALS

Any materials you have enough of to make a pattern



VOCABULARY

Pattern: a design that repeats in a predictable way so that you know what comes next

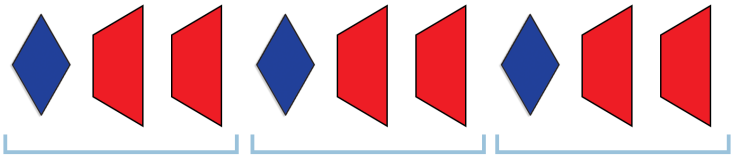
QUESTIONS

Can you make the same pattern that I made but using different materials?

What is repeating in this pattern?

HOW TO PLAY

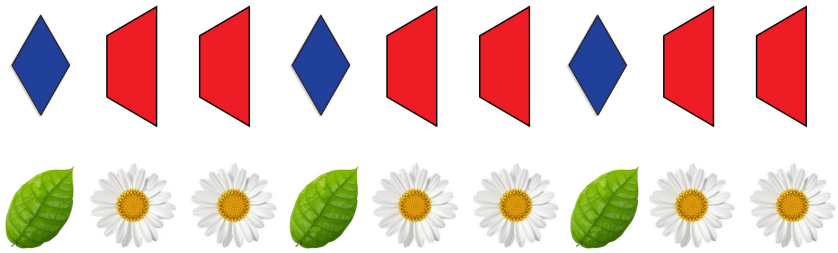
1. Create a pattern with at least two repeating units.



What is a repeating unit? Patterns repeat in predictable ways. One type of pattern is the "red, white" pattern of stripes on the United States flag: red, white, red, white, red, white... In this case the repeating unit is "red, white." A repeating unit is the part of the pattern that repeats over and over again.

2. Ask, "Can you make the pattern like mine but using different materials?"

3. Ask children, "What is repeating in this pattern?"



TIPS FOR PLAYING

- This is an advanced patterning skill for young children, so give them a lot of practice with it.

- For an extra challenge, you can show children only one repeating unit and ask them to build a pattern by repeating that unit with similar or different materials.

WHAT CHILDREN ARE LEARNING

- To copy a pattern structure using different materials, children need to be able to recognize the repeating unit of a pattern. For example, if you have rock, stick, rock, stick, you can think about it as something, then something else, then the first thing again. If you take some other materials, like colored bears, you can transfer the pattern by putting red bear, blue bear, red bear, blue bear. The mathematical term for this is *transfer* because it focuses on transferring the structure of a pattern, not copying the pattern exactly.

- In elementary school, children may learn to use letters to represent a repeating pattern. Each unique item in the pattern's repeating unit can be assigned a letter. A triangle, square, square pattern, could be called an ABB pattern, where the triangle is represented by A and the square is represented by B. Using letters makes it a lot easier to talk about different pattern structures and describe them to others.

MATH TOPICS

Patterns and Structure | Shapes and Geometry

VIDEO

Watch Game Video

View the QR code in your smartphone's camera app or QR code reader to watch a video that shows how to play Same Rule, Different Stuff.

Make It From Memory

YOUNG MATHEMATICIANS

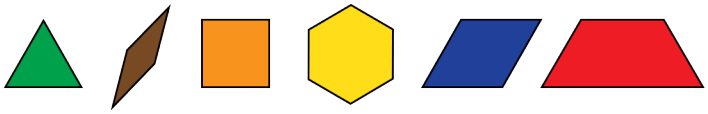
Players 1-4 | Ages 5+ | 5-10 min

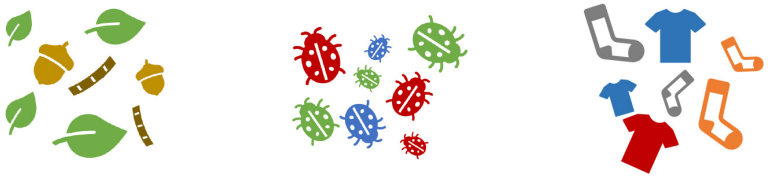
GOAL

To copy a pattern from memory.

MATERIALS

Any materials you have enough of to make a pattern.





1 cloth, piece of paper, or other covering

VOCABULARY

Pattern: a design that repeats in a predictable way so that you know what comes next

Repeat

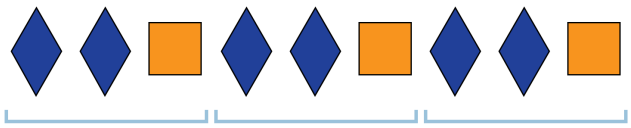
QUESTIONS

What is the part that repeats in this pattern?

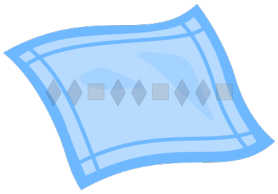
How did you remember how to make the pattern?

HOW TO PLAY

1. Create a pattern with at least two repeating units.



2. Hide the pattern under something so no one can see it.

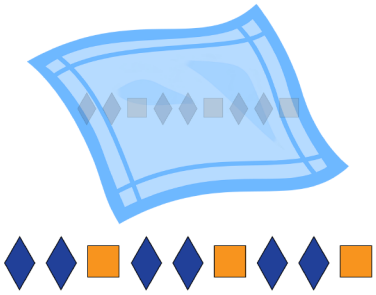


3. Give children the same materials you used to make the pattern.

4. Say, "I'm going to show you a pattern for just a short time, then I'm going to hide it. Then you can try to make the same pattern from memory."

5. Show the pattern for a few seconds. For children just learning, show it for longer. You can reduce the time you show the pattern as children get more practice.

6. Give children time to make the pattern.



7. Ask, "How did you remember how to make the pattern?" Talk about how they remembered.

TIPS FOR PLAYING

- This game is challenging! Make sure children have lots of experience with patterns before you play.

- Let children peek if they want to. Over time, they will peek less and less.

WHAT CHILDREN ARE LEARNING

- Children are practicing both their patterning and memory skills. The more complex a pattern is, the more challenging it is to remember! Once children are able to recreate simple AB patterns, like red-blue, red-blue, from memory, challenge them to try to remember patterns with other structures, like ABC (red-blue-green), or even ABCA (square-triangle-circle-square) from memory!

- Encourage children to name the part of the pattern that is repeating. When children are ready, you can challenge them to copy the same pattern structure using different materials. (See **Same Rule, Different Stuff** for more).

MATH TOPICS

Patterns and Structure | Shapes and Geometry

VIDEO

Watch Game Video

View the QR code in your smartphone's camera app or QR code reader to watch a video that shows how to play Make It From Memory.

The Mystery Rule

YOUNG MATHEMATICIANS

Players 2–4 | Ages 5+ | 10–15 min

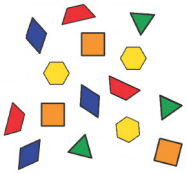
GOAL

Children determine the common attribute, or characteristic, among a set of items.

MATERIALS

Nature items

Counter sets



Pattern Block cutouts

Clothing items

VOCABULARY

Same (in common)

Different

Sorting rule

QUESTIONS

How did you figure out what the sorting rule was?

What did you look at and notice?

What did you think about?

HOW TO PLAY

1. Choose a collection of items, and think about how you would like to sort them. Sorting means to separate into groups. You could sort by attributes, such as size, color, and shape, or by how an item is used.

2. Then, put all the items that follow your rule in one group, and all the items that don't follow your rule in another group.

3. Start your turn by saying, "I used a mystery sorting rule to sort these items from the rest of the pile. Can you look at the items and tell me what my sorting rule was? What do all of these items have in common? What is the same about these items?"

   Some children may be able to tell what the sorting rule is right away ("You took out all the orange"). You can respond by saying, "Yes, I made a group of all the orange laundry!"

   Others may need more time and experience. Ask questions to direct children's attention to the sorting rule.

"Are these items the same size or different sizes?"
"Are they the same color?"
"Are these all the same type of laundry item?"

4. Discuss with children how they figured out the rule. Don't be surprised if they come up with a different rule than you thought of. It's exciting to talk about how more than one rule can be true.

5. When you're ready, play again, or this time have the children choose their own mystery sorting rule for others to solve.

WHAT CHILDREN ARE LEARNING

- Many young children love to sort and organize groups of objects. This process of sorting, or classification, is an important practice in science and mathematics. Activities like this help children focus on the attributes of objects and think about what makes things the same and different.

- To solve the mystery sorting rule, children need to ignore the differences between the items in the set (e.g., that the orange laundry includes different clothing items) in order to determine what the items have in common (they are all orange). This helps children develop both their sorting skills and their attention-shifting skills.

MATH TOPICS

Data Collection and Analysis

Sorting and Attributes

Shapes and Geometry

VIDEO

Watch Game Video

View the QR code in your smartphone's camera app or QR code reader to watch a video that shows how to play *The Mystery Rule*.

The Yes/No Sort

YOUNG MATHEMATICIANS

Players 1–4 | Ages 3+ | 5–10 min

GOAL

To sort a group of items into two sets (yes/no) according to one sorting attribute, or characteristic.

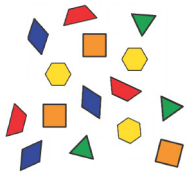
MATERIALS

Any collection of items that can be sorted into yes and no piles according to one specific attribute (a particular type, size, shape, color, texture, etc.). Examples include:

Nature items

Clothing items

Kitchen items



Pattern Block Shapes

VOCABULARY

Compare

Same

Different

QUESTIONS

Can you explain the sorting rule to me?

What is another sorting rule we could use?

HOW TO PLAY

1. Choose a collection of items, and place them in a pile on a table or floor.

2. Choose an attribute, or characteristic, for children to sort the collection into “Yes” and “No” piles by. Examples:

    - Nature items: things that are brown, things that are soft

- Clothing: blue items, small items, sandals
- Kitchen: spoons, raisins (from a fruit or trail mix)
- Shapes: triangles, shapes with four sides

3. Show children the collection of items. For example, show a laundry basket with clothes inside. Then say, "Let's sort these clothes into two piles. In one pile, put all of the clothing that is blue. In another pile, put all of the clothing that is ***not*** blue."

4. Hold up a piece of clothing from the basket, then ask, "Is this blue?"

5. Once a child responds correctly, ask, "Which pile should we put it in? The blue pile or the other colors pile?"

6. Let the child add the piece of clothing to the correct pile.

7. Have children continue to sort the clothes into the piles of blue and non-blue. Allow them to make reasonable sorting decisions as they go, providing questions to draw out the child's thought process. For example, if a shirt has blue and yellow stripes, ask children which pile they think the shirt belongs to (e.g., "it goes in the blue pile because everything that has some blue on it will go in the blue pile").

8. Once children have finished sorting, ask comparison questions:

"Which pile looks bigger, the blue pile or the other colors pile?"
"The blue pile is bigger. What do you think that means? Do we wear a lot of blue clothing?"
"How many pieces of clothing do you think are in the blue pile? Can you count and see if you are right?"

9. Try to expand on this activity by putting the clothing items back into the basket and choosing a new attribute for children to sort the collection into yes and no piles by. For example: "Let's sort the clothes into two piles again. This time, let's put all of the kids' clothes in one pile and the grown-up clothes in another pile."

WHAT CHILDREN ARE LEARNING

- Many young children love to sort and organize their toys or other collections of objects around the house or in their classroom. This process of sorting, or classification, is an important practice in science and mathematics. Activities like this help children gain experience with grouping objects by their characteristics and counting how many in each group. Later, they will use these skills when collecting and analyzing data to solve problems.

- It is important to understand that young children's verbal skills vary. Some will be able to verbalize their answers to questions more easily than others. Children who demonstrate emergent language skills should be allowed to respond by pointing to piles or showing numbers with their fingers.

MATH TOPICS

Data Collection and Analysis

Sorting and Attributes

Shapes and Geometry

VIDEO

Watch Game Video

View the QR code in your smartphone's camera app or QR code reader to watch a video that shows how to play *The Yes/No Sort*.

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