

# Practical Patterns

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<b>Strand:</b>	Patterns, Functions, and Algebra
<b>Topic:</b>	Exploring patterns
<b>Primary SOL:</b>	1.14 The student will identify, describe, extend, create, and transfer growing and repeating patterns.
<b>Related SOL:</b>	1.1, 1.11

## Materials

- Connecting cubes
- Colored pencils or crayons
- Brown paper lunch bag
- Chart paper
- Markers
- Pencils
- Repeating Pattern recording sheet (attached)

## Vocabulary

*continue, core, extend, growing pattern, pattern, repeating pattern, transfer*

## Student/Teacher Actions: What should students be doing? What should teachers be doing?

1. Before the lesson with students, construct three patterns (ABABABABABAB, ABBABBABBABB, ABCCABCCABCC) using linking cubes with 12–15 cubes in each.
2. Gather students in an open area in the classroom. Begin a mathematics discussion about patterns. Ask, “*What is a pattern?*” Discuss what students say. You may want to make a visual representation of student responses so they can refer to the list. Explain that in the next several days, they will be learning about repeating and growing patterns and about using materials to create patterns, including manipulatives, letters, and numbers.
3. Show students the first four cubes of a pattern that you have created, hiding the rest of the cubes for the pattern in a brown paper lunch bag. Tell students that you have made a repeating pattern, but part of it is hidden in the bag. Ask them what they notice about the pattern that they can see. *How do students describe the pattern? How are they making predictions about what color may come next in the pattern? What is a repeating pattern? What does “repeat” mean?*
4. After discussing for a few minutes, pull a little bit more of the pattern out of the bag and have students check their predictions. In addition, introduce the term *core*. Tell students that the core of the pattern is the part of the pattern that repeats. Ask them to identify the core of the pattern with the cube pattern you just shared with them. To help students better understand the core, use additional cubes and connect them to match the core. Then use that group of cubes and move it along the pattern to show that the core is repeating. This is a method students can use to help identify the core.

5. Show students another pattern that you have prepared with cubes, only showing the first three cubes. Tell students that you have made another repeating pattern and the rest is hidden in the bag. Ask students to make a prediction about what they think could come next. *How do students describe the pattern? How are they making predictions about what color may come next in the pattern? Are they able to identify the core of the pattern?*
6. After discussing for a few minutes, pull a little bit more of the pattern out of the bag and have students check their predictions.
7. Show students the ABCC pattern that you created, only showing the first three cubes. Have students make a prediction about what they think comes next. (Many will think that it is an ABCABC pattern until you reveal the fourth cube.) Again, consider how students are describing their prediction and whether they recognize that it could be a variety of colors that could come next.
8. Next, show the students two more cubes of the pattern. Ask: *“Did your original prediction stay the same or change? Why?” Do students realize that sometimes patterns are more complex?*
9. Then, explain that students will be making two of their own patterns out of cubes. They can make any pattern they would like, but each needs to be at least 12 cubes long. They are going to make a representation of the pattern on a recording sheet. Students should also identify the core of their patterns.
10. Observe students as they are working. Here are some questions to consider while you are observing: *What kinds of patterns are they creating? Are some creating more complex patterns than others? Are some students struggling to make a repeating pattern? Does their pattern repeat or was it created randomly? How are students deciding what pattern to make? How are they describing their patterns? Are there any children that can be encouraged to make more complex patterns?*
11. Gather students in an open area where they can share and discuss their patterns. Have them bring the actual linking cube patterns that they created so others can see. Say: *“Tell us about one of the patterns that you made. How do you know it is a pattern?” “What would come next in your pattern if it continued?” “What is the core of the pattern?” “How are your two patterns similar or different?” “How is your pattern similar to (student’s) pattern? How is it different?” “Can you name your pattern in a different way using letters, numbers, or color words?”*
12. Be sure to include a variety of student-created patterns into the discussion. After several patterns have been discussed and compared, challenge students to find another student(s) in the room that has a pattern like their pattern. (For example, a student may have created a black-green-black-green cube pattern and they could match up with a student who made an orange-yellow-orange-yellow cube pattern, because they are both ABABAB patterns.)
13. Have students explain how they figured out whether their pattern was similar or different to other student patterns in the class.
14. When introducing growing patterns to students, you can use a similar process. Instead of hiding the repeating cube patterns in a lunch bag, build a growing pattern with

connecting cubes, color tiles, pattern blocks, etc. Have students discuss how the pattern is growing or changing and what is staying the same. Some examples of possible growing patterns are: AB AAB AAAB AAAAB, CD CDD CDDD CDDDD, and ABC AABC AAABC.

### Assessment

- **Questions**

- What type of patterns did you make with your connecting cubes? Name your patterns in a different way with letters, numbers, shapes, etc.
- Use different pictures or symbols to make two patterns that are like one of the patterns that you made.
- Have students use sounds or movement to represent one or both of their cube patterns.
- What is the difference between a repeating pattern and a growing pattern? What is an example of each?

- **Journal/writing prompts**

- Mrs. Smith decided to line up everyone in her class. She put a boy first, a girl second, a boy third, and a girl fourth. Who will be tenth? How do you know? Explain your thinking using pictures, numbers, and words.
- Ted decided to make his sister a bead necklace. First, he put a blue bead on a string. Next, he put a red bead on the string. Last he put a green bead on the string. He decided to continue this pattern. What color will the ninth bead be? How do you know? Explain your thinking using pictures, numbers, and words.
- Emily repairs roofs of houses. She climbs a ladder to get on top of roofs. The ladder has 15 rungs that need to be painted. Emily wants to use 3 different colors to paint the rungs on her ladder. She also wants to make a pattern. Show how Emily should paint the ladder. Explain your thinking using pictures, numbers, and words.
- Look at the following picture. Is it a pattern? Why or why not? Explain your thinking. 😊 😞 😞 😊 😞 😞 😊 😊 😊 😞 😞 😊 😞 😞
- I went to the park after school every day for a week. On Monday, I saw one bird. On Tuesday, I saw two birds. On Wednesday, I saw three birds. On Friday, after I went to the park I said, “Wow! It’s a pattern!” How many birds did I see that week? Use pictures, numbers, and words to explain your thinking.

- **Other Assessments**

- Place in your mathematics center containers of different types of materials (e.g., buttons, bread tabs, and keys) for students to use to make patterns. Using the materials, have students create patterns and name them in a variety of ways.
- Give students a manipulative, such as toothpicks. Have students use the toothpicks to create a pattern.

- Have several examples of repeating and growing patterns on cards. Have students sort them into two columns, repeating and growing. Have students choose one of each kind of pattern to extend.
- Create a repeating or growing pattern using some kind of manipulative. Be sure that you are repeating the core several times. Then use an index card to cover a section of the pattern in the middle. Ask students to determine the missing part of the pattern.

### Extensions and Connections (for all students)

- Create a “Pattern Museum” in your classroom where students can bring in items that display different types of patterns. Invite another classroom in to visit your Pattern Museum.
- Engage students in the rhythmic pattern: clap, clap, pat, clap, clap, pat, clap, clap, pat .... Have students say the pattern as they clap and pat. Then, ask students to create a similar pattern using color words such as *red, red, blue, red, red, blue* .... Have them keep repeating the clap, clap, pat pattern while substituting the words *red, red, blue*. Repeat this activity several times with different rhythmic patterns, such as snap, clap, snap, clap ..., until students have orally repeated many patterns using color words, shape words (e.g., *square, square, triangle, square, square, triangle* ...), number words (e.g., *one, one, two, one, one, two* ...), and letters (e.g., *A, A, B, A, A, B* ...).
- Discuss patterns seen in nature (e.g., in butterflies, flowers, pine cones, tiles on the floor). Take students on a nature hike to look for different types of patterns. Have students bring their mathematics journals to record and illustrate their findings.
- Read books and sing songs that contain repeating and growing patterns.

### Strategies for Differentiation

- Provide students with manipulatives to create a pattern.
- Provide students with examples of patterns and non-patterns to sort. Have students explain the reasoning for their decisions.
- Have students construct a pattern with six cubes. Have them extend the pattern to 12 cubes and then make predictions about what color the 10th, 12th, etc., cube would be. Have students explain how they know using pictures, numbers, and words.
- For struggling students, give students the core and have them extend the pattern.
- Vary the complexity of the pattern according to student abilities.
- When transferring patterns, limit the additional ways struggling students need to represent the pattern.
- For struggling students, limit the number of different elements used in a growing pattern.

**Note: The following pages are intended for classroom use for students as a visual aid to learning.**



Name \_\_\_\_\_

## Repeating Patterns

Make a pattern with cubes. Color your pattern to match the cubes.

1	2	3	4	5	6	7	8	9	10	11	12

What is your pattern core?

Make another pattern with cubes. Color your pattern to match the cubes.

1	2	3	4	5	6	7	8	9	10	11	12

What is your pattern core?