

## Grade 4 Mathematics

### Patterns, Relations, and Functions: Lesson 1

Read aloud to the students the material that is printed in **boldface type** inside the boxes. Information in regular type inside the boxes and all information outside the boxes should **not** be read to students. Possible student responses are included in parentheses after the questions.

NOTE: The directions read to students may depend on the available materials. Read only those parts of the lesson that apply to the materials you are using.

Any directions that ask you to do something, such as to turn to a page or to hand out materials to students will have an arrow symbol ( $\Rightarrow$ ) by them.

#### *Purpose of Lesson 1:*

- In this lesson, the tutor and the students will
  - ✓ identify missing shapes in a pattern, sequence, or display of geometric shapes; and
  - ✓ continue a given sequence or pattern of geometric shapes.

#### *Equipment/Materials Needed:*

- Some type of geometric figures (patterns blocks, 2-color counters, colored tiles, cutout shapes) – something with which to make patterns. You will need about 10 per student. If you have access to an Ellison Machine or die cut machine, you can cut figures out of construction paper or card stock.
- If the items above are not available, use Student Sheets 63 and 64. It would be better to duplicate these sheets on card stock.
- Copies of Student Sheet 65
- Paper and pencils

#### *Preparations before beginning Lesson 1:*

- Gather the geometric figures or make copies of and cut out the figures on Student Sheets 63 and 64.
- Run off 1 copy of Student Sheet 65 for each student.
- Make sure you have paper and pencils available.

## Lesson 1: Patterns, Functions, and Relations

⇒ Put the figures you are going to use in front of you. You can use the ones on Sheets 63 and 64. Give students some sort of figures to work with. They do not all have to have the same figures.

Say:

**I am going to place some figures on the table. I am going to place them so that they make a repeating pattern. What do you think I mean by a *repeating pattern*? (one that repeats or goes on and on in the same way) I want you to see whether you can figure out what comes next in my pattern.**

⇒ Make an AB AB pattern. An *AB pattern* means that you place use 2 different objects and just alternate each one. You can use any of the materials available. The instructions are for the figures on Student Sheets 63 and 64. Just adapt them to fit the materials you are working with. Place a rectangle, then a triangle, repeat with a rectangle, then a triangle. Keep placing the figures until someone sees the pattern.



Say:

**I am making a pattern that repeats over and over. What figure should I place next? (rectangle) Does anyone know what my pattern is? Would you say my pattern out loud? (rectangle, triangle, rectangle, triangle, etc.; or 4 sides, 3 sides, 4 sides, 3 sides, etc.)** Having students say the patterns aloud helps them see the patterns. Always ask them to say their patterns.

⇒ Make another AB AB pattern but use different figures. Place a black pentagon, then a white pentagon, repeat with a black pentagon, then a white pentagon. Keep placing the figures until someone sees the pattern.



Say:

**I am making a pattern that repeats over and over. What figure should I place next? (black pentagon) Does anyone know what my pattern is? Would you say my pattern out loud? (black, white, black, white, etc.) How is this pattern different from the last pattern? (We used different figures and different colors.) How is it similar to the other pattern? (We used 1 of the first object, then 1 of the second object and then repeated this pattern.)**

**Can you make a pattern that is similar to the two we have just done? Make your pattern and we will see whether we can figure it out.** (See whether they make an AB AB pattern with any materials. Allow the other children to name the pattern.)

⇒ Make another pattern, but this time make an AAB AAB pattern. Place 2 gray circles, 1 checkered circle, 2 gray circles, 1 checkered circle. Continue until someone sees the pattern. ● ● ● ● ● ●

Say:

**I am making a pattern that repeats over and over. What figure should I place next?** (gray circle) **Does anyone know what my pattern is? Would you say my pattern out loud?** (gray, gray, checkered, gray, gray, checkered etc.; or 2 gray circles, 1 checkered circle, 2 gray circles, 1 checkered circle)

⇒ Make another AAB AAB pattern but use different figures. Place 2 black rectangles, then a white triangle, repeat with 2 black rectangles, then a white triangle. Continue until someone sees the pattern.



Say:

**I am making a pattern that repeats over and over. What figure should I place next?** (black rectangle) **Does anyone know what my pattern is? Would you say my pattern out loud?** (black, black, white, black, black, white, etc.; or rectangle, rectangle, triangle, rectangle, rectangle, triangle; or black rectangle, black rectangle, white triangle, black rectangle, black rectangle, white triangle) **How is this pattern different from the last pattern?** (We used different figures and different colors.) **How is it similar to the other pattern?** (We placed 2 of the first object, then 1 of the second object, and then repeated the pattern.) **Could you make a pattern that is similar to the two we have just done? Make your pattern and we will see whether we can figure it out.** (See whether they make an AAB AAB pattern with any materials. Allow the other children to name the pattern.)

⇒ Make another pattern, but this time, make an ABC ABC pattern. Place 1 circle, 1 triangle, 1 rectangle, 1 circle, 1 triangle, and 1 rectangle. Continue until someone sees the pattern. ○ △ □ ○ △ □

Say:

**I am making a pattern that repeats over and over. What figure should I place next? (circle) Does anyone know what my pattern is? Would you say it out loud? (circle, triangle, rectangle, circle, triangle, rectangle)**

⇒ Make another ABC ABC pattern but use different figures. Place a black rectangle, a striped triangle, and a white circle, then repeat black rectangle, striped triangle, white circle. Continue until someone sees the pattern.

Say: 

**I am making a pattern that repeats over and over. What figure should I place next? (striped triangle) Does anyone know what my pattern is? Would you say my pattern out loud? (black rectangle, striped triangle, white circle, black rectangle, striped triangle, white circle) How is this pattern different from the last pattern? (We used different figures and different colors.) How is it similar to the other pattern? (We placed 1 of the first object, one of the second object, and one of the third object and then repeated the pattern.) Could you make a pattern that is similar to the two we have just done? Make your pattern and we will see whether we can figure it out. (See whether they make an ABC ABC pattern with any materials. Allow the other children to name the pattern.)**

⇒ Give Student Sheet 65 to the students. Work through each item separately.

Say:

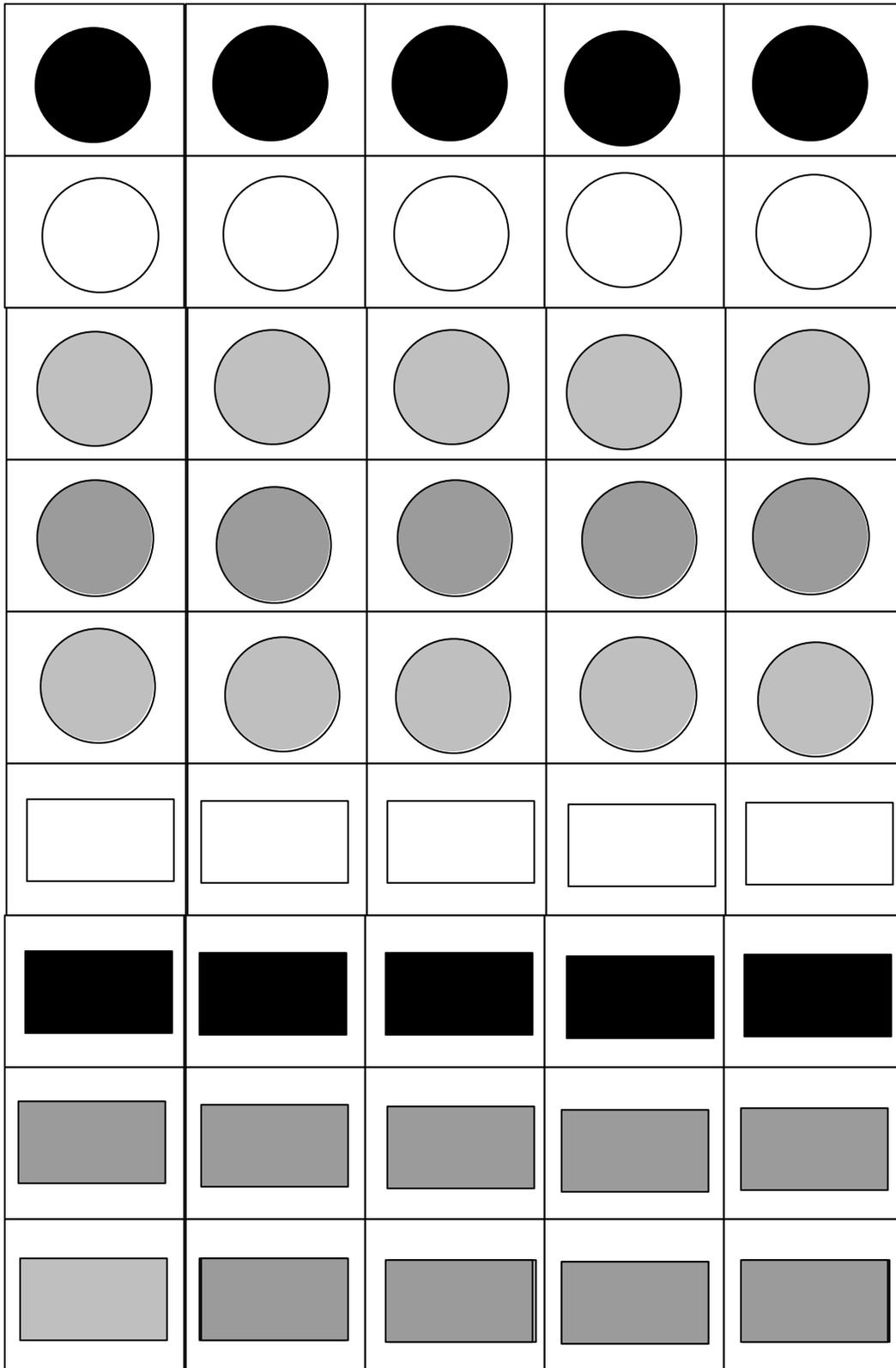
**On this paper there are some patterns that repeat. Let's look at each one. Say the patterns to yourself silently. Then tell me what the next object in the pattern would be.**

Answers:

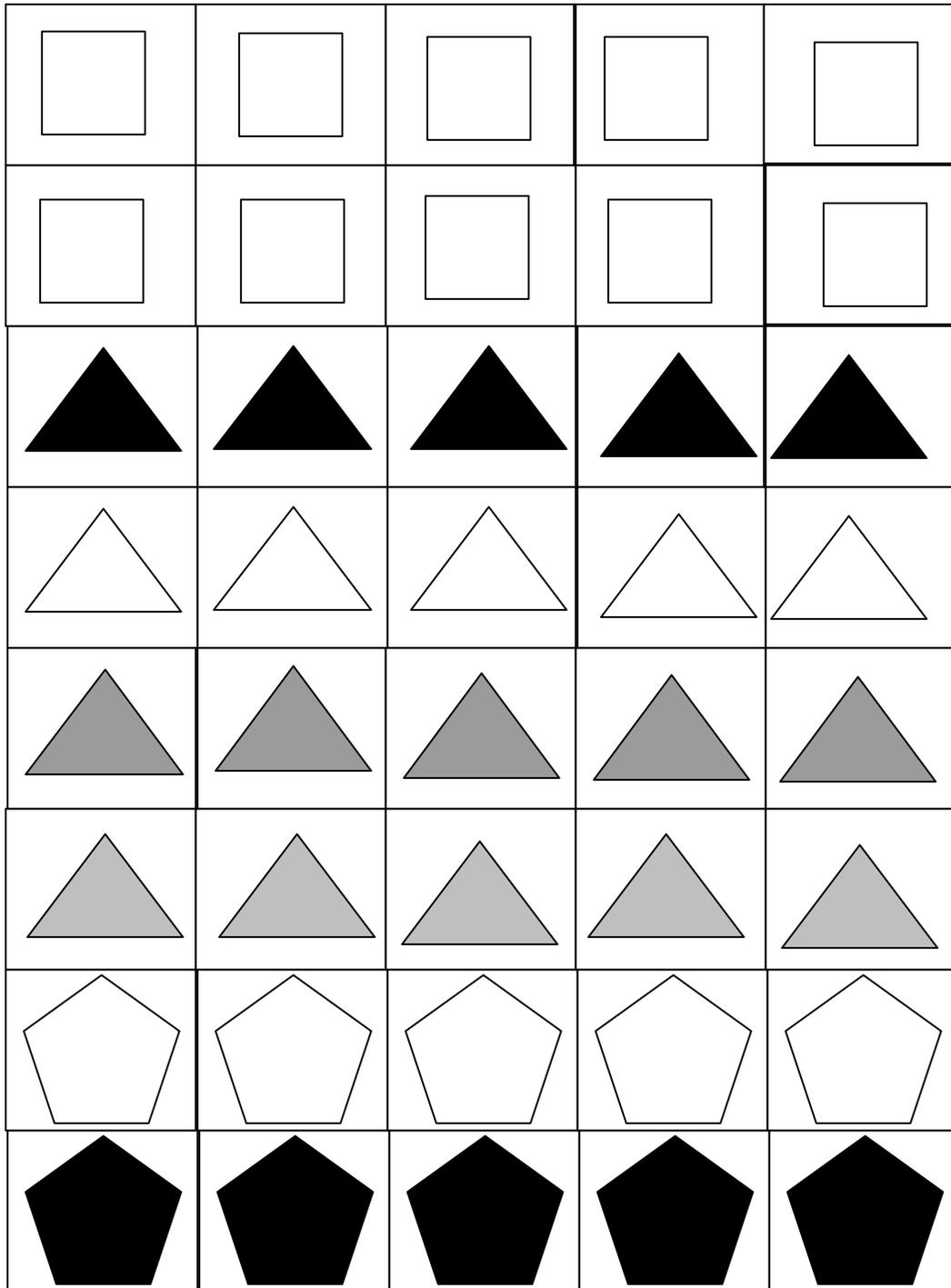
1. Bus
2. Sad face
3. Eye
4. 2 circles
5. Diagonal from left to right
6. 5
7. A hand with 5 fingers
8. 2 triangles put together to form a rectangle
9. A square with the figure inside turned sideways
10. \$

⇒ Have one student summarize the lesson.

**Student Sheet 63 (Patterns: Lesson 1)**



# Student Sheet 64 (Patterns: Lesson 1)



**Student Sheet 65 (Patterns: Lesson 1)**

**Look at the patterns in each row. What would be the next object in each row?**

