

# *Discovering Math: Patterns and Trends*

## Teacher's Guide

**Grade Level:** K–2

**Curriculum Focus:** Mathematics

**Lesson Duration:** Two class periods

### **Program Description**

*Discovering Math: Patterns and Trends* — From recognizing patterns of repeating events to determining rules for extending patterns, introduce young students to basic properties of functions and algebra.

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### **Lesson Plan**

#### *Student Objectives*

- Create visual, musical, and numeric patterns.
- Extend simple patterns.

#### *Materials*

- *Discovering Math: Patterns and Trends* video
- Pattern blocks for each team
- Colored blocks for each team
- Simple musical instruments (drum, bell, tambourine, etc.), one for each team
- Pattern Displays 1–2
- Number Cards for each team (see below)
- Picture of a zebra

#### *Procedures*

##### 1. Identifying and Creating Patterns

- Display a picture of a zebra. Ask students to identify the zebra's pattern. They should share ideas and identify a black-white-black-white pattern. Ask if they can think of any other animals or objects that have a pattern. Allow students to share their thoughts and explain the patterns they identify.

- Distribute Pattern Display 1. Have students discuss the patterns. They should share their ideas with the class and explain each pattern.
- Tell students they will create a visual pattern using pattern or colored blocks, a musical pattern (if simple instruments are available), and a numeric pattern. Have them work in small groups. Give each group a set of pattern or colored blocks, a musical instrument, and Number Cards. Review the patterns shown in the video – visual patterns, musical patterns, and numerical patterns.
  - Have each group create a visual pattern with the pattern or colored blocks. They should be able to describe their pattern (one square, two triangles, one rectangle, one square, two triangles, one rectangle, etc.) verbally or in writing. Each group should share and explain their visual patterns with the class.
  - Have each group create a musical pattern with the instrument. They should be able to describe their pattern (five quick beats of the drum, one slow beat of the drum, five quick beats of the drum, one slow beat of the drum, etc.) verbally or in writing. Each group should share and explain their visual patterns with the class.
  - Have each group create a numeric pattern with the Number Cards. They should be able to describe their pattern (2, 2, 3, 4, 2, 2, 3, 4, etc.) verbally or in writing. Each group should share and explain their visual patterns with the class.
- Once all the groups have shared and explained their patterns, discuss how prevalent patterns are in students' lives. Patterns are found in many places. They are an important part of math, and people use patterns in math all the time. Ask students if they can think of a time in math where they identified or used a pattern. Elicit responses and discuss ideas.

## 2. Extending Patterns

- Have students work in groups. Assign each group a space in the classroom. Review creating visual and numeric patterns using the pattern or colored blocks and the Number Cards. Distribute Pattern Display 2. Have students identify and explain each pattern.
- Tell students that each team will create a visual and numeric pattern. Then the teams will rotate around the room and extend each other's patterns.
- Give each team a set of pattern or colored blocks and a set of numbered cards. Allow time for each team to create simple visual and numeric patterns.
- Have the teams rotate to another work area and extend that team's patterns. Students can rotate to as many different work areas as time allows. Ask them to identify each team's patterns verbally or in writing. They can draw the patterns or, if there are enough materials, they can extend the pattern by adding more blocks and numbers.

- As an extension have students to create growing patterns with numbers. Review the growing patterns presented in the video – the number grows by a certain amount each time (1, 4, 7, 10, etc. , adding 3 each time).

### Assessment

Use the following three-point rubric to evaluate students' work during this lesson.

- **3 points:** The student clearly demonstrated the ability to identify, create, and extend patterns; clearly demonstrated the ability to explain a pattern.
- **2 points:** The student demonstrated the ability to identify, create, and extend some patterns; demonstrated the ability to explain some patterns.
- **1 point:** The student did not demonstrate the ability to identify, create, and extend patterns; did not demonstrate the ability to explain a pattern.

### Vocabulary

#### extend

*Definition:* To continue something

*Context:* The teacher asked the students to extend the pattern using the colored blocks.

#### pattern

*Definition:* Lines, shapes, numbers, actions, or sounds that repeat in a systematic way

*Context:* The artist painted a pattern on the wall. She drew one square, one circle, and one diamond. Then she drew the shapes in the same order many times to create the pattern.

### Academic Standards

#### Mid-continent Research for Education and Learning (McREL)

McREL's Content Knowledge: A Compendium of Standards and Benchmarks for K-12 Education addresses 14 content areas. To view the standards and benchmarks, visit

<http://www.mcrel.org/compendium/browse.asp>.

This lesson plan addresses the following benchmarks:

- Mathematics: Understands and applies basic and advanced properties of functions and algebra.

#### National Council of Teachers of Mathematics (NCTM)

The National Council of Teachers of Mathematics (NCTM) has developed national standards to provide guidelines for teaching mathematics. To view the standards online, go to

<http://standards.nctm.org>.

This lesson plan addresses the following standards:

- Understand patterns, relations, and functions.

## Support Materials

Develop custom worksheets, educational puzzles, online quizzes, and more with the free teaching tools offered on the Discoveryschool.com Web site. Create and print support materials, or save them to a Custom Classroom account for future use. To learn more, visit

- <http://school.discovery.com/teachingtools/teachingtools.html>
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## DVD Content

This program is available in an interactive DVD format. The following information and activities are specific to the DVD version.

### *How to Use the DVD*

The DVD starting screen has the following options:

**Play Video** – This plays the video from start to finish. There are no programmed stops, except by using a remote control. With a computer, depending on the particular software player, a pause button is included with the other video controls.

**Video Index** – Here the video is divided into chapters indicated by title. Each chapter is then divided into four sections indicated by video thumbnail icons; brief descriptions are noted for each section. To play a particular segment, press Enter on the remote for TV playback; on a computer, click once to highlight a thumbnail and read the accompanying text description and click again to start the video.

**Quiz** – Each chapter has four interactive quiz questions correlated to each of the chapter's four sections.

**Standards Link** – Selecting this option displays a single screen that lists the national academic standards the video addresses.

**Teacher Resources** – This screen gives the technical support number and Web site address.

## Video Index

### I. Regularities (6 min.)

#### **Regularities: Introduction**

Lines, shapes, numbers, actions, or sounds that repeat form a pattern. Examples illustrate patterns on animals and patterns in actions and sounds.

#### **Example 1: Visual Patterns**

See similarities in repeated visual patterns between those in nature and those made by people.

#### **Example 2: Event Patterns**

Hear event patterns in music. Written music shows how an event pattern is recorded on a page.

#### **Example 3: Numeric Patterns**

See repeating sequences and repeating changes in numeric patterns. Explore how numbers can change in a pattern and the rules for the changes.

### II. Extending Patterns (6 min.)

#### **Extending Patterns: Introduction**

Patterns occur in nature and in artificial events and objects. Knowing the rule for a pattern's repetition allows extending the pattern.

#### **Example 1: Extending Visual Patterns**

See extensions of simple patterns of geometric shapes by following their rules of repetition.

#### **Example 2: Extending Numeric Patterns**

See extensions of simple numeric patterns by following their rules of repetition. The same sequence repeats or numbers change by a particular amount.

#### **Example 3: Extending More Numeric Patterns**

Figure out the rule of repetition to extend more complex numeric patterns. In one example, a graphic representation helps visualize the rule. In another, auditory recognition helps detect an error.

## Quiz

### I. Regularities

1. What does a set of repeated numbers, shapes, objects, or events form?  
A. chart  
B. group  
C. graph  
D. pattern

*Answer: D*

2. Jack wants to make a pattern that represents tall trees. What will his pattern probably look like?  
A. small square objects  
B. tall columns  
C. wide cubes  
D. circles

*Answer: B*

3. What usually includes a repeating pattern of notes and beats?  
A. music  
B. pictures  
C. sneezes  
D. flowers

*Answer: A*

4. What is the next number in the pattern 2, 4, 6, 8, \_\_\_\_\_?  
A. 9  
B. 10  
C. 11  
D. 12

*Answer: B*

### II. Extending Patterns

1. What does a set of repeated numbers, shapes, objects, or events form?  
A. group  
B. pattern  
C. graph  
D. chart

*Answer: B*

2. What would come next in this pattern?  
OOIOOIOOIO \_\_\_\_\_
- A. II
  - B. OI
  - C. OO
  - D. IO

*Answer: B*

3. What would come next in this pattern?  
4, 7, 10, \_\_\_\_\_
- A. 11
  - B. 12
  - C. 13
  - D. 14

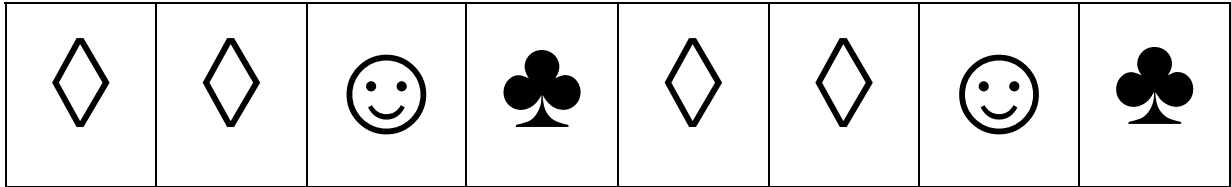
*Answer: C*

4. What would come next in this pattern?  
77177277377477 \_\_\_\_\_
- A. 5
  - B. 6
  - C. 7
  - D. 8

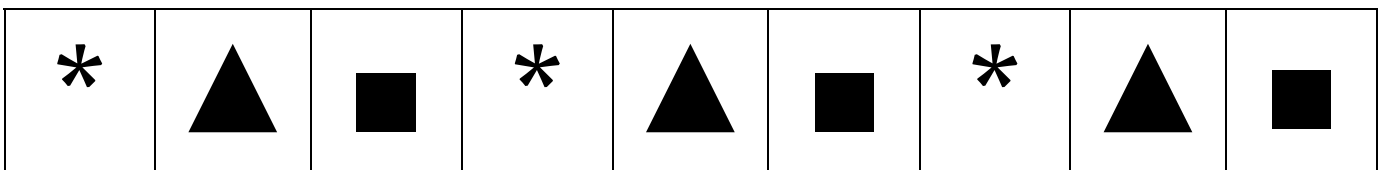
*Answer: A*

### Pattern Display 1

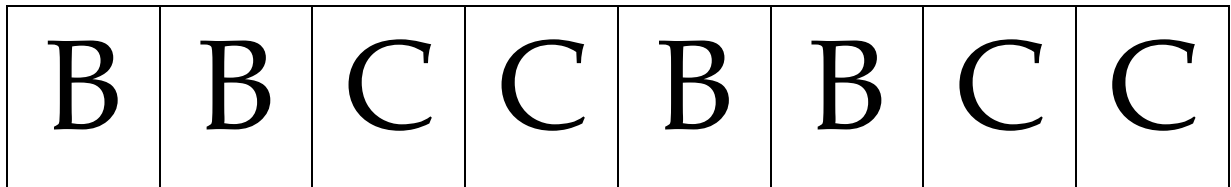
Pattern #1



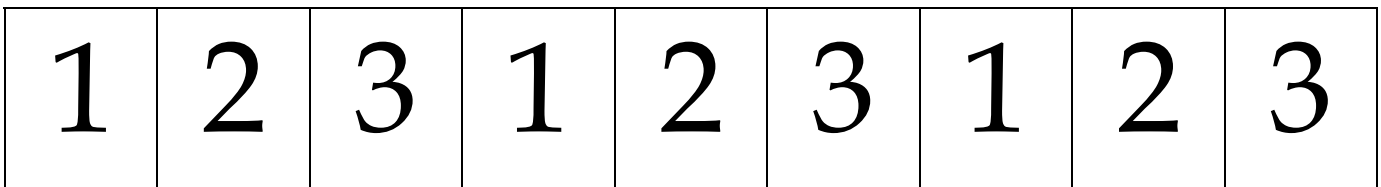
Pattern #2



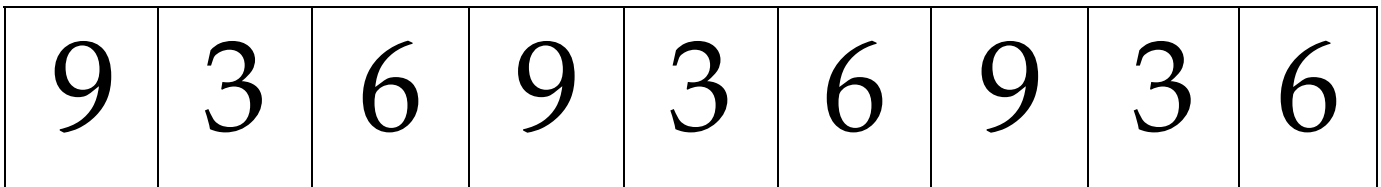
Pattern #3



Pattern #4

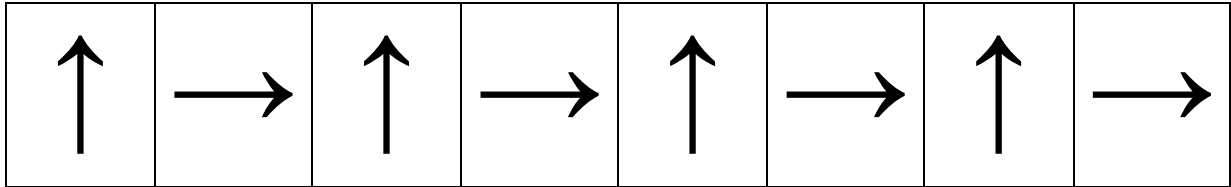


Pattern #5

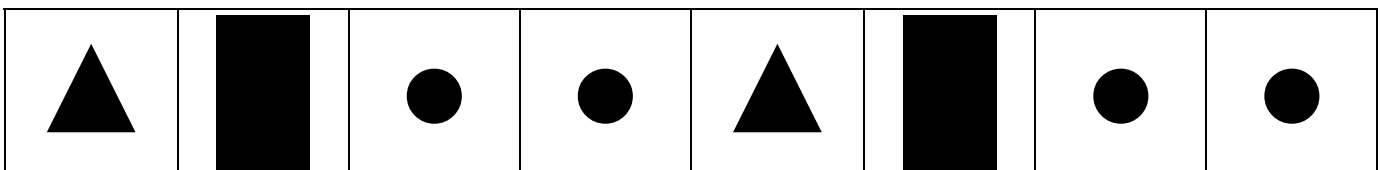


### Pattern Display 2

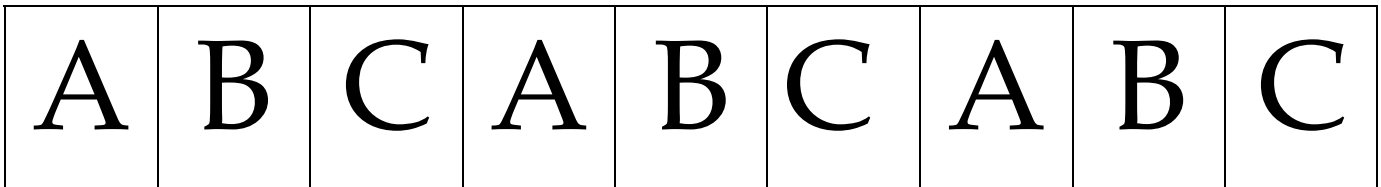
Pattern #1



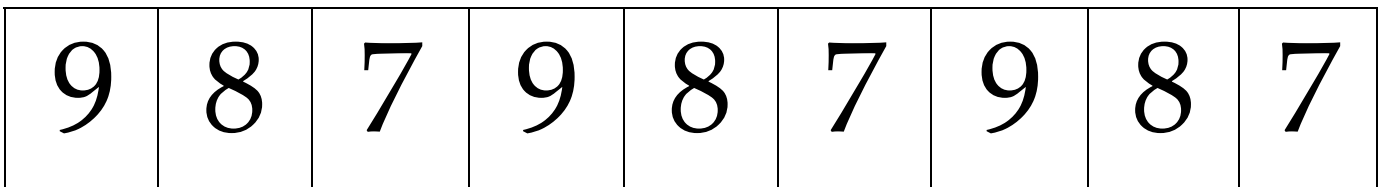
Pattern #2



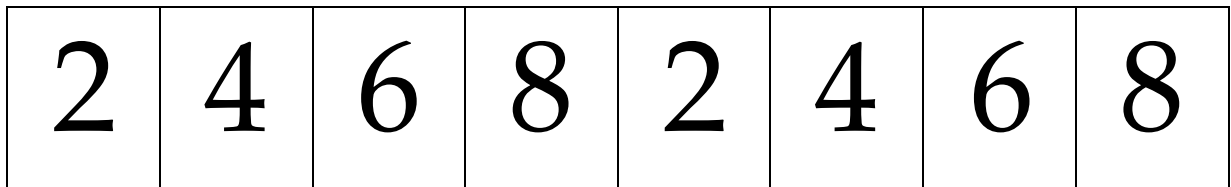
Pattern #3



Pattern #4



Pattern #5



*Numbered Cards*

0	1	2	3	4
5	6	7	8	9
0	1	2	3	4
5	6	7	8	9
0	1	2	3	4
5	6	7	8	9