

# Eye Spy a Pattern

## Summary

Students will learn how to see patterns by understanding how things work together.

## Materials

Eye Spy a Pattern

For each pair:

- [Eye Spy a Pattern worksheet.](#)

Hundreds Board Patterns

For each student:

- [Hundreds Board handout](#)

Colored pencils

Patterns and Patterns Galore

For each group:

- [Hundreds Board handout](#)

Set of number tiles

Additional Resources

Books

- *Math for All Seasons*  
, by Greg Tang; ISBN 0-439-44440-3
- *Ten Little Rabbits*  
, by Virginia Grossman; ISBN 0-87701-552-X
- *A Problem Solving Approach to Mathematics for Elementary School Teachers*  
, by Rick Billstein; ISBN 0-201-52565-8
- *Hundred Number Board Activities Grades 4-5*  
, by Cindy Barden; ISBN 0-7424-2780-3
- *Math Grades 4-6, The Best of The Mailbox Magazine*  
; ISBN 1-56234-157-X
- *Math on Call*  
, by Great Source; ISBN 0-669-45770-1

## Background for Teachers

Students look for understandable ways to make sense out of what they are learning. If they are directed and encouraged into seeing and understanding how things work together, then they are seeing and understanding patterns. Helping students understand and communicate the connection and relationship in patterns enables them to understand strategies for problem solving in a variety of ways.

It is beneficial for students to play games, learn, and work together. This practice encourages the lowest to the highest achieving students to engage in active and social learning. Many cooperative learning research studies have proven that when students work together they practice and experience a variety of social skills.

Give students some background information by explaining to them that Blaise Pascal was a French mathematician, philosopher, and scientist who studied number patterns and lived from 1623 to 1662. Leonardo Fibonacci was an Italian mathematician who studied number patterns and lived from 1180 to 1250.

## Intended Learning Outcomes

2. Become mathematical problem solvers.
3. Reason mathematically.

## Instructional Procedures

### Invitation to Learn

Choose one or both of the following activities to get the students thinking about patterns and how to describe them.

### Spy A Pattern

Tell the students that you 'Spy a Pattern' in the classroom (choose a pattern visible for all students to see, e.g., repeating tiles on the ceiling, bricks on the wall, a group of shelves, etc.). Students are the detectives and they are to guess what you have chosen for the pattern by asking questions. When one or more students have guessed the pattern, have them tell the class what it is and explain how they guessed it.

### Growing Patterns

Have the students sing a song with a growing pattern such as "BINGO," "I Knew an Old Lady Who Swallowed a Fly," "There's a Hole in the Bottom of the Sea," or "The Green Grass Grew All Around."

Ask the students to listen for patterns as they are singing (e.g., the rhythm or beat of the song, letters or words increasing or decreasing, lyrics repeat, etc.).

After the song is over, have the students explain the patterns they heard and write these on the board.

## Instructional Procedures

### Eye Spy a Pattern

Give an [Eye Spy a Pattern worksheet](#) to each pair.

Each pair studies a pattern in the first column, then, discuss the possible solution(s) to the corresponding question in the second column. Solve and talk about one pattern at a time.

Give the students time to figure out each solution. If needed, give clues as to what the solution(s) may be. Guide students to look for patterns by adding, subtracting, looking at the numbers diagonally, top to bottom, right to left, etc.

When time is up, choose groups to come to the front of the classroom and explain the solution(s) to an assigned pattern.

Ask questions like, "What is the rule for the next pattern? Is there more than one pattern? What patterns do we see in the world around us?"

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### Answers for Eye Spy a Pattern worksheet:

N; Reading left to right and top to bottom, the letters are the first letters in the number words 1-9.

1 9 36 84 126 126 84 36 9 1. Answers will vary. Yes.

12345 X 9 + 6 = 111111. Yes, it will work until you add 10.

89, 144, 233. Answers will vary.

D, A (Beginning in the top left corner, the pattern consists of A, AB, ABC, ABCD; B, BC, BCD, BCDA; etc.)

### Hundreds Board Patterns

Hand each student a [Hundreds Board worksheet](#).

Have students follow the directions below. After each direction is given, have the students describe the pattern.

Underline all multiples of 2 with red.

Circle all multiples of 3 with blue.

Draw a purple box around each multiple of 6.

Cross out all multiples of 9 with orange.

Draw a yellow triangle around each multiple of 5.

True/False

Multiples of 2 are found in alternating columns.

All multiples of 3 are also multiples of 2.

Multiples of 6 are multiples of both 2 and 3.

Multiples of 9 are also multiples of 3.

The sum of the digits for all multiples of 9 (except 99) is 9.

The multiples of 6 are also multiples of 9.

90 is a multiple of 2, 3, 5, 6, and 9.

All multiples of 5 end in 5 or 0.

Discuss the correlation between multiplication and patterns. Explain how multiplication is repeated addition, while division is repeated subtraction.

Patterns and Patterns Galore

Divide students into teams of two to four. Give each team a *Hundreds Board* handout and a set of number tiles. Explain how to play a game called *Patterns and Patterns Galore*.

Place the number tiles face down on the table next to the *Hundreds Board* handout.

Each player draws 10 number tiles and places them face up in front of them on the table.

Player 1 places any number pattern or sequence of numbers on the *Hundreds Board* using any of his/her 10 number tiles. A pattern or sequence may be horizontal, vertical, or diagonal. A pattern or sequence may be any length, but may go in one direction only. Player one does not draw additional tiles at this time.

Player 2 adds any number pattern or sequence of numbers to what is already on the board. If a player cannot add on or start a new number pattern or sequence, s/he draws 2 tiles from the pile and play moves on to the next player.

Players continue taking turns adding number tiles to existing number patterns and sequences, starting new ones when needed, or drawing two tiles from the pile.

The first player to place all of his/her tiles on the board wins.

Have each team show and discuss the various patterns created. Ask students if they see any patterns that continue with a rule (e.g., 10, 20, 30, 40, the rule is  $n \times 10$ ).

Extensions

Read picture books on counting to the students (e.g., *Math for All Seasons* and *Ten Little Rabbits*). Have students describe patterns they hear and see in the illustrations.

Family Connections

Have students do the *Patterned Names* activity at home with family, using a family member's name. Compare and contrast differences and what is alike between all name patterns created.

Conduct a Family Math Night at school. Invite students and family members to come in the evening to experience the fun of the math activities used in the lesson.

Assessment Plan

Materials

1/2 inch graph paper

Students write a summary and draw examples of their definition of patterns in their math journals. Go on a walking field trip around the school. Have students spy patterns they see and describe how they repeat, grow, or continue.

As a class, assign each letter of the alphabet a different solid color or colored pattern. Then, hand each student a piece of graph paper. Have the students write each letter of their first name very

lightly across the first row of graph squares (one letter per graph square). Repeat this seven times, moving to the next row each time. Cut out the square that is created with the letters. Color each letter the assigned color or pattern. Have the students describe patterns they see. Display the students' work around the room.

*Example:* If possible, have the students create their Patterned Name Square using a keyboarding program.

Patterned Name Square

C	A	R	L	A
C	A	R	L	A
C	A	R	L	A
C	A	R	L	A
C	A	R	L	A
C	A	R	L	A
C	A	R	L	A

*Variation:* Delete or add one column and one row, see what pattern is created. Discuss the changes and new patterns that are seen. Have the students explain in detail how the pattern will repeat and grow and how many graph squares will be needed to create their name two or more times.

*Example:*

C	A	R	L
A	C	A	R
L	A	C	A
R	L	A	C
A	R	L	A
C	A	R	L

Bibliography

Research Basis

Kagan, S. (1994). *Cooperative learning*. Resources for Teachers, Inc. ISBN 1-879097-10-9. Cooperative learning promotes higher achievement than competitive and individualistic learning structures across all age levels, subject areas, and almost all tasks. Studies have demonstrated that when students are allowed to work together, they experience an increase in a variety of social skills. Students become more able to solve problems that demand cooperation for a solution, are better able to take the role of the other, and are generally more cooperative on a variety of measures, such as willingness to help and reward others.

#### Authors

[Utah LessonPlans](#)