

Kerpoof Lesson Plan: Patterns

Title: Patterns

Topic(s): Pre-math, patterns & relationships

Materials and Resources: Kerpoof's Make a Drawing, Make a Picture, and/or Spell a Picture, Additional Resources

Grades: Pre-K—2

Objectives: Students will learn about many different types of patterns (including patterns found in art, stories, and everyday life), and then apply their knowledge with a fun group activity on Kerpoof.

Standards (NCTM):

- 2.1 Understand patterns, relations, and functions
- 2.1.2 Recognize, describe, and extend patterns such as sequences of sounds and shapes or simple numeric patterns and translate from one representation to another
- 2.1.3 Analyze how both repeating and growing patterns are generated

Vocabulary:

Pattern — a set of recurring events or objects

Repeating pattern — a type of pattern in which elements repeat in a simple manner (ex. boy, girl, boy, girl, boy, girl)

Growing pattern — a type of pattern in which successive elements grow according to a rule (ex. 1, 2, 4, 7, 11, 16...)

Instruction:

The following seven sections comprise a full introduction to patterns. You may want to pick and choose the activities that you include in your lesson, or expand on some while deemphasizing others.

1. *Find the Patterns!*

Begin the lesson by having your students pick out patterns in the room—floor or ceiling tiles, wallpaper, or clothing, for example. Ask your students to explain what a pattern is and what it is not. Help them to see that patterns are everyday things! Then ask them to think bigger... what other patterns are always present in our lives? [days in a week, months in a year, the seasons] If they need a hint, point to the classroom calendar.

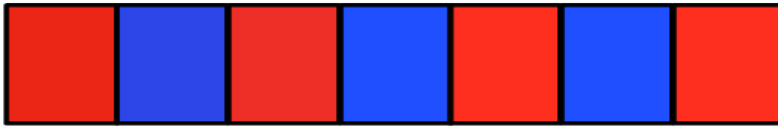
2. *People Patterns*

Now let's use people to create some patterns. Have a group of students (or the whole class) stand in a line, and ask them to create a simple pattern on their own. They might pick out physical characteristics (long hair, short hair, long hair, short hair; boy, girl, boy, girl) or movement (standing, sitting, standing, sitting) - help them form both types of pattern before they sit down again. Split up the rest of the class into groups, and give them each an area of the room to work with in order to generate their own creative "people patterns."

3. Color and Shape Patterns

Now take some time to have your students think more critically about patterns. Fire up your projection system or have illustrations ready on a chalkboard, and show your students these two patterns (or their equivalent):

Pattern #1:



Pattern #2:



Ask your students (1) to predict which colors will come next in both patterns [blue, red, blue, red; blue, red, red, blue, red, red] and (2) what are other ways to generate these patterns, besides using individual red and blue blocks? [make a rectangle that's half red and half blue and repeat it; make a rectangle with red on the sides and blue in the middle and repeat it] Then show your students this pattern:

Pattern #3:



Ask them the same two questions. They should be able to answer the first one right away [blue, then five reds, then blue, then six reds], but they will have a harder time with the second question. Let them be stumped for a little while before explaining that the second question is impossible to answer for this type of pattern. Explain that the first two color patterns they saw, and (probably) all of the people patterns they made are called *repeating patterns*. Pattern #3 is a new type of pattern, called a *growing pattern*. If you have reasonable access to computers, have your students log on to Kerpoof individually or in pairs, and let them create their own repeating and growing patterns with shape and color in Kerpoof's Make a Drawing. If not you could project Kerpoof and work as a class to create different types of repeating and growing patterns. Try to use shapes and colors together!

4. Number Patterns

Depending on what grade you're teaching, you might want to introduce simple math into the lesson. Simply project a few number patterns and help students see how they fall into repeating and growing categories just like the color patterns.



Examples of repeating number patterns:

- 1, 2, 1, 2, 1, 2, 1, 2...
- 1, 3, 3, 1, 3, 3, 1, 3, 3, 1...

Examples of growing number patterns:

- 1, 2, 4, 7, 11, 16, 22...
- 1, 1, 2, 6, 24, 120, 720...

Have fun trying to figure out the rules that govern the growing number patterns (again, the simplicity/complexity of these rules should be governed by your student's grade level). Students can create their own growing patterns and switch with a partner to figure out what numbers come next. Then show your students this pattern:

- 100, 99, 98, 97, 96...

Ask, "How is this like a growing pattern? How is it different?"

5. Sound Patterns

It's time to think about patterns in even *more* interesting ways! First, have students think back over all the patterns they've seen so far. Could there be a type of pattern that they can't "see?" [sound!] Have students create their own sound patterns with combinations of clapping, humming, and stomping. For a way to introduce technology into this part of the lesson, project MmmmTsss (http://web.mit.edu/~eric_r/Public/mmmmtsss/) and create some sound patterns as a class.

6. Story Patterns



Patterns are very important in math and computer science, but they are also present in literature! Prompt your students to think about when they've encountered patterns in fairy tales and stories. One of the most important recurring patterns in English writing is called "the rule of three." The rule of three says that things that come in threes are inherently funnier, more satisfying, or more effective than other numbered groupings. See how many examples of the rule of three your students can come up with in literature, nursery rhymes, and even movies. [The Three Musketeers, The Three Little Pigs, Three Billy Goats Gruff, Goldilocks and the Three Bears, The Three Blind Mice, the three good fairies in Sleeping Beauty, the three hyenas in The Lion King] Remember, the rule of three applies to *events* as well as characters.

[Rumpelstiltskin, Jack and the Beanstalk, The Twelve Dancing Princesses]

Sometimes picture books include patterns. Read one of the suggested books on the Additional Resources page to your class and have them identify patterns in the story's words, rhyme, and rhythm. If the author ever breaks the pattern, ask your students why they think he or she chose to do it that way. [Emphasis, because it is the end of the story, to surprise the reader]

7. Art Patterns

Finally, it's time to look at some patterns in famous works of art and get inspired for creating patterns on Kerpoof! Men and women have used patterns in art for as long as art itself has existed. Here are some suggested pieces of art to project (many can be found at The Metropolitan Museum of Art's website), along with a little background information:



- **Pyxis (box with lid)**, mid-8th century BC; Geometric Greek; Attic Terracotta



http://www.metmuseum.org/toah/images/h2/h2_48.11.5a,b.jpg

This pyxis probably served as a container for small objects, such as jewelry and toiletries. The bigger pattern running across the middle is called a “meander pattern” and is still common in Greek art today.

- **Textile fragment**, 14th century; Nasrid; Spain; silk, lampas weave



<http://www.metmuseum.org/toah/works-of-art/29.22>

This silk textile fragment actually incorporates writing into its patterns! The knotted script in black says “beatitude” over and over. Smaller green script (inside the cartouches outlined in white) repeats “good luck and prosperity.” How many other patterns can you find?

- **Interior of Saint Peter’s, Rome**, Giovanni Paolo Panini; 18th century; Oil on canvas



Remember, architecture is also a form of art, and there are many, many patterns to be found!

http://www.metmuseum.org/Works_of_Art/collection_database/european_paintings/interior_of_saint_peter_s_rome_giovanni_paolo_panini/objectview.aspx?OID=110001694&collID=11&dd1=11

- **A Farm in Brittany**, Paul Gauguin; ca. 1894; Oil on canvas



Look carefully to see the pattern in the mountains... What other patterns can you see in this painting?

http://www.metmuseum.org/Works_of_Art/collection_database/european_paintings/a_farm_in_brittany_paul_gauguin/objectview.aspx?OID=110000890&collID=11&dd1=11

- **Woman in Profile**, Pablo Picasso; 1901; Oil on paperboard mounted on particle board



See any patterns in the brushstrokes? A lot of Cubist and Impressionist paintings incorporate fun patterns—check out Cypresses by Vincent van Gogh for another fun example.

http://www.metmuseum.org/Works_of_Art/collection_database/modern_art/woman_in_profile_pablo_picasso/objectview.aspx?OID=210010252&collID=21&dd1=21

- **Adele Bloch-Bauer I**, Gustav Klimt; 1907; Oil, silver and gold on canvas



Patterns, patterns everywhere!

http://en.wikipedia.org/wiki/Adele_Bloch-Bauer_I

- **Eight Heads**, M.C. Escher; 1922; woodcut



This early piece is among Escher's most interesting tessellations. Explore the website below for more examples.

<http://www.mcescher.com/>

- **Campbell's Soup Cans**, Andy Warhol; 1962; Synthetic polymer paint on thirty-two canvases



In this piece, and his similar Marilyn prints, Warhol makes the pattern the whole point!

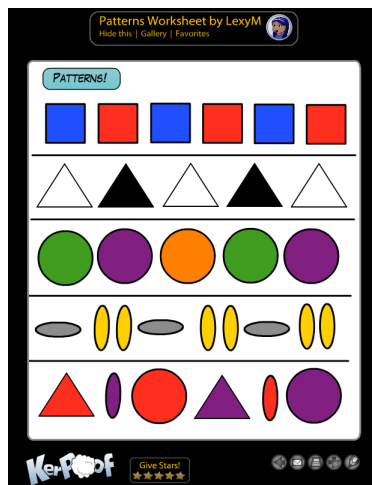
http://www.moma.org/collection/browse_results.php?criteria=0%3AAD%3AE%3A6246&page_number=31&template_id=1&sort_order=1

8. Kerpoof Assignment

Now it's time for your students to apply their knowledge and unleash their creativity on Kerpoof. Choose the level of assignment that corresponds to your students' grade level:

Pre-K—K

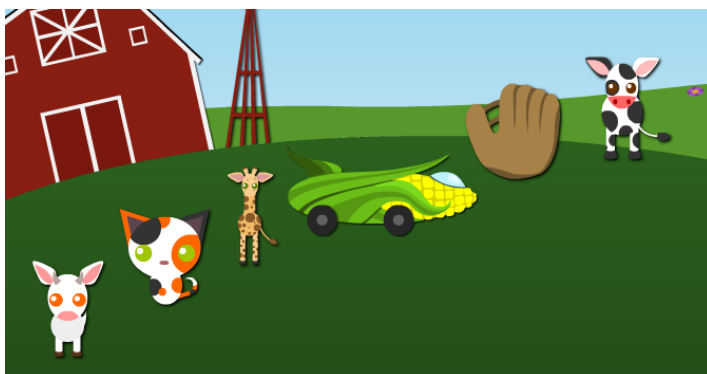
Create a worksheet in Make a Drawing like the one below, or just use this one. (Available for full-size printing at <http://www.kerpoof.com/#/view?s=2gs118P39Mo5djo4wgo0-e-4828a8-x>) If you don't have the resources to print a full-color worksheet for all of your students, you have the option to project the worksheet for the duration of the students' work time. The assignment is as follows: The students should try to figure out which colored shape comes next for all of the patterns. They'll draw these shapes with crayon and paper (or on Make a Drawing, if they have a little bit of help). Then they will create a separate work of art that incorporates all of the right answers! See example below (also available at <http://www.kerpoof.com/#/view?s=2gs118P39Mo5djA4whs0-e-baa162-x>).



1—2

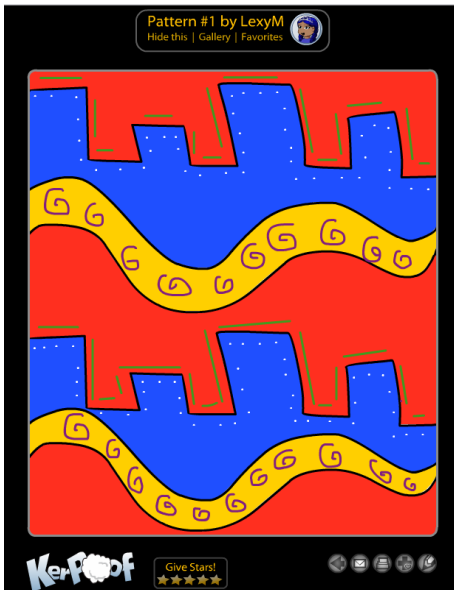
This version of the assignment is for older students who are more comfortable using Kerpoof on their own. Your students will have the option to use Make a Drawing, Make a Picture, or Spell a Picture to create five patterns for a classmate to solve. Once solved, the students will use their five answers to create a new piece of art to share on Kerpoof. Project the following images as examples, or create your own:

Spell a Picture

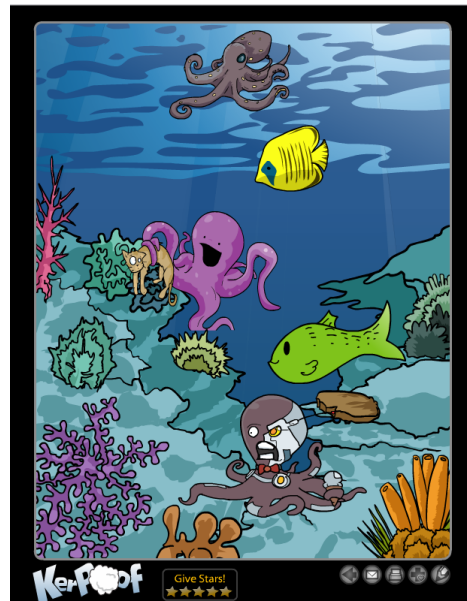


Do you see the spelling-based pattern?

Make a Drawing



Make a Picture



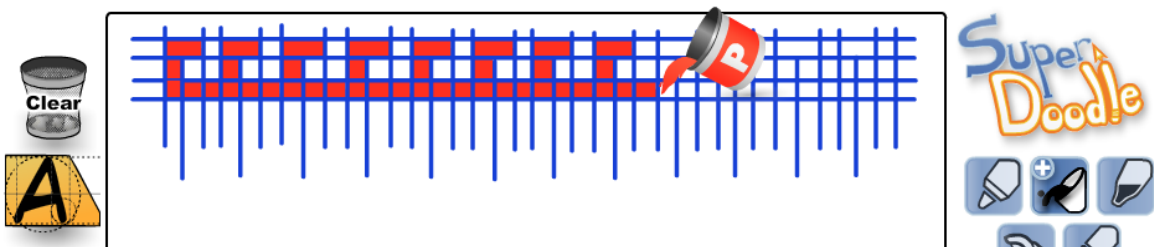
These examples are available here:

- <http://www.kerpoof.com/#/view?s=2gs118P39Mo5diw4wkw0-e-d5ce1e-x>
- <http://www.kerpoof.com/#/view?s=2gs118P39Mo5dz04aw00-d-da2a47>

Tell your students to be as creative as possible when coming up with patterns. Ask, what is a way to incorporate number patterns into your Kerpoof creations? When they are done creating their five patterns, they'll print and switch with a partner (or just share on the class message board). Now it's up to the partner to put his or her own creative twist on what comes next!

Tips:

- When your students are creating their "answer sheets," have them use the Doodle icon to incorporate Make a Drawing "answers" into Make a Picture scenes.
- If your students received a Spell a Picture pattern from their partner, they'll have to search the Kerpoof object library for an answer or draw their own!
- Incorporate a more traditional number patterns worksheet into this lesson as homework.



Patterns: Additional Resources

More on patterns:

- <http://en.wikipedia.org/wiki/Patterns>
- http://www.linkslearning.org/Kids/1_Math/2_Illustrated_Lessons/5_Patterns/index.html
- http://en.wikipedia.org/wiki/Pattern_theory
- <http://www.lessonplanspage.com/MathPatterns.htm>
- <http://www.lessonplanspage.com/MathPatternsUsingComputerAndUnifixCubesP2.htm>
- <http://www.proteacher.com/100026.shtml>
- <http://atozteacherstuff.com/pages/365.shtml>
- <http://www.lessonplanet.com/directory/Math/Patterns>

Patterns in stories:

Title: Why Mosquitos Buzz in People's Ears

Author: Verna Aardema, Leo Dillon, Diane Dillon

Publication Date: 2004

Publisher: Puffin/Dial

ISBN: 0140549056

Title: Who Sank the Boat?

Author: Pamela Allen

Publication Date: 1996

Publisher: Putnam Juvenile

ISBN: 069811373X

Title: Goodnight Moon

Author: Margaret Wise Brown

Publication Date: 1947

Publisher: HarperCollins

ISBN: 0060207051

Title: A Dark, Dark Tale

Author: Ruth Brown

Publication Date: 1992

Publisher: Red Fox

ISBN: 0099874008

Title: The Very Quiet Cricket

Author: Eric Carle

Publication Date: 1990

Publisher: Philomel

ISBN: 0399218858

Title: Jesse Bear, What Will You Wear?

Author: Nancy White Carlstrom

Publication Date: 1996

Publisher: Demco Media

ISBN: 0606094903

Title: Chicka Chicka Boom Boom

Author: Bill Martin Jr., John Archambault, Lois Ehlert

Publication Date: 1989

Publisher: Simon & Schuster

ISBN: 1416990917

Title: If You Give a Mouse a Cookie

Author: Laura Joffe Numeroff, Felicia Bond

Publication Date: 1985

Publisher: Balzer + Bray

ISBN: 0060245867

Title: Chicken Soup With Rice

Author: Maurice Sendak

Publication Date: 1991

Publisher: Perfection Learning

ISBN: 0812422155