

It Just Keeps Going and Going...

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OVERVIEW: Mathematics, Pattern. This lesson targets different learning styles as students become actively involved in pattern exploration. Students will practice pattern identification, extension and completion, using hands-on activities and will use interactive websites to demonstrate comprehension of patterning skills.

Grades: K-2

Time Allotment: Two 45 minute sessions

Subject Matter: Mathematics, Pattern

Learning Objectives:

Students will be able to:

- Create and extend a variety of patterns using concrete objects.
- Recognize, describe, and extend patterns, using sequences of sounds, different shapes and colors, and simple numeric patterns.
- Translate a pattern from one representation to another such as creating a sequence of sounds from a given pattern (ABAB...)
- Analyze how both repeating and growing patterns are generated.

Standards:

The objectives listed above may be used in part to address the following Virginia Standards of Learning available online at

<http://www.pen.k12.va.us/VDOE/Superintendent/Sols/mathsol2001.doc>

Math K.18 The student will identify, describe, and extend a repeating relationship (pattern) found in common objects, sounds, and movements.

Math 1.21 The student will recognize, describe, extend, and create a wide variety of patterns, including rhythmic, color, shape, and numerical. Patterns will include both growing and repeating patterns.

Math 2.25 The student will identify, create, and extend a wide variety of patterns, using numbers, concrete objects, and pictures.

Computer/Technology 5.3 The student will use local and wide-area networks to access interactive sites on the Internet for the purpose of practicing pattern creation, completion, and extension.

Music K.2, 1.2, 2.2 The student will perform rhythm patterns that include sounds and silences.

Visual Arts 1.3 The student will identify and use patterns—alternating and repeating.

Media Components:

United Streaming Video: <http://www.unitedstreaming.com/index.cfm> **Sweet Dreams**, Clip #1 – *Patterns*

Video: **Math Monsters**, Episode #110 *Patterns*

Web sites:

For whole class or individual work:

PrimaryGames.com - Pattern Mania

<http://www.primarygames.com/patterns/start.htm>

On this site students can play a game to practice their skills in recognizing and completing patterns. Students must choose the correct symbol to fill in a blank to complete a pattern.

Making Patterns

<http://standards.nctm.org/document/eexamples/chap4/4.1/index.htm#applet>

On this site, students use an interactive grid to create, compare, and view multiple repetitions of pattern units. It includes specific tasks for students to complete as they work with various color and number combinations.

Displaying Number Patterns

<http://standards.nctm.org/document/eexamples/chap4/4.5/index.htm>

On this site, students use virtual hundred boards and calculators to highlight and display various patterns and relationships among numbers. Students compare counting sequences on the calculator with the way they appear as a pattern generated on the hundred board.

Cyberchase: Crack Hacker's Safe

http://pbskids.org/cyberchase/webisode_1/web_1game.html

This site allows users to test their pattern recognition skills. It combines three different attributes within the pattern: colors, shapes and numbers, for a more challenging activity.

Materials:

TV/VCR

LCD projection device

Computers for teacher and student use

per class:

six sets of markers to share

pictures or overhead transparencies of different buildings

per student:

pencil

100s grid paper

1 piece of 9" x 12" red or blue construction paper

black sharpie marker

scissors

Prep for Teachers

Prior to teaching, have all Internet sites bookmarked for easy access during the lesson. The sites should be bookmarked on classroom computers for easy access by students during their individual time in the computer center, or on the computers in the lab for whole class use. You should preview the videos (You will need to download the United Streaming video onto the desktop of your computer and hook a LCD projector to it or another presentation unit device in order to show it to the class.) and cue them as indicated in the Introductory and Learning Activities sections. Familiarize yourself with the lesson format and be sure to have all materials ready as listed in the materials section. When using media, provide students with a **FOCUS FOR MEDIA INTERACTION**, a specific task to complete and/or information to identify during or after viewing of video segments, Web sites, or other multimedia elements.

Introductory Activity: Setting the Stage

1. To get students' attention clap the following pattern:

CLAP (rest) CLAP (rest) CLAP CLAP CLAP (rest)

Say: "Can you do the same thing? Clap along with me:

CLAP (rest) CLAP (rest) CLAP CLAP CLAP (rest)

CLAP (rest) CLAP (rest) CLAP CLAP CLAP (rest)

Say: "What can we call the sounds we just made?" (Answer: A pattern) "Can you follow this pattern? Listen carefully."

CLAP CLAP CLAP (rest) CLAP (rest) CLAP (rest) "Now you try it with me."

CLAP CLAP CLAP (rest) CLAP (rest) CLAP (rest)

CLAP CLAP CLAP (rest) CLAP (rest) CLAP (rest)

2. CUE the video, **Mathica's Mathshop *Sweet Dreams*** to the title screen of the video, just after the math magician has introduced Mathica. (1:27 on streaming video counter) Provide students with a **Focus for Media Interaction** by saying, "I'm going to show you a short video clip that will help you see different kinds of patterns. When you see a pattern forming, raise your hand." **START** and **PAUSE** after Mathica says: "Well what do you know, the same steps over and over." Ask, "Did anyone see a different kind of pattern?" (Answer: Yes, in the footprints on the floor) Say, "Let's see if you were right."

3. Provide students with a **Focus for Media Interaction** by saying, "In this part I want you to pay attention to Mathica's feet and see if she can follow the pattern of footprints on the floor." **PLAY** and **PAUSE** when the music starts to speed up as she is following the dance steps. (1:58) Say, "Mathica's feet were really moving. What could we call the kind of a pattern Mathica showed us?" (Answer: A dance pattern) Say, "Let's try to do the dance pattern with Mathica. Carefully stand up behind your desk. I'm going to rewind the video a little bit so we can also try the pattern." **REWIND** the video back to the beginning of the dance. (Drag the box on the streaming video progress bar back to 1:27) **PLAY** and **PAUSE** again after the dance music speeds up. Say, "OK everyone, I think we need a rest. You can sit down again. How many of you could feel the pattern as you danced? Can you think of other places we can find patterns?" (Brainstorm with the class to get numerous ideas: clothing, tile floor, bulletin board borders, blinds, carpeting, music, etc.)

4. Provide students with a **Focus for Media Interaction** by saying, "Now look for some other kinds of patterns that Mathica finds. Raise your hand again whenever you see a pattern on this next video clip." **PLAY** and **PAUSE** after the witch says, "...4, 8, 12 fair shares." Ask, "What kinds of patterns did you see?" (Answer: on the pillow, the handkerchief, and in the number of

apple pieces 4, 8, 12) Discuss how the numbers actually create a growing pattern, by adding 4 each time.

Learning Activities

1. **CUE** the video, Math Monsters Episode #110, Pattern, after the opening segment, the parachute drop and the narrator has said, "...Math's our favorite game, Math Monsters." Provide students with a **Focus for Media Interaction** by saying, "We've already talked about lots of patterns and now we're going to watch another short pattern video. In the first segment I'm going to stop the video at a certain point in the middle of a pattern. I want you to be able to tell me what shape comes next to continue it." **START** the video and **STOP** after the character sings the words, "...round the room I'll keep on going, watch my border keep on growing." Ask, "Who can tell me what shape comes next to continue the pattern?" (Answer: triangle) Say, "Pick up your piece of red or blue construction paper. Fold it in half, then in half again. Open your paper back up and cut the paper into four sections on the fold lines." Ask, "What fractions have we made? How many parts have we made from our original piece of paper?" (Answer: quarters, or $\frac{1}{4}$, we have divided the paper into four parts) Now say, "Take one fourth of the paper and draw a triangle that fills most of the space. Cut the triangle out and print the letter "A" on it."

2. Provide students with a **Focus for Media Interaction** by saying, "Let's go on with the video. I'll stop it again and ask you what comes next in the pattern, so be ready." **PLAY** and **PAUSE** after she sings, "...Triangle, circle, heart, square, triangle.." Ask, "What comes next?" (Answer: circle) Say, "Take another $\frac{1}{4}$ of your paper and draw a circle that fills it. Cut it out and print the letter "B" on it. Does anyone know what will come after the circle in the pattern?" (Answer: heart, square) If students don't get the answer right, play the next two words in the song, or **REWIND** and **REPLAY** the segment until they understand what comes next in the pattern. **STOP** the video and say, "Let's make the next two shapes we need for the pattern. On one piece of paper, draw and cut out a heart. Print the letter "C" on it. Then draw a square on the last piece of paper and cut it out. Print the letter "D" on it. Line up your pieces to create the same sequence we saw in the video. Try to spread them out so your pieces connect to your neighbors, that way we can create a pattern that just keeps going and going. Does anyone know what kind of pattern we made?" (Answer: an ABCD pattern)

3. Provide students with a **Focus for Media Interaction** by saying, "Let's look at this next section of video. I think something is going to happen to Split's border. Be able to tell me what goes wrong." **RESUME** video and **PAUSE** when Multiplex sings, "...Gosh these shapes are so inviting, Split will find them so exciting." Ask, "What happened to Split's border?" (Answer: Multiplex changed it) Ask, "Can anyone tell me what the new pattern is?" (Answer: diamond, oval, dash, dot, dash) **REPLAY** if necessary.

3. Provide students with a **Focus for Media Interaction** by saying, "Now we're going to watch a little more. I think something else is going to go wrong. See if you can figure it out. **RESUME** and **PAUSE** after the minus sign says, "...but I used the same four shapes Split did. I wonder what the problem is." Ask, "Did you see what went wrong?" (heart, square, triangle, circle – she changed the pattern to a CDAB pattern) Ask, "What do we have to do to fix it?" (Use monster magic to erase it, then start the new section over with the original ABCD sequence.)

4. Provide students with a **Focus for Media Interaction** by saying, "Let's see if we were correct. In this next segment you also might see or hear a different pattern. Raise your hand if you do." **RESUME** and **PAUSE** after the music notes are drawn on the screen. Ask, "Did you see or hear a new pattern?" (Answer: Yes, a music pattern)

5. Provide students with a **Focus for Media Interaction** by saying, “This is getting a little more difficult. Now we will see another different type of pattern. See if you can figure it out.” **PLAY** and **PAUSE** after Addison says, “You just painted red, red, now you’ll paint blue, blue again.” Ask, “Do you think she’s right?” (Answer: No, but students will probably answer yes) Poll students – ask, “How many think she is right” (raise hands) “How many think she is wrong?” (raise hands)

6. Provide students with a **Focus for Media Interaction** by saying, “Let’s find out what is correct.” **PLAY** and **PAUSE** at the question mark. Say, “So, can you figure out what comes next? Let’s start at the beginning –red, blue, red, red, blue, blue, red, red, red, blue, blue, blue,--What’s the pattern here?” (Answer: add one more of each color every time)

7. Provide students with a **Focus for Media Interaction** by saying, “Do you know what this type of pattern is called? Listen for the answer in this segment.” **PLAY** and **STOP** after Addison says, “...red, red, red, red, blue, blue, blue, blue.” Ask, “did anyone hear a word that describes this type of pattern?” (Answer: It’s a growing pattern)

Ask students, "Who can find an example of a pattern on their clothes?" Have students stand up next to each other and compare patterns. Have them analyze why some things really are patterns (they repeat over and over), and some things are not (a picture on the front of a t-shirt is not a pattern unless it has a repeat.)

Culminating Activity

1. Using the Name Patterns worksheet, have each student create a pattern on the 100s grid using his or her own first name. Beginning in the upper left-hand corner, print the name over and over until the entire grid is filled. Have students choose a favorite color crayon or marker. Color only the boxes with the first letter of their name every time it appears in the grid. Also have students color around the outline of the grid with a contrasting color. Students who finish early may create a repeating pattern of symbols or small pictures around the border of the grid.



2. Compare the different patterns created by each student’s name. Have students share their work as they finish, by hanging them in the front of the classroom. Ask “Why did some names create a different pattern?” (the number of letters made the patterns change, different numbers create different patterns)

Assessment

1. Use the following game as practice and as an assessment for primary level students who are just beginning pattern activities. Provide students with a **Focus for Media Interaction** by saying, "When you visit the computer center in the classroom (or computer lab) today, I want you to go to the site I have bookmarked, *PrimaryGames.com - Pattern Mania*." On this site students can play a game to practice their skills in recognizing and completing patterns. Students must choose the correct symbol to fill in a blank to complete a pattern. Demonstrate how to play the game by

visiting the site listed below, then have students individually click on the site to play the game:
<http://www.primarygames.com/patterns/start.htm>

2. These games are suitable for higher level students to practice more advanced patterning skills. Provide students with a **Focus for Media Interaction** by saying, "When you visit the computer center in the classroom (or computer lab) today, I want you to go to the sites I have bookmarked, *Making Patterns*" (<http://standards.nctm.org/document/eexamples/chap4/4.1/index.htm#applet>) On this site, students use an interactive grid to create, compare, and view multiple repetitions of pattern units. It includes specific tasks for students to complete as they work with various color and number combinations.

Cross-Curricular Extensions

Language Arts:

1. Have students read trade books about pattern such as Pattern (Math Counts) by Henry Pluckrose, and Lots and Lots of Zebra Stripes: Patterns in Nature by Stephen R. Swineburne.
2. Look at examples of poetry and nursery rhymes with the students to find and compare patterns.

Social Studies:

1. Have students identify and analyze patterns found on Native American artwork and pottery.
2. Have students identify patterns in American symbols, such as red and white stripes on the flag. (ABAB pattern)

Math:

1. Have students repeat the name pattern activity, but this time using an actual 100s chart. Choose a number to count by, such as count by 2's or count by 4's, and color in just those numbers. Make sure students choose different numbers so when they share the papers, they will see that different number counts will create different patterns. This is similar to the name pattern activity, only it is directly related to numbers.
2. Have students create Powerpoint presentations using clip art, which illustrates different types of patterns. As added enrichment, children could also incorporate sound patterns into their presentation.

Art:

1. Using a paintbrush, different color paints, and construction paper, have each student create examples of repeating patterns, alternating patterns, and growing patterns.
2. Examine pictures of different examples of architecture (Coliseum, Great Pyramid, Great Wall of China, etc.) and identify the patterns.

Music:

1. Bookmark the following site on classroom computers to allow students to create their own sound patterns. *Cyber-Pattern Player*
<http://pbskids.org/cyberchase/games/patterns/patterns.html>

Technology:

1. Have students visit the web site *Cyberchase: Crack Hacker's Safe*
http://pbskids.org/cyberchase/webisode_1/web_1game.html
This site allows users to test their pattern recognition skills. It combines three different attributes within the pattern: colors, shapes and numbers, for a more challenging activity.

Community Connections

1. Invite a group of dancers in to the school to demonstrate the patterns found in line dancing, square dancing, and other forms of dance.
2. To illustrate the variety of patterns found in folk art and fabric design, invite a quilter in to share how quilts are planned and pieced together. This would be a great activity to do during the study of fractions.
3. Take a walking field trip to find patterns in everyday life and nature, such as brick patterns in walls, column and window patterns on building facades, vein patterns in leaves, etc.

Student Materials

Name Patterns worksheet
100s chart

Hundreds Chart

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

