

Dance and Math Infused Lesson

Lesson One: **Moving Number Patterns: Finding the Rule**

Author: Debbie Gilbert Grade Level: Fourth



Enduring Understanding

Identifying a rule or relationship can enable one to extend a pattern of numbers or movements.

Lesson Description (Use for family communication and displaying student art)

In this math and dance lesson, students create number patterns with movement. They explore movements in self-space and general space in a pattern and find the rule used to create the pattern. As a class, they choose a rule, decide the starting number, select a movement, and dance the pattern. With a partner, they dance Number Pattern Duos and find the rule for the pattern in the dance.

Learning Targets and Assessment Criteria

Target: Represent a pattern in movement in self-space and general space.

Criteria: Performs movements in one spot and movements that travel that match the sequence of six numbers with a given rule.

Target: Creates a duet that demonstrates a pattern with the rule: divide by two, start at 16.

Criteria: Alternates dancing in self and general space with a partner: for 16 counts, 8 counts, 4 counts, and 2 counts.

Vocabulary	Materials	Learning Standards
<p>Arts Infused: Pattern</p> <p>Math: Rule Number</p> <p>Arts: General space Locomotor Non-locomotor Self-space Shape Space bubble</p>	<p>Museum Artworks or Performance</p> <p>Seattle, WA Pacific Northwest Ballet UW World Series of Dance</p> <p>Tacoma, WA Broadway Center for the Performing Arts</p> <p>Materials <i>Math Dances</i> CD by Debbie Gilbert; CD player; White board or chart paper & markers; Drum or other percussion instrument; Class Assessment Worksheet</p> <p><i>continued</i></p>	<p>WA Arts State Grade Level Expectations <i>For the full description of each WA State Arts Grade Level Expectation, see: http://www.k12.wa.us/Arts/Standards</i></p> <p>1.1.1 Elements: Space, Shape 1.2.1 Skills and Techniques: Movements with Full Body Extension 1.4.1 Audience Skills 2.1.1 Creative Process 2.2.1 Performance Process 2.3.1 Responding Process 4.2.1 Connection between Dance and Math</p> <p>Common Core State Standards (CCSS) in Math <i>For a full description of CCSS Standards by grade level see: http://www.k12.wa.us/CoreStandards/Mathematics/default.aspx</i></p> <p>4.OA. Generate and analyze patterns. 4.OA.5. Generate a number or shape pattern that follows a given rule.</p> <p>CCSS Mathematical Practices MP.2. Reason abstractly and quantitatively. MP.4. Model with mathematics. MP.7. Look for and make use of structure.</p>

Pacific Northwest Ballet images:
Kaori Nakamura in George
Balanchine's *Serenade*;
Choreography © The George
Balanchine Trust



Jodie Thomas, James Moore, and
Lucien Postlewaite in Twyla Tharp's
Opus 111



Company Dancers in George
Balanchine's *A Midsummer Night's
Dream*; Choreography © The
George Balanchine Trust



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ICON KEY:

 = Indicates note or reminder for teacher

 = Embedded assessment points in the lesson

Pre-Teach

Practice the *Math BrainDance*, see lesson step 3. Unpack the math concepts in the BrainDance. Identify, create, and extend number patterns.

Lesson Steps Outline

1. Introduce creating and analyzing number patterns in movement. Analyze number patterns in photos of dancers.

2. Prepare students for dancing by creating agreements for appropriate dance behavior. Chart student responses.

3. Lead students in *Math BrainDance* warm-up.

Music: "Math BrainDance (Fourth Grade)" #5, *Math Dances* by Debbie Gilbert

4. Introduce the dance concepts of shape, self-space, and general space. Use patterns in the exploration. Play percussion instrument(s) for accompaniment.

 Criteria-based process assessment: Performs movements in one spot and traveling through the room. Freezes in shapes.

5. Guide students in choosing a rule and then creating and extending number patterns with movement.

 Criteria-based teacher checklist, self-assessment: Performs movements in one spot and movements that travel that match the sequence of six numbers with a given rule.

6. Direct students in Number Pattern Duos. Play drum for accompaniment.

 Criteria-based teacher checklist: Alternates dancing in self and general space with a partner: for 16 counts, 8 counts, 4 counts, 2 counts.

7. Lead reflection.

 Criteria-based reflection: Makes a connection between dance and math.

LESSON STEPS

☐ Prepare the classroom for dance.



Moving Desks/Set-up

1. Introduce creating and analyzing number patterns in movement. Analyze number patterns in photos of dancers.

- *Today, we are going to be doing a dance and math lesson. We will be Dancing Mathematicians.*
- *Dancing Mathematicians are curious and look for answers. They can use movements with their bodies to figure out why something is true in math.*
- *As Dancing Mathematicians, we'll be creating number patterns and asking ourselves, "What's the rule?"*

☐ You may use these photos: Pacific Northwest Ballet: Kaori Nakamura in George Balanchine's *Serenade*, Jodie Thomas, James Moore, and Lucien Postlewaite in Twyla Tharp's *Opus 111*, and Company Dancers in George Balanchine's *A Midsummer Night's Dream*. You could also choose to find your own photos or videos that represent a variety of styles and cultures. Look for a photo of one dancer, a photo of three dancers, and a photo of nine dancers.



- Look at these pictures of dancers. Notice how many dancers are in each picture. If these three pictures showed a pattern, what's the rule? (x3) How many dancers would there be in the next picture?
- We can also make patterns in movement. Shrug your shoulders six times: 1, 2, 3, 4, 5, 6. Shrug your shoulders four times: 1, 2, 3, 4. Shrug your shoulders two times: 1, 2. What would be next in the pattern? (zero) What's the rule? (-2).

2. Prepare students for dancing by creating agreements for appropriate dance behavior. Chart student responses.



Movement Safety

- Before we begin moving, I have a question for you. How can you be creative and safe at the same time?

3. Lead students in **Math BrainDance warm-up.** (BrainDance originally developed by Anne Green Gilbert, www.creativedance.org, reference: *Brain-Compatible Dance Education*, video: *BrainDance, Variations for Infants through Seniors.*)

Music: "Math BrainDance (Fourth Grade)" #5, *Math Dances* by Debbie Gilbert



BrainDance by Artist Mentor

- The BrainDance is designed to warm up your body and make your brain work better at the same time. Notice when we use patterns in the BrainDance.

Breath

- *Dancing Mathematicians, breathe peacefully.*



BrainDance by Students

Tactile

- Tap the top of your head three times. Tap your shoulders five times. Tap your stomachs seven times. Tap your knees nine times. Tap your feet eleven times. What's my rule?

Core-Distal

- Grow into a huge shape imagining that your arms are rays that reach into space and never end. Shrink into a small shape, imagining that your arms are small line segments.

Head-Tail

- Curl your backbone forwards and backwards with your arms in parallel lines. Bend from side to side with your arms in perpendicular lines.

Upper Half

- Freeze the lower half of your body. Do symmetrical movements with the top half of your body.

Lower Half

- Freeze the upper half of your body. Do movements that are not symmetrical with the lower half of your body.

Body-Half Right

- Make angles with the right half of your body while the left half is frozen. Make an acute angle, a right angle, an obtuse angle, a straight angle.

Body-Half Left

- Make angles with the left half of your body while the right half is frozen. Make an acute angle, a right angle, an obtuse angle, a straight angle.

Eye-Tracking

- Focus on your right thumb. Watch it as you draw a shape in the air with parallel and perpendicular lines. Watch your left thumb as you draw a shape in the air with parallel and perpendicular lines.

Cross-Lateral

- Reach across your body up high, up high, down low, down low. We'll count to twelve: 1, 2, 3 ... 12. Let's cut that in half: 1, 2, 3 ... 6. Let's cut that in half again: 1, 2, 3.

Vestibular

- Turn, then freeze in a shape with an acute angle. Turn, then freeze in a shape with a right angle. Turn, then freeze in a shape with an obtuse angle. Turn, then freeze in a shape with a straight angle.

Breath

- Breathe peacefully, *Dancing Mathematicians*.

4. Introduce the dance concepts of **shape**, **self-space**, and **general space**. Use patterns in the exploration. Play percussion instrument(s) for accompaniment.

☐ Count the numbers out loud.



Prompting for Creativity

- Our first dance word is shape. When you make a shape, you freeze your whole body, like a statue. It's OK to breathe and blink.
- Make a shape. Freeze with your whole body. Make a different shape. It could be higher or lower or twisted or stretched. Freeze.
- Our next dance word is self-space. When dancers dance in self-space, they stay in one spot. When you move in one spot, your movements are called **non-locomotor** movements. Twisting, shaking, and bending are examples of non-locomotor movements.
- Let's explore some movements in self-space. Twist. Freeze. Shake. Freeze. Bend. Freeze. What other self-space movements can we do?
- Now let's add a pattern. Move in self-space: one, two, three. Freeze. Move in self-space one, two, three, four, five. Freeze. Move in self-space: one, two, three, four, five, six, seven. Freeze. Did you notice a pattern? You moved three counts, then five counts, then seven counts. What was the rule? (+2)
- Our next dance word is general space. When dancers dance in general space, they travel through the empty space in the room. When you move in general space, your movements are called **locomotor** movements. Walking, leaping, and tiptoeing are examples of locomotor movement.
- Let's explore some movements in general space. Make sure you look for empty space. Put a **space bubble** around yourself and walk. Freeze. Leap. Freeze. Tiptoe. Freeze. What other general space movements can we do?
- Now let's add a pattern. Move in general space: one, two, three, four, five, six, seven, eight. Freeze. Move in general space: one, two, three, four, five. Freeze. Move in general space: one, two. Freeze. Did you notice a pattern? You traveled eight counts, then five counts, then two counts. What was the rule? (-3)

☑ **Criteria-based process assessment:** Performs movements in one spot and traveling through the room. Freezes in shapes.

5. Guide students in choosing a rule and then creating and extending number patterns with movement. (Optional: play percussion instrument as accompaniment).

☐ When assessing the criteria in this lesson, any students who are not meeting criteria will be very clear to you, so you may want to use a reverse checklist, putting a “0” where students have not met criteria, rather than trying to notate every single one who has met criteria. You can go back later and give those who have met criteria a “1.” This information will let you know who needs more practice, to guide your future instruction.



Number Pattern in Self-space

- *Let’s create a number pattern. What should the rule be? What should the starting number be? Let’s extend the pattern for a total of six numbers.*

☐ Write the sequence on the board.

- *Now, let’s dance that pattern. What non-locomotor movement in self-space should we do?*



Number Pattern in General Space

☐ Lead the sequence, counting the numbers out loud.

- *What’s another number pattern? What should the rule be? What should the starting number be? Let’s extend the pattern for a total of six numbers.*

☐ Write the sequence on the board.

- *Now, let’s dance that pattern. What locomotor movement in general space should we do?*

☐ Lead the sequence, counting the numbers out loud.

- *How do you know that your dance matched the pattern?*

☑ Criteria-based teacher checklist, self-assessment: Performs movements in one spot and movements that travel that match the sequence of six numbers with a given rule.

6. Direct students in Number Pattern Duos. Play drum for accompaniment.

- *I’ll demonstrate a Number Pattern Duo with a partner. Dancer #1 dances in self-space for 16 counts, then freezes. Dancer #2 dances in general space and returns to dancer #1 at the end of 16 counts and freezes in a matching shape. Then we’ll reverse roles. Notice how when we move and freeze we use our whole bodies.*



Number Pattern Duos

- *Find a partner. Decide who will start in self-space and who will start in general space. I’ll count to 16 and then say, “Freeze.” Then, you and your partner will switch roles.*
- *Next we’ll do eight counts each. Then, four counts each. Then, 2 counts each.*
- *We did 16, 8, 4, 2. What’s my rule? How do you know it’s true?*

☐ Optional: repeat with a different rule.

☑ Criteria-based teacher checklist: Alternates dancing in self and general space with a partner: for 16 counts, 8 counts, 4 counts, 2 counts.

7. Lead reflection.

- *What other patterns could you dance? How would you dance them?*
- *The next time you identify or extend a pattern in math, remember how you did it with movement. What you've done with movement will help you in math.*

Criteria-based reflection: Makes a connection between dance and math.

ARTS IMPACT LESSON PLAN Dance and Math Infusion

Fourth Grade Lesson One: *Moving Number Patterns: Finding the Rule*

Teachers may choose to use or adapt the following self-assessment tool.

STUDENT SELF-ASSESSMENT WORKSHEET

Disciplines	DANCE/MATH		DANCE/MATH	Total 3
Concept	Pattern		Pattern	
Criteria	Performs movements in one spot that match the sequence of six numbers with a given rule.	Performs movements that travel that match the sequence of six numbers with a given rule.	Alternates dancing in self and general space with a partner: for 16 counts, 8 counts, 4 counts, 2 counts.	
Student Name				

ARTS IMPACT LESSON PLAN Dance and Math Infusion

Fourth Grade Lesson One: *Moving Number Patterns: Finding the Rule*

CLASS ASSESSMENT WORKSHEET

Disciplines	DANCE/MATH		DANCE/MATH	Total 3
Concept	Pattern		Pattern	
Criteria	Performs movements in one spot that match the sequence of six numbers with a given rule.	Performs movements that travel that match the sequence of six numbers with a given rule.	Alternates dancing in self and general space with a partner: for 16 counts, 8 counts, 4 counts, 2 counts.	
Student Name				
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29.				
30.				
Total				
Percentage				

What was effective in the lesson? Why?

What do I want to consider for the next time I teach this lesson?

What were the strongest connections between dance and math?

Teacher: _____

Date: _____

DANCE AND MATH LESSON: *Moving Number Patterns: Finding the Rule*

Dear Family:

Today your child participated in an **Arts and Math** lesson. We talked about how both mathematicians and dancers can create number patterns.

- We analyzed the pattern in photographs of dancers. The first picture had one dancer. The next had three dancers. The last had nine dancers. We discovered that the rule was *times 3*. Then we extended the pattern and said that if there were another picture, it would have 27 dancers.
- We did the Math BrainDance to warm up our brains and bodies.
- We made shapes with our bodies and explored movements in self-space (in one spot) and general space (traveling) in a pattern and found the rule used to create the pattern.
- We chose a rule, like *plus two*, decided what would be the starting number (4), and figured out the number pattern: 4, 6, 8, 10, 12, 14. Then we danced the pattern by repeating the movements to match the numbers in the pattern.
- We created Number Pattern Duos, alternating with a partner and dancing a number pattern.
- We reflected by suggesting other number patterns and thought about how doing number patterns with movement could help us identify and extend number patterns in math.

At home, you could create a number pattern with your child. Ask your child to show you how to show the number pattern with movement.

Enduring Understanding

Identifying a rule or relationship can enable one to extend a pattern of numbers or movements.