# ARTS IMPACT LESSON PLAN

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

Arts Infused:

Pattern

Math:

Rule

Number

Arts:

General space

Locomotor

Non-locomotor

Self-space

Shape

Space bubble

Museum Artworks or Performance

Seattle, WA

Pacific Northwest Ballet

UW World Series of Dance

Tacoma, WA

Broadway Center for the

Performing Arts

Materials

Math Dances CD by Debbie Gilbert; CD

player; White board or chart paper &

markers; Drum or other percussion

instrument; Class

Assessment Worksheet

continued

WA Arts State Grade Level Expectations

For the full description of each WA State Arts Grade Level

Expectation, see: http://www.k12.wa.us/Arts/Standards

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

Common Core State Standards (CCSS) in Math

For a full description of CCSS Standards by grade level see:

http://www.k12.wa.us/CoreStandards/Mathematics/default.as

px

4.OA. Generate and analyze patterns.

4.OA.5. Generate a number or shape pattern that follows a

given rule.

CCSS Mathematical Practices

MP.2. Reason abstractly and quantitatively.

MP.4. Model with mathematics.

MP.7. Look for and make use of structure.

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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

©Angela Sterling

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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.

ICON KEY:

" = Indicates note or reminder for teacher

! = Embedded assessment points in the lesson

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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.

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• 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).

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2. Prepare students for dancing by creating agreements for appropriate dance

behavior. Chart student responses.

• Before we begin moving, I have a question for you. How can you be creative and

safe at the same time?

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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

• 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.

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.

Movement Safety

BrainDance by

Artist Mentor

BrainDance by

Students

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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.

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4. Introduce the dance concepts of shape, self-space, and general space. Use

patterns in the exploration. Play percussion instrument(s) for accompaniment.

3 Count the numbers out loud.

• 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)

þ Criteria-based process assessment: Performs movements in one spot and traveling through

the room. Freezes in shapes.

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Prompting for Creativity

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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.

• 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?

" 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.

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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.

• 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.

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Number Pattern in

Self-space

Number Pattern in

General Space

Number Pattern Duos

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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.

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ARTS IMPACT LESSON PLAN Dance and Math Infusion

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

STUDENT SELF-ASSESSMENT WORKSHEET

Disciplines DANCE/MATH DANCE/MATH Total

Concept Pattern Pattern 3

Criteria

Student Name

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.

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ARTS IMPACT LESSON PLAN Dance and Math Infusion

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CLASS ASSESSMENT WORKSHEET

Disciplines DANCE/MATH DANCE/MATH Total

Concept Pattern Pattern 3

Criteria

Student Name

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.

1.

2.

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28.

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:

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