

ARTS IMPACT LESSON PLAN

Dance and Math Infused Lesson

Lesson Three: *Fractions in Action*

Author: Debbie Gilbert Grade Level: Fourth



Enduring Understanding

Fractions decomposed into a sum of fractions with the same denominator can be represented by an equation or a movement sequence.

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

In this math and dance lesson, students learn the South African line dance Pata Pata. They break the dance into five parts and determine the fraction that corresponds to each part of the dance. In small groups, they write five fractions that total 16/16 or 1. They choreograph a line dance in which each movement corresponds to one of the fractions to create a sixteen-count dance. They perform for each other and describe the fractions and the movements.

Learning Targets and Assessment Criteria

Target: Performs a dance from South Africa.

Criteria: Dances the five parts of the dance Pata Pata in a line formation.

Target: Creates a sequence of fractions that when combined total one.

Criteria: Writes five fractions with a denominator of 16. Adds the fractions to total 16/16.

Target: Choreographs a sixteen-count line dance.

Criteria: Creates a movement sequence with five parts, performed in a line formation. Designs each part to correspond to a fraction of the dance. When added, all fractions of the dance total 16/16 or 1.

Vocabulary	Materials	Learning Standards
<p><u>Arts Infused:</u> Counts Sequence</p> <p><u>Math:</u> Fractions</p> <p><u>Arts:</u> Choreographer Movement</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; "Pata Pata" by Miriam Makeba (optional); CD player; White board, document camera, or chart paper & markers; 8.5x11" white copy paper: copy Fractions in Action Student Worksheets, one per student; Writing pencils; 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.NF. Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers. 4.NF.3.a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. 4.NF.3.b. Decompose a fraction into a sum of fractions with the same denominator.</p> <p>CCSS Mathematical Practices MP.1. Make sense of problems and persevere in solving them. MP.2. Reason abstractly and quantitatively. MP.4. Model with mathematics. MP.6. Attend to precision.</p>

Images:
Miriam Makeba singing Pata Pata



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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). Add and subtract fractions with the same denominator.

Lesson Steps Outline

Day One

1. Introduce using fractions to analyze a dance from South Africa and to choreograph dances.

2. Remind students about agreements for appropriate dance behavior.

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

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

4. Teach Pata Pata, a dance from South Africa.

Music: "Fraction Line Dance" #12, *Math Dances* by Debbie Gilbert, or "Pata Pata" by Miriam Makeba

Criteria-based teacher checklist: Dances the five parts of the dance Pata Pata in a line formation.

5. Analyze Pata Pata. Break the dance into fractions.

6. Ask students to create their own fractional plan for a dance. Divide students into groups of four or five. Distribute worksheets and pencils.

Criteria-based teacher checklist, self-assessment: Writes five fractions with a denominator of 16 and adds the fractions to total 16/16.

7. Support students as they begin to choreograph their line dances.

Music: "Fraction Line Dance" #12, *Math Dances* by Debbie Gilbert, or "Pata Pata" by Miriam Makeba

Criteria-based teacher checklist: Creates a movement sequence with five parts, performed in a line formation. Designs each part to correspond to a fraction of the dance. When added, all fractions of the dance total 16/16 or 1.

8. Lead reflection.

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

Day Two

1. Prepare students for refining and rehearsing their dances.

2. Remind students about agreements for appropriate dance behavior.

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

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

4. Support students as they rehearse their line dances.

Music: "Fraction Line Dance" #12, *Math Dances* by Debbie Gilbert or "Pata Pata" by Miriam Makeba

Criteria-based teacher checklist, self-assessment: Creates a movement sequence with five parts, performed in a line formation. Designs each part to correspond to a fraction of the dance. When added, all fractions of the dance total $16/16$ or 1.

5. Facilitate performance of line dances and response. Review performer and audience expectations.

Criteria-based teacher checklist, peer assessment: Creates a movement sequence with five parts, performed in a line formation. Designs each part to correspond to a fraction of the dance. When added, all fractions of the dance total $16/16$ or 1.

6. Lead reflection.

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

LESSON STEPS

- ▣ Prepare the classroom for dance.



Moving Desks/Set-up

Day One

1. Introduce using fractions to analyze a dance from South Africa and to choreograph dances.

- *We'll be doing dance and math together in this lesson. Dancing Mathematicians, today we'll learn a dance from South Africa called Pata Pata. Then we'll break the dance into fractions, figuring out which fraction of the whole dance each section is. Finally, you'll use fractions, to create your own movements.*
- *I'll demonstrate the process with a hand dance that I choreographed. I'll shake my hands for four counts, scrunch them up for two counts, and open them up for two counts. What fraction of the eight-count dance is the four-count handshake? ($\frac{4}{8}$) What fraction of the eight-count dance is the hand scrunch for two counts? ($\frac{2}{8}$) What fraction of the eight-count dance is the hand opening for two counts? ($\frac{2}{8}$). So the whole dance is $\frac{4}{8} + \frac{2}{8} + \frac{2}{8} = \frac{8}{8}$ or 1.*
- *Do your own hand dance. Do the first movement: 1, 2, 3, 4. Do the second movement: 5, 6. Do the last movement: 7, 8.*
- *We'll do the same process with Pata Pata, but first let's get warmed up.*

2. Remind students about agreements for appropriate dance behavior.

- *Remind me, how can you be creative and safe at the same time?*



Movement Safety

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 fractions in the BrainDance.*



BrainDance by Artist Mentor

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. Teach Pata Pata, a dance from South Africa.

Music: "Fraction Line Dance" #12, *Math Dances* by Debbie Gilbert or "Pata Pata" by Miriam Makeba



Pata Pata



- *Pata Pata* comes from a song by Miriam Makeba from South Africa that she wrote in 1957. We are going to learn the line dance that goes with the song.
- Part one (counts 1, 2, 3, 4):
Touch right foot to the side, then bring feet together.
Touch left foot to the side, then bring feet together.
- Part two (counts 5, 6, 7, 8):
Toes out (hands up), heels out (elbows up).
Heels in (hands up), toes in (elbows up).
- Part three (counts 9, 10, 11, 12):
Knee up forward right, then touch right foot to the side.
Knee up forward right, then right foot down.
- Part four (counts 13, 14):
Kick left, then put left foot down.
- Part five (count 15, 16):
Jump while doing $\frac{1}{4}$ turn to the right.
Clap.
- Let's put it all together and practice! We'll repeat the 16-count sequence four times. You may have noticed that each time you repeat the sequence you are facing a different wall.

Criteria-based teacher checklist: Dances the five parts of the dance Pata Pata in a line formation.

5. Analyze Pata Pata. Break the dance into fractions.

Notate fractions on board or document camera.

- If *Pata Pata* is 16 counts long, and our first part is four counts long. How many sixteenths of the whole dance is part one? ($\frac{4}{16}$)
- Part two is four counts long. How many sixteenths of the whole dance is part two? ($\frac{4}{16}$)
- Part three is four counts long. How many sixteenths of the whole dance is part three? ($\frac{4}{16}$)
- Part four is two counts long. How many sixteenths? ($\frac{2}{16}$)
- Part five is two counts long. How many sixteenths? ($\frac{2}{16}$)
- Let's check our work: $\frac{4}{16} + \frac{4}{16} + \frac{4}{16} + \frac{2}{16} + \frac{2}{16}$. What does that equal?

	counts	fraction	movement
1.	4	$\frac{4}{16}$	right side step left side step
2.	4	$\frac{4}{16}$	Windshield wipers heels out, toes in 2
3.	4	$\frac{4}{16}$	teeth right knee lift 2x
4.	2	$\frac{2}{16}$	left leg kick
5.	2	$\frac{2}{16}$	$\frac{1}{4}$ turn, jump right clap
total:		16	sum: $\frac{16}{16}$ or 1

6. Ask students to create their own fractional plan for a dance. Divide students into groups of four or five. Distribute worksheets and pencils.

☐ You can choose the groups in advance to keep the momentum of the class going. Then you can list the students in that order on the assessment checklist. That will make assessment of the performance later much easier.



Prompting for Creativity

- *You will be mathematicians and choreographers, the inventors of sixteen-count dance sequences.*
- *In your small group, work together to decide how you will divide the sixteen counts into five sections. Figure out how many counts will be in each section and then what fraction of the dance each section will be. Check your work by adding up your fractions to see if they total 16/16 or 1.*

☑ Criteria-based teacher checklist, self-assessment: Writes five fractions with a denominator of 16 and adds the fractions to total 16/16.

7. Support students as they begin to choreograph their line dances.

Music: "Fraction Line Dance" #12, *Math Dances* by Debbie Gilbert or "Pata Pata" by Miriam Makeba



Fraction Line Dance

☐ As you assess the criteria on Day One, use a reverse checklist, placing a "0" for students who are not successful. Use pencil; this is preliminary and will be revisited on Day Two. Your notations on Day One will help you determine who will need extra attention on Day Two. Hopefully on the second day, you will be able to erase the zeros.

- *Choose a movement for each of the five parts of your line dance.*
- *Everyone in your group will all do the same movements at the same time in a line.*
- *Work as a group and make sure that whatever movements you select are simple and can be done easily by everyone in your group. I am sure you could create very challenging movements. However, since our rehearsal time will be limited, I am going to ask you to keep them simple, but use your whole bodies.*
- *Plan each part of the dance, so that each section has the number of counts in the plan that you created on your worksheets.*
- *Another way that dancers use math is to choose their formations. This is a line dance, but you can choose to divide your group into more than one line.*
- *Practice your dance together. We'll have more time on another day to refine, rehearse and present the dances.*
- *Write your movements on the worksheet to help you remember them the next time we dance.*



☐ Feel free to give students short times to practice their dances before the next dance/math day.

☑ Criteria-based teacher checklist: Creates a movement sequence with five parts, performed in a line formation. Designs each part to correspond to a fraction of the dance. When added, all fractions of the dance total 16/16 or 1.

8. Lead reflection.

- *Dancing Mathematicians, what did you discover about how choreographers use math?*

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

Day Two

1. Prepare students for refining and rehearsing their dances.

- *Today, we will refine and rehearse our line dances and then perform them for each other.*
 - *Dancing Mathematicians, as you work on your dance, check to make sure that each fraction of your dance adds up to $16/16$ or 1 .*
-

2. Remind students about agreements for appropriate dance behavior.

- *Before you warm up, remind me, how can you be creative and safe at the same time?*
-

3. Lead students in *Math BrainDance* from Day One.

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

4. Support students as they rehearse their line dances.

Music: "Fraction Line Dance" #12, *Math Dances* by Debbie Gilbert or "Pata Pata" by Miriam Makeba

- *Review your worksheets to remember your counts and movements.*
- *Does your dance have five parts?*
- *Does the total number of counts in your line dance sequence equal sixteen?*
- *Do all the fractions of the dance add up to $16/16$ or 1 ?*
- *Are you using your whole bodies in the dance?*
- *Are you focusing and concentrating from the beginning to the end of the dance?*
- *Practice your dance several times all together in your formation of one or more lines.*
- *Practicing helps you remember the dance and also helps you all move together as a group.*

Criteria-based teacher checklist, self-assessment: Creates a movement sequence with five parts, performed in a line formation. Designs each part to correspond to a fraction of the dance. When added, all fractions of the dance total $16/16$ or 1 .

5. Facilitate performance of line dances and response. Review performer and audience expectations.



Performer and Audience Expectations

- *What do the performers want from their audience? What does the audience want from the performers?*
- *Each group will perform its line dance. After the performance, the dancers will explain the fractions for each part and how they totaled $16/16$ or 1 . Audience, I'll ask you to describe the movements that you observed.*

Criteria-based teacher checklist, peer assessment: Creates a movement sequence with five parts, performed in a line formation. Designs each part to correspond to a fraction of the dance. When added, all fractions of the dance total $16/16$ or 1 .

6. Lead reflection.

- *Dancing Mathematicians, what did you discover by choreographing a dance using fractions?*
- *The next time you work with fractions in math, remember how you used them to choreograph a dance.*

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

Fractions in Action Student Worksheet

Name: _____

Date: _____

	How many counts?	What is the fraction?	Draw or describe the movements.
Part 1		$\frac{\quad}{16}$	
Part 2		$\frac{\quad}{16}$	
Part 3		$\frac{\quad}{16}$	
Part 4		$\frac{\quad}{16}$	
Part 5		$\frac{\quad}{16}$	
	The total number of counts should be 16.	Add your fractions. What is the sum? $\frac{\quad}{16}$	

ARTS IMPACT LESSON PLAN Dance and Math Infusion

Fourth Grade Lesson Three: *Fractions in Action*

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

STUDENT SELF-ASSESSMENT WORKSHEET

Disciplines	DANCE	MATH	DANCE	DANCE/MATH	Total
Concept	Cultural Dance	Fractions	Choreography	Fractions	4
Criteria	Dances the five parts of the dance Pata Pata in a line formation.	Writes five fractions with a denominator of 16. Adds the fractions to total 16/16.	Creates a movement sequence with five parts, performed in a line formation.	Designs each part to correspond to a fraction of the dance. When added, all fractions of the dance total 16/16 or 1.	
Student Name					

ARTS IMPACT LESSON PLAN Dance and Math Infusion

Fourth Grade Lesson Three: *Fractions in Action*

CLASS ASSESSMENT WORKSHEET

Disciplines	DANCE	MATH	DANCE	DANCE/MATH	Total 4
Concept	Cultural Dance	Fractions	Choreography	Fractions	
Criteria	Dances the five parts of the dance Pata Pata in a line formation.	Writes five fractions with a denominator of 16. Adds the fractions to total 16/16.	Creates a movement sequence with five parts, performed in a line formation.	Designs each part to correspond to a fraction of the dance. When added, all fractions of the dance total 16/16 or 1.	
Student Name					
1.					
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24.					
25.					
26.					
27.					
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: _____

DANCE AND MATH LESSON: *Fractions in Action*

Dear Family:

Today your child participated in an **Arts and Math** lesson. We talked about how both mathematicians and dancers can use fractions to analyze dance and to choreograph a dance.

- We did the Math BrainDance to warm up our brains and bodies.
- We learned Pata Pata, a line dance from South Africa.
- We broke the choreography of the dance into five parts and figured out the fractions that represented each part of the dance: $\frac{4}{16} + \frac{4}{16} + \frac{4}{16} + \frac{2}{16} + \frac{2}{16} = \frac{16}{16}$ or 1.
- We worked with a small group and wrote five fractions that when added together made $\frac{16}{16}$ or 1.
- We choreographed our own line dances that matched our fractions.
- We performed them for each other and talked about how dancers are mathematicians who use fractions to create dances.

At home, you could look at how a whole pizza or pan of brownies can be divided into fractions. Ask your child to teach you the fraction line dance.

Enduring Understanding

Fractions decomposed into a sum of fractions with the same denominator can be represented by an equation or a movement sequence.