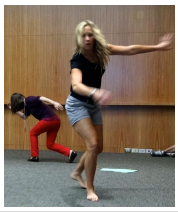
ARTS IMPACT LESSON PLAN

Dance and Math Infused Lesson



Lesson Two: *Fractional Choreography*

Author: Debbie Gilbert Grade Level: Third

Enduring Understanding

A fraction — which is part of a whole — can be represented by numbers, movements, or shapes.

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

In this math and dance lesson, students view photographs of professional dancers and use fractions to talk about the number of dancers in the pictures. They explore self-space (moving in one spot) and general space (traveling), levels, and shapes. In small groups, they create and perform dances that are a total of 16 counts long. One movement in self-space is 8/16 of the dance. One movement in general space is 4/16 of the dance. Two shapes are each 2/16 of the dance.

Learning Targets and Assessment Criteria

Target: Notates the fractions represented by 8 counts out of 16 counts, 4 counts out of 16 counts, 2 counts out of 16 counts.

Criteria: Writes 8/16, 4/16, 2/16 corresponding to counts on worksheet.

Target: Choreographs a sequence of movements and shapes using fractions.

Criteria: Creates a dance in which one self-space movement is 8/16 of the dance, a general space movement is 4/16 of the dance, and two shapes are each 2/16 of the dance. Uses more than one level in the dance.

Vocabulary

Arts Infused:
Counts

Math:
Fractions

Arts:
Choreography
General Space
Levels:
High
Low
Self-space
Shape

Materials

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, document camera or chart paper & markers; Drum/percussion instrument; 8.5x11" white copy paper: copy Fractional Choreography Student Worksheets, one per student; Writing pencils; Class Assessment Worksheet

continued

Learning Standards

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, Level
1.2.1 Skills and Techniques: Focus
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

Early Learning Guidelines (Pre-K – Grade 3)
For a full description of Washington State Early Learning and Child Development Guidelines see:
http://www.del.wa.gov/development/guidelines/
(3rd grade) 3. Touching, seeing, hearing and moving around: Using the large muscles (gross motor skills): show good form in basic movement (locomotor skills).
(3rd grade) 6. Learning about my world: Math: develop an understanding of fractions. Arts: create and perform movement, showing balance through coordination and muscle control; show interest in developing skills in dance.

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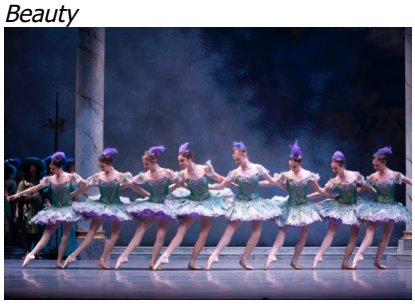
Pacific Northwest Ballet images:
Dancers in Ronald Hynd's *The Sleeping Beauty*



Dancers in Benjamin Millepied's *3 Movements*

Rachel Foster and Kiyon Gaines in Twyla Tharp's *Opus III*

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.aspx

3.NF. Develop understanding of fractions as numbers.

3.NF.1. Understand a fraction 1/*b* as the quantity formed by 1 part when a whole is partitioned into *b* equal parts; understand a fraction *a/b* as the quantity formed by *a* parts of size 1/*b*.

CCSS Mathematical Practices

MP.1. Make sense of problems and persevere in solving them.
MP.4. Model with mathematics.
MP.7. Look for and make use of structure.

ICON KEY:

= Indicates note or reminder for teacher

☑ = Embedded assessment points in the lesson

Pre-Teach

Practice the *Math BrainDance*, see lesson step 3. Explore fractions as parts of the whole in various contexts and with a variety of models.

Lesson Steps Outline

1. Introduce using fractions to create dances. Analyze fractions using photos of dancers.

2. Remind students about agreements for appropriate dance behavior.

3. Lead students in *Math BrainDance* warm-up.
Music: "Math BrainDance (Third Grade)" #4, *Math Dances* by Debbie Gilbert

4. Explore self and general space, levels, and shape with fractions. Use a drum for accompaniment.

☑ Criteria-based process assessment: Dances high and low in one spot and traveling, and freezes.

5. Demonstrate creating and notating Fractional Choreography.
Music: "Fractional Choreography" #11, *Math Dances* by Debbie Gilbert

6. Guide students in groups of 4 – 5 as they create, notate, and rehearse Fractional Choreography. Distribute Fractional Dance Choreography Worksheets and pencils.
Music: "Fractional Choreography" #11, *Math Dances* by Debbie Gilbert

☑ Criteria-based teacher checklist, self-assessment: Writes 8/16, 4/16, and 2/16 corresponding to counts on worksheet. Creates a dance in which one self-space movement is 8/16 of the dance, a general space movement is 4/16 of the dance, and two shapes are each 2/16 of the dance. Uses more than one level in the dance.

7. Facilitate performance of Fractional Dances and response. Review performer and audience expectations.

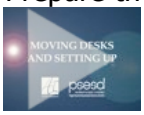
☑ Criteria-based teacher checklist, peer assessment: Creates a dance in which one self-space movement is 8/16 of the dance, a general space movement is 4/16 of the dance, and two shapes are each 2/16 of the dance. Uses more than one level in the dance.

8. Lead reflection.

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

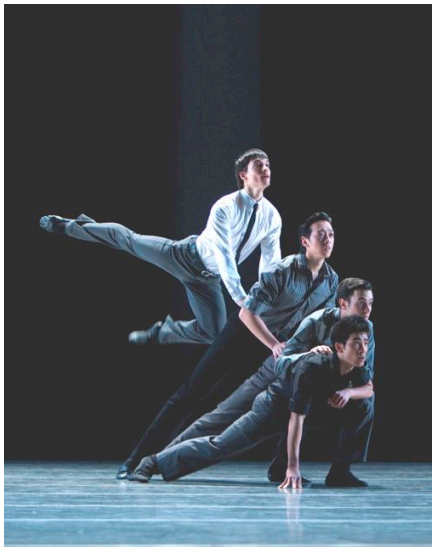
LESSON STEPS

Prepare the classroom for dance.



Moving Desks/Set-up

1. Introduce using fractions to create dances. Analyze fractions using photos of dancers.



You may use these photos: Pacific Northwest Ballet: Dancers in Ronald Hynd's *The Sleeping Beauty,* Dancers in Benjamin Millepied's *3 Movements*, and Rachel Foster and Kiyon Gaines in Twyla Tharp's *Opus III*. You could also choose to find your own photos or videos that represent a variety of styles and cultures. You could review, for example, The UW World Dance Series, http://uwworldseries.org/world-dance. Look for a photo of eight dancers, a photo of four dancers, and a photo of two dancers.

- *Dancers use fractions to create dances. Dancing Mathematicians can use fractions to talk about the number of dancers or the number of counts of a shape or movement.*

- *How many dancers are in the first picture?*

- *The next picture has four dancers. What fraction of the number of dancers in the first picture is that?* (4/8)

- *The third picture has two dancers. What fraction of the number of dancers in the first picture is that?* (2/8)

- *How many dancers would there be if you had one eighth as many dancers as the first picture?*
- *Today we will use fractions represented by the number of counts of movements and shapes to make dances.*

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2. Remind students about agreements for appropriate dance behavior.

Movement Safety

- *Remind me, 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 (Third Grade)" #4, *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 fractions in the BrainDance.*


BrainDance by Students

Breath
- *Dancing Mathematicians, breathe gently.*

Tactile
- *Tap the top of your head five times. Tap your shoulders five times. Tap your stomachs five times. Tap your knees five times. Tap your feet five times. That was five sets of five. How many counts total was that?*

Core-Distal
- *Grow into a huge shape, filling the area of a gigantic polygon. Shrink into a small shape, filling the area of a tiny polygon.*

Head-Tail
- *Curl your backbone forwards and backwards four times. Bend from side to side four times. That was two sets of four. How many counts total was that?*

Upper Half
- *Freeze the lower half of your body. Draw the perimeter of a giant rectangle in the air with your hand. Cover the area of the rectangle with big movements with your arms.*

Lower Half
- *Freeze the upper half of your body. Draw the perimeter of a small rectangle on the floor with your toes. Cover the area of the rectangle with small movements with your feet.*

Body-Half Right
- *Freeze the left side of your body. Dance with the whole right side of your body. Dance with one half of your right side. Dance with one fourth of your right side. Dance with one eighth of your right side.*

Body-Half Left

- *Freeze the right side of your body. Dance with the whole left side of your body. Dance with one half of your left side. Dance with one fourth of your left side. Dance with one eighth of your left side.*

Eye-Tracking

- *Focus on your right thumb. Watch it as you draw the perimeter of a polygon in the air. Watch your left thumb as you draw the perimeter of a polygon in the air.*

Cross-Lateral

- *Reach across your body up high, up high, down low, down low. We'll count to eight: 1, 2, 3 … 8. Let's cut that in half: 1, 2, 3, 4. Let's cut that in half again: 1, 2.*

Vestibular

- *Turn, then freeze in a rectangle shape. Turn, then freeze in a square shape. Turn, then freeze in a rhombus shape. Turn, then freeze in a different quadrilateral shape.*

Breath

- *Breathe gently, Dancing Mathematicians.*

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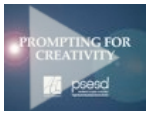
4. Explore self-space, general space, levels, and shape with fractions.
Use a drum for accompaniment.



Prompting for Creativity

Demonstrate as you speak the following introductory prompt.

- *We are going to explore moving in self-space, that means dancing in one spot, and moving in general space, that means traveling through the empty spaces in the room. We'll also use high and low levels and freeze in shapes.*

Count the numbers out loud as you drum.

- *Do your own dance in self-space (staying in one spot) when you hear the drum and freeze in a shape when it stops. I'll play for sixteen counts. We can call that 16/16.*

- *Do a dance on a high level in your self-space and then freeze in a shape. I'll play for one half of sixteen counts. How many will that be?* (eight) *So you'll move for eight counts and freeze for eight counts. We can call that 8/16.*

- *Do a dance on a low level in your self-space and then freeze in a shape. I'll play for one fourth of sixteen counts. How many will that be?* (four) *So you'll move for four counts and freeze for twelve counts. We can call that 4/16.*

- *Do a dance on a high level in your self-space and then freeze in a shape. I'll play for one eighth of sixteen counts. How many will that be?* (two) *So you'll move for two counts and freeze for fourteen counts. We can call that 2/16.*

- *Do your own dance in general space (traveling) when you hear the drum and freeze in a shape when it stops. I'll play for sixteen counts — 16/16. Look for the empty spaces.*

- *Do a dance on a high level in the general space and then freeze in a shape. I'll play for one half of sixteen counts. How many will that be?* (eight) *So you'll move for eight counts and freeze for eight counts. We can call that 8/16.*

- *Do a dance on a low level in the general space and then freeze in a shape. I'll play for one fourth of sixteen counts. How many will that be?* (four) *So you'll move for four counts and freeze for twelve counts. We can call that 4/16.*

- *Do a dance on a high level in the general space and then freeze in a shape. I'll play for one eighth of sixteen counts. How many will that be?* (two) *So you'll move for two counts and freeze for fourteen counts. We can call that 2/16.*

- *How did we just use fractions?*

☑ Criteria-based process assessment: Dances high and low in one spot and traveling, and freezes.

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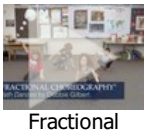
5. Demonstrate creating and notating Fractional Choreography.
Music: "Fractional Choreography" #11, *Math Dances* by Debbie Gilbert


Fractional Choreography Dance

Use a document camera to fill out worksheet or write it on chart paper.

Based on your students' prior experience with fractions, you may want to incorporate visual fraction models or other strategies. If appropriate, you could challenge your students to look for equivalent fractions (8/16 = 1/2, 4/16 = 1/4, 2/16 = 1/8).

- *I am going to choreograph a 16-count dance using fractions. If my dance is 16 counts long, 8 counts are what fraction of the whole dance?* (8/16) *I'll write 8/16 on my worksheet.*

- *If my dance is 16 counts long, 4 counts are what fraction of the whole dance?* (4/16) *I'll write 4/16 on my worksheet.*

- *If my dance is 16 counts long, 2 counts are what fraction of the whole dance?* (2/8) *I'll write 2/8 on my worksheet two times.*

- *For my 8-count movement, I'll do a self-space low level bend. I'll write "low" on my worksheet.*

- *For my 4-count movement, I'll do a general space high level skip. I'll write "high" on my worksheet.*

- *For my first 2-count shape, I'll do a low and small shape. I'll write "low" on my worksheet.*

- *For my second 2-count shape, I'll do a high and big shape. I'll write "high" on my worksheet.*

- *Now, I'll show you my dance!*

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6. Guide students in groups of 4 – 5 as they create, notate, and rehearse Fractional Choreography. Distribute Fractional Dance Choreography Worksheets and pencils.
Music: "Fractional Choreography" #11, *Math Dances* by Debbie Gilbert

You can choose the groups in advance to keep the momentum of the class going. If you put their names on the assessment checklist in the order of their groups, it will make it easy to assess them during the performance. You can also choose to assess them during the rehearsal as you travel from group to group observing their process.

To assess this criterion, use a reverse checklist and put "0" for each student who doesn't show the concept. It will let you know if you need to spend more time on a particular concept.

- *With your groups, fill out your worksheets. Write the fraction of the total of 16 counts for each movement and shape.*

- *Plan the self-space movement and the general space movement and the two shapes with your group.*

- *You are choreographers. Try several different movements and shapes and make a choice as a group.*

- *Even though you have the same fractions as all the other groups, I expect that each group's dance will look different from the other dances based on your choices as choreographers.*

- *Ask yourself if you are doing different levels. Write the level (high or low) of the movements and shapes on the worksheet.*

- *Check the math on your worksheet. Are the movements and shapes you created the correct fractions of the dance?*

- *Practice your dance! Use your whole body, not just your arms and legs. Stay focused and concentrate from the beginning to the end of your dance.*

☑ Criteria-based teacher checklist, self-assessment: Writes 8/16, 4/16, 2/16 corresponding to counts on worksheet. Creates a dance in which one self-space movement is 8/16 of the dance, a general space movement is 4/16 of the dance, and two shapes are each 2/16 of the dance. Uses more than one level in the dance.

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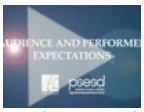
7. Facilitate performance of Fractional Dances and response. Review performer and audience expectations.

Music: "Fractional Choreography" #11, *Math Dances* by Debbie Gilbert



Audience and Performer Expectations

- *What do the performers want from their audience? What does the audience want from the performers?*

- *Each group will perform its dance. Audience, after the performance, I'll ask you to describe the movements and shapes that you observed.*

☑ Criteria-based teacher checklist, peer assessment: Creates a dance in which one self-space movement is 8/16 of the dance, a general space movement is 4/16 of the dance, and two shapes are each 2/16 of the dance. Uses more than one level in the dance.

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8. Lead reflection.

- *Dancing Mathematicians, how did you know that the first movement was 8/16 of the dance? How did you know that the second movement was 4/16 of the dance? How did you know that the shapes were each 2/16 of the dance?*

- *The next time that you use fractions in math, remember how you combined fractions to make a whole dance.*

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

Fractional Choreography Student Worksheet

Name: _____ Date: _____

	Number of counts	What is the fraction?	Is the movement or shape high or low?
First movement (self-space)	8	$\frac{\square}{16}$	
Second movement (general space)	4	$\frac{\square}{16}$	
Shape	2	$\frac{\square}{16}$	
Shape	2	$\frac{\square}{16}$	
	The total number of counts should be 16.	Add your fractions. What is the sum? $\frac{\square}{16}$	

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

STUDENT SELF-ASSESSMENT WORKSHEET

Disciplines	**MATH**	**DANCE/MATH**					Total 6
Concept	**Fractions**	**Fractional Choreography**					
Criteria	Writes 8/16, 4/16, 2/16 corresponding to counts on worksheet.	Creates a dance in which one self-space movement is 8/16 of the dance; a general space movement is 4/16 of the dance; and two shapes are each 2/16 of the dance. Uses more than one level in the dance.					
Student Name		8/16	4/16	2/16	2/16	Levels	

ARTS IMPACT LESSON PLAN Dance and Math Infusion

Third Grade Lesson Two: *Fractional Choreography*

CLASS ASSESSMENT WORKSHEET

Disciplines	**MATH**	**DANCE/MATH**					Total 6
Concept	**Fractions**	**Fractional Choreography**					
Criteria	Writes 8/16, 4/16, 2/16 corresponding to counts on worksheet.	Creates a dance in which one self-space movement is 8/16 of the dance; a general space movement is 4/16 of the dance; and two shapes are each 2/16 of the dance. Uses more than one level in the dance.					
Student Name		8/16	4/16	2/16	2/16	Levels	
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							
11.							
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15.							
16.							
17.							
18.							
19.							
20.							
21.							
22.							
23.							
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: _____

ARTS IMPACT FAMILY LETTER

DANCE AND MATH LESSON: ***Fractional Choreography***

Today your child participated in an **Arts and Math** lesson. We talked about how both mathematicians and dancers can use fractions to make dances.

- We looked at photographs of professional dancers and used fractions to talk about the number of dancers in the pictures.
- We did the Math BrainDance to warm up our brains and bodies.
- We explored self-space (moving in one spot) and general space (traveling), high and low levels, and freezing in shapes.
- We worked in a small group, to create and perform dances that were a total of 16 counts long. One movement in self-space was 8/16 of the dance. One movement in general space was 4/16 of the dance. Two shapes were each 2/16 of the dance. We notated the fractions on a worksheet.
- We performed the dances and talked about how we knew it was true that our movements and shapes matched the fractions in the dance that combined to make a whole dance.

At home, you could look divide cookies or sandwiches or fruit into halves, quarters, eighths, or sixteenths. Ask your child to show you Fractional Choreography.

Enduring Understanding

A fraction — which is part of a whole — can be represented by numbers, movements, or shapes.