

ARTS IMPACT LESSON PLAN

Dance and Math Infused Lesson

Lesson One: *Story Problem Dance: Sets of Eight*

Author: Debbie Gilbert Grade Level: Third



Enduring Understanding

Multiplication can determine the total number of objects or counts when there is a specific number of sets with equal numbers of objects or counts in each set.

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

In this math and dance lesson, students consider how dancers use multiplication in creating dances. They explore smooth, sharp, swinging, and shaking energy in sets of eight or six counts. In small groups, they solve a story problem by creating a dance that is four sets of eight using one of the energy qualities. Students calculate the total number of counts in their dances.

Learning Targets and Assessment Criteria

Target: Moves using four qualities of energy to match the musical structure.

Criteria: Performs smooth movement, sharp movement, swinging movement, and shaking movement in sets of eight or six counts.

Target: Calculates the total number of counts in a section of a dance.

Criteria: Multiplies four sets of eight counts to equal 32 counts.

Target: Performs a 32-count sequence of movement using one energy quality.

Criteria: Dances four sets of eight counts of smooth, sharp, or swinging movement.

Vocabulary	Materials	Learning Standards
<p>Arts Infused: Counts Sets</p> <p>Math: Multiplication</p> <p>Arts: Energy:</p> <ul style="list-style-type: none"> <li style="border: 1px solid black; display: inline-block; padding: 2px;">Shaking <li style="border: 1px solid black; display: inline-block; padding: 2px;">Sharp <li style="border: 1px solid black; display: inline-block; padding: 2px;">Smooth <li style="border: 1px solid black; display: inline-block; padding: 2px;">Swinging <li style="border: 1px solid black; display: inline-block; padding: 2px;">Space bubble 	<p style="border: 1px solid black; padding: 2px;">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; <i>Music for Creative Dance, Volume IV</i>, by Eric Chappelle; CD player; White board, document camera, or chart paper & markers; 8.5x11" white copy paper: copy The Story Problem: Sets of Eight, one per student; Class Assessment Worksheet</p> <p style="text-align: right; font-style: italic;">continued</p>	<p style="border: 1px solid black; padding: 2px;">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>1.1.3 Elements: Energy 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</p> <p>Early Learning Guidelines (Pre-K – Grade 3) <i>For a full description of Washington State Early Learning and Child Development Guidelines see: http://www.del.wa.gov/development/guidelines/</i></p> <p>(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: build skills to multiply and divide accurately; solve word (story) problems using multiplication. Arts: create and perform movement, showing balance through coordination and muscle control; show interest in developing skills in dance.</p> <p style="text-align: right; font-style: italic;">continued</p>

Pacific Northwest Ballet image:
Dancer Eric Hipolito, Jr. in Jerome
Robbins' *Glass Pieces*



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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.OA. Represent and solve problems involving multiplication and division.

3.OA.1. Interpret products of whole numbers.

3.OA.3. Use multiplication and division within 100 to solve word problems in situations involving equal groups.

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.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. Unpack the math concepts in the BrainDance. Explore finding the total number of objects when there is a specific number of groups with the same number of objects per group. Practice multiplying whole numbers up to 10×10 .

Lesson Steps Outline

1. Introduce using multiplication to determine the total number of counts in a dance. Use a photo of a dancer to illustrate multiplication.

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 (Third Grade)" #4, *Math Dances* by Debbie Gilbert

4. Guide exploration of smooth, sharp, swinging, and shaking energy in sets of eight or six counts. Ask students to calculate the total number of counts for each type of energy.

Music: "Energy" #16, *Music for Creative Dance, Volume IV*, by Eric Chappelle

 Criteria-based teacher checklist: Performs smooth movement, sharp movement, swinging movement, and shaking movement in sets of eight or six counts.

5. Read the multiplication story problem and support students as they solve the problem in movement with six small groups.

 Criteria-based teacher checklist: Multiplies four sets of eight counts to equal 32 counts. Dances four sets of eight counts of smooth, sharp, or swinging movement.

6. Direct a rehearsal with music.

Music: "Energy" #16, *Music for Creative Dance, Volume IV*, by Eric Chappelle

 Criteria-based teacher checklist, self-assessment: Dances four sets of eight counts of smooth, sharp, or swinging movement.

7. Facilitate performance and response. Review performer and audience expectations.

Music: "Energy" #16, *Music for Creative Dance, Volume IV*, by Eric Chappelle

Criteria-based teacher checklist, peer assessment: Dances four sets of eight counts of smooth, sharp, or swinging movement.

8. 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 using multiplication to determine the total number of counts in a dance. Use a photo of a dancer to illustrate multiplication.

- *We are going to do dance and math at the same time. We'll be Dancing Mathematicians!*
- *Dancing Mathematicians ask questions and look for answers. Dancing Mathematicians use their shapes and movements to figure out why something is true in math.*
- *Dancers use multiplication to figure out how many counts or movements are in a dance.*

☐ You may use this photo: Pacific Northwest Ballet: Dancer Eric Hipolito, Jr. in Jerome Robbins' *Glass Pieces*. 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 at the picture of this dancer leaping. Let's say that he leaps four times, then four more times, and then four more times. That's three sets of four or 3×4 . Dancing Mathematicians, how many leaps did he do? I'll write an equation on the board to show that $(3 \times 4 = 12)$.*
- *We are going to create our own dances with sets of eight and use multiplication to figure out how many counts are in our dance.*

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?*



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 (Third Grade)" #4, *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 multiplication in the BrainDance.*



BrainDance by Artist Mentor

Breath

- *Dancing Mathematicians, breathe gently.*



BrainDance by Students

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.*

4. Guide exploration of **smooth**, **sharp**, **swinging**, and **shaking** energy in sets of eight or six counts. Ask students to calculate the total number of counts for each type of energy.

Music: "Energy" #16, *Music for Creative Dance, Volume IV*, by Eric Chappelle



Prompting for Creativity

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

- *Dancers use different types of energy when they move. Today we'll dance with smooth, sharp, swinging, and shaking energy.*
- *Smooth energy is flowing movement that doesn't stop; it just keeps going. When you hear the first music, use your whole body to move with smooth energy. If you listen to the music as you move, you'll hear that it is created with four sets of eight. I could write that like this: 4×8 .*

▣ Play the first four sets of eight of the music. Count the music out loud in sets of eight as it plays and then pause the music.

- *Sharp energy is jerky; it stops and starts. When you hear the second part of the music, use your whole body to move with sharp energy. Put on your **space bubble**, and look for the empty spaces so you don't bump anyone.*
- *If you listen to the music as you move, you'll hear the four sets of eight. I could write that like this: 4×8 .*

▣ Play the second four sets of eight of the music. Count the music out loud in sets of eight as it plays and then pause the music.

- *Swinging energy drops and lifts or suspends. When you hear the third part of the music, use your whole body to move with swinging energy. If you listen to the music as you move, you'll hear the four sets of eight or 4×8 .*

▣ Play the third four sets of eight of the music. Count the music out loud in sets of eight as it plays and then pause the music.

- *Shaking energy is just what it sounds like – shaking. You can shake with your whole body or just one part of your body. If you listen to this part of the music as you move, you'll hear eight sets of six. That's 8×6 .*

▮ Play the next part of the music. It is in eight sets of six. Count the music out loud in sets of six as it plays and then pause the music.

- *Dancing Mathematicians, how did the composer use multiplication to create the music? How many counts total were for smooth energy? How do you know that's true? I'll draw the equation for that on the board ($4 \times 8 = 32$).*

▮ Repeat the process, multiplying to find the total number of counts for sharp, swinging, and shaking energy.

▮ You may play the music from the beginning again to give students another opportunity to dance each energy quality. If time permits, you can continue to explore energy with the music. The next sections of the music are: smooth (2 sets of 8), sharp (2 sets of 8), swinging (2 sets of 8), shaking (4 sets of 6). Then that pattern repeats.

Criteria-based teacher checklist: Performs smooth movement, sharp movement, swinging movement, and shaking movement in sets of eight or six counts.

5. Read the multiplication story problem and support students as they solve the problem in movement with six small groups.

▮ 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 on the last criteria during the rehearsal as you travel from group to group observing their process. You'll want to assess the multiplication criteria as you confer with each group.



Story Problem Dance - Smooth

▮ Display the story problem on the board, with a document camera, or on chart paper.

- *Dancing Mathematicians, we are going to use what we know about multiplication and movement to solve a story problem.*
- *Here's your story problem: You have been asked to make a dance for an assembly. You will use smooth, sharp, or swinging energy in your dance. Your dance will be four sets of eight counts long. How many counts total will your dance have?*
- *I'll divide you into six groups. Group one, you will create four sets of eight counts with smooth movement. Group two, you will create four sets of eight counts with sharp movement. Group three, you will create four sets of eight counts with swinging movement. Group four, you will create four sets of eight counts with smooth movement. Group five, you will create four sets of eight counts with sharp movement. Group six, you will create four sets of eight counts with swinging movement.*
- *Work with your group to decide what movements to do with your type of energy. You could pick one movement and repeat it for four sets of eight, you could pick two movements and do each one for two sets of eight, or you could pick four movements and do each one for one set of eight. Use your whole bodies. You can travel or stay in one spot. Make sure you have empty space to move.*
- *As you practice your dance with your group, I'll come around and conference briefly with each group. I'll ask you how many movements you have chosen to do and how many sets you will repeat them. I'll also ask you to tell me how many counts total are in your dance — the product of 4×8 .*



Story Problem Dance - Sharp



Story Problem Dance - Swinging

Criteria-based teacher checklist: Multiplies four sets of eight counts to equal 32 counts. Dances four sets of eight counts of smooth, sharp, or swinging movement.

6. Direct a rehearsal with music.

Music: "Energy" #16, *Music for Creative Dance, Volume IV*, by Eric Chappelle

- *Let's practice with music. I'll play the three sections: smooth, sharp, and swinging. When you hear your section, practice your dance. I'll count the sets of eight so you can hear them. I'll go back to the beginning of the music a few times and play it again so you can have several chances to practice.*
- *Ask yourself, are you dancing four sets of eight or a total of 32 counts?*
- *Is each movement in your dance showing your assigned energy quality? If it is smooth, are all your movements really smooth? If it is sharp, are all your movements really sharp? If it is swinging, are all your movements really swinging?*

Criteria-based teacher checklist, self-assessment: Dances four sets of eight counts of smooth, sharp, or swinging movement.

7. Facilitate performance and response.

Review performer and audience expectations.

Music: "Energy" #16, *Music for Creative Dance, Volume IV*, by Eric Chappelle



Audience and Performer Expectations

Play the music and pause between each section (4 sets of 8). After first three groups have performed, go back to the beginning of the music.

- *What do the performers want from their audience? What does the audience want from the performers?*
- *Each group will perform its dance. Audience, describe the movements you saw that matched the energy quality of the group.*

Criteria-based teacher checklist, peer assessment: Dances four sets of eight counts of smooth, sharp, or swinging movement.

8. Lead reflection.

- *Dancing Mathematicians, how did you know that the dances were 32 counts long?*
- *What equation did you use to calculate the total number of counts in the dance? Can you think of another equation that uses multiplication to show the total number of counts in this dance?*
- *The next time that you do multiplication in math, remember how you used multiplication to invent a dance.*

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

The Story Problem: Sets of Eight

You have been asked to make a dance for an assembly. You will use smooth, sharp, or swinging energy in your dance. Your dance will be four sets of eight counts long. How many counts total will your dance have?

ARTS IMPACT LESSON PLAN Dance and Math Infusion

Third Grade Lesson One: *Story Problem Dance: Sets of Eight*

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

STUDENT SELF-ASSESSMENT WORKSHEET

Disciplines	DANCE				MATH	DANCE/MATH	Total 6
Concept	Energy				Multiplication	Multiplication Choreography	
Criteria	Performs movement:				Multiplies four sets of eight counts to equal 32 counts.	Dances four sets of eight counts of smooth, sharp, or swinging movement.	
Student Name	Smooth in sets of 8 counts.	Sharp in sets of 8 counts.	Swinging in sets of 8 counts.	Shaking in sets of 6 counts.			

ARTS IMPACT LESSON PLAN Dance and Math Infusion

Third Grade Lesson One: *Story Problem Dance: Sets of Eight*

CLASS ASSESSMENT WORKSHEET

Disciplines	DANCE				MATH	DANCE/MATH	Total 6
Concept	Energy				Multiplication	Multiplication Choreography	
Criteria	Performs movement:				Multiplies four sets of eight counts to equal 32 counts.	Dances four sets of eight counts of smooth, sharp, or swinging movement.	
Student Name	Smooth in sets of 8 counts.	Sharp in sets of 8 counts.	Swinging in sets of 8 counts.	Shaking in sets of 6 counts.			
1.							
2.							
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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: _____

DANCE AND MATH LESSON: *Story Problem Dance: Sets of Eight*

Dear Family:

Today your child participated in an **Arts and Math** lesson. We talked about how both mathematicians and dancers can use multiplication in calculating totals and in making dances.

- We looked at a photograph of a professional dancer leaping and used multiplication to calculate how many leaps he would do if he did three sets of four leaps.
- We did the Math BrainDance to warm up our brains and bodies.
- We explored smooth, sharp, swinging, and shaking energy.
- We worked in a small group, to solve a story problem by creating and performing dances that were four sets of eight long and used smooth, sharp, or swinging energy.
- We performed the dances and talked about how we knew it was true that our dances were 32 counts long.

At home, you could make several equal numbered sets of pencils, spoons, or chocolates. Then multiply the sets to find the total. Ask your child to show you how to do four sets of eight counts of smooth, sharp, or swinging movement. Ask you child to help you figure out the total number of counts.

Enduring Understanding

Multiplication can determine the total number of objects or counts when there is a specific number of sets with equal numbers of objects or counts in each set.