

Dance and Math Infused Lesson

Lesson Two: **Classifying Quadrilaterals Dance**

Author: Debbie Gilbert Grade Level: Fifth



Enduring Understanding

Parallelograms, trapezoids, kites, rectangles, rhombi, and squares are quadrilaterals. Rectangles, rhombi, and squares are parallelograms. A square is a rectangle, and a square is a rhombus.

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

In this math and dance lesson, students analyze the properties of quadrilaterals, parallelograms, trapezoids, kites, rectangles, rhombi, and squares. They use stretchy fabric to create large-scale quadrilaterals and discuss how they are classified. In small groups, students perform a sequence of three quadrilaterals. One shape is a quadrilateral that is not a parallelogram. The second shape is a parallelogram that is not a square. The third shape is a quadrilateral of the dancer's choice.

Learning Targets and Assessment Criteria

**Target:** Choreographs a dance representing three quadrilaterals.

**Criteria:** Using a prop, makes a shape of a quadrilateral that is not a parallelogram, a parallelogram that is not a square, and a quadrilateral of the dancer's choice.

**Target:** Records quadrilateral shapes from the dance.

**Criteria:** Draws the shape of a quadrilateral that is not a parallelogram, a parallelogram that is not a square, and a quadrilateral of the dancer's choice.

| Vocabulary  | Materials  | Learning Standards  |
|---|--|---|
| <p><b>Arts Infused:</b><br/>Sequence<br/>Shape</p> <p><b>Math:</b><br/>Angle<br/>Kite<br/>Parallelogram<br/>Trapezoid<br/>Polygon<br/>Quadrilateral<br/>Rectangle<br/>Rhombus<br/>Side<br/>Square</p> <p><b>Arts:</b><br/>Choreographer</p> | <p><b>Museum Artworks or Performance</b></p> <p><b>Seattle, WA</b><br/>Pacific Northwest Ballet<br/>UW World Series of Dance</p> <p><b>Tacoma, WA</b><br/>Broadway Center for the Performing Arts</p> <p><b>Materials</b><br/>Stretchies; <i>Math Dances</i> CD by Debbie Gilbert; CD player; White board, document camera, or chart paper &amp; markers; 8.5x11" copy paper: copy Quadrilateral Hierarchy Chart, Quadrilateral Choreography Task Chart, and Classifying Quadrilaterals Dance Choreographer's Worksheet, one per student; Quadrilateral Choreography Task Chart (large one to post, or project); Writing pencils; Class Assessment Worksheet</p> | <p><b>WA Arts State Grade Level Expectations</b><br/><i>For the full description of each WA State Arts Grade Level Expectation, see: <a href="http://www.k12.wa.us/Arts/Standards">http://www.k12.wa.us/Arts/Standards</a></i></p> <p>1.1.1 Elements: Shape<br/>1.2.1 Skills and Techniques: Focus and Concentration<br/>1.4.1 Audience Skills<br/><b>2.1.1 Creative Process</b><br/>2.2.1 Performance Process<br/>2.3.1 Responding Process<br/>4.2.1 Connection between Dance and Math</p> <p><b>Common Core State Standards (CCSS) in Math</b><br/><i>For a full description of CCSS Standards by grade level see: <a href="http://www.k12.wa.us/CoreStandards/Mathematics/default.aspx">http://www.k12.wa.us/CoreStandards/Mathematics/default.aspx</a></i></p> <p>5.G. Classify two-dimensional figures into categories based on their properties.<br/>5.G.3. Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category.<br/>5.G.4. Classify two-dimensional figures in a hierarchy based on properties.</p> <p><b>CCSS Mathematical Practices</b><br/>MP.3. Construct viable arguments and critique the reasoning of others.<br/>MP.4. Model with mathematics.<br/>MP.5. Use appropriate tools strategically.<br/>MP.6. Attend to precision.</p> |
|   | <p><i>continued</i></p>  |   |

Pacific Northwest Ballet  
Mara Vinson in George Balanchine's  
*Agon*; 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. Explore the properties of quadrilaterals, parallelograms, trapezoids, kites, rectangles, rhombi, and squares.

### Lesson Steps Outline

**1.** Introduce classifying and dancing quadrilaterals. Review properties of quadrilaterals, parallelograms, trapezoids, kites, rectangles, rhombi, and squares. Analyze photo of a dancer making a shape.

**2.** Remind students about agreements for appropriate dance behavior.

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

Music: "Math BrainDance (Fifth Grade)" #6, *Math Dances* by Debbie Gilbert

**4.** Introduce the props for dancing quadrilaterals: stretchies. Discuss how to move safely and appropriately with them.

**5.** Lead exploration of quadrilaterals, parallelograms, trapezoids, kites, rhombi, rectangles, and squares with stretchies.

 Criteria-based process assessment: Uses a prop to make a quadrilateral, parallelogram, trapezoid, kite, rhombus, rectangle, and square.

**6.** Guide students to create specific three quadrilaterals with stretchies in a small group of about four. Ask students to draw their shapes on Choreographers' Worksheets.

Music: "The Three Quadrilaterals" #14, *Math Dances* by Debbie Gilbert

 Criteria-based teacher checklist: Using a prop, makes a shape of a quadrilateral that is not a parallelogram, a parallelogram that is not a square, and a quadrilateral of the dancer's choice. Draws the shape of a quadrilateral that is not a parallelogram, a parallelogram that is not a square, and a quadrilateral of the dancer's choice.

**7.** Facilitate performance of quadrilateral dances and response. Review performer and audience expectations.

Criteria-based teacher checklist, peer assessment: Using a prop, makes a shape of a quadrilateral that is not a parallelogram, a parallelogram that is not a square, and a quadrilateral of the dancer's choice.

**8.** Lead reflection.

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

## LESSON STEPS

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▣ Prepare the classroom for dance.



Moving Desks/Set-up

**1. Introduce classifying and dancing quadrilaterals. Review properties of quadrilaterals, parallelograms, trapezoids, kites, rectangles, rhombi, and squares. Analyze photo of a dancer making a shape.**

▣ Use a document camera to display Quadrilateral Hierarchy Chart or draw on board or chart paper. Draw the polygons or ask students to draw the polygons.

- *In this dance and math lesson, we'll be classifying different types of quadrilaterals and dancing them with giant stretchy bands.*
- *Dancing Mathematicians, what are the properties of a quadrilateral?*

▣ Repeat analysis of all the properties of all quadrilaterals on the chart.

- *Let's figure out why the quadrilaterals are classified in this way on our chart.*
- *Is a parallelogram a quadrilateral? Why or why not?*
- *Is a trapezoid a parallelogram? Why or why not??*
- *Is a rectangle a parallelogram? Why or why not??*
- *Is a rectangle a rhombus? Why or why not??*
- *Is a rhombus a parallelogram? Why or why not??*
- *Is a square a rectangle? Why or why not??*
- *Is a square a rhombus? Why or why not??*
- *Is a kite a rhombus? Why or why not?*

▣ Display photo of dancer. You can use this photo of a Pacific Northwest Ballet dancer to illustrate shapes. You could also choose to find your own photos that represent a variety of styles and cultures. Look for dancers that are making quadrilateral shapes.

- *What shape is this dancer making? How do you know?*



## 2. Remind students about agreements for appropriate dance behavior.

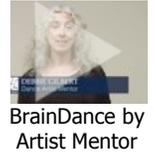
- *Remind me, how can you be creative and safe at the same time?*



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

Music: "Math BrainDance (Fifth Grade)" #6, *Math Dances* by Debbie Gilbert

- *The BrainDance will warm up your body and make your brain work better at the same time. Notice when we make quadrilaterals in the BrainDance.*



### Breath

- *Dancing Mathematicians, breathe silently.*

### Tactile

- *Tap the top of your head twelve times. Tap your arms six times. Tap your stomachs three times. Tap your legs 1.5 times. What's my rule?*



### Core-Distal

- *Grow into a large symmetrical quadrilateral shape. Shrink into a small shape that is not symmetrical.*

### Head-Tail

- *What is 1/3 of 24? Curl your backbone forwards and backwards and from side to side eight times.*

### Upper Half

- *Freeze the lower half of your body. Draw parallel lines with the top half of your body.*

### Lower Half

- *Freeze the upper half of your body. Draw perpendicular lines with the lower half of your body.*

### Body-Half Right

- *Dance with your whole right side while the left side is frozen. Dance with 2/3 of your right side. Dance with 1/3 of your right side.*

### Body-Half Left

- *Dance with your whole left side while the right side is frozen. Dance with 2/3 of your left side. Dance with 1/3 of your left side.*

### Eye-Tracking

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

### Cross-Lateral

- *What is one fourth of 80? Reach across your body up high, up high, down low, down low for a total of 20 reaches.*

### Vestibular

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

### Breath

- *Breathe silently, Dancing Mathematicians.*

#### 4. Introduce the props for dancing quadrilaterals: stretchies. Discuss how to move safely and appropriately with them.

▣ The stretchies are strips of 4-way stretch fabric about 3 inches wide and 4-6 feet long tied tightly together to make a loop.

- *We'll use the stretchies to make the quadrilaterals. They are math tools and not toys.*
- *How can we dance safely with the stretchies?*
- *When you start moving, remember to keep empty space around you. Put a space bubble around yourself and your stretchy. Do not wrap the stretchy around your neck. What should you do with your prop when you are listening to directions so it doesn't distract you?*

#### 5. Lead exploration of quadrilaterals, parallelograms, trapezoids, kites, rectangles, rhombi, and squares with stretchies.



Prompting for Creativity

- *Show me a quadrilateral with your stretchy. How do you know that is a quadrilateral?*
- *Ask yourself, how many sides does your quadrilateral have? How many angles does your quadrilateral have?*
- *How is this quadrilateral different from that quadrilateral? How are they the same?*
- *Make a parallelogram with your stretchy. Ask yourself, do you have two pairs of parallel sides? Is your parallelogram also a rectangle, a trapezoid, a rhombus, or a square? Why or why not?*



▣ Repeat process, making trapezoids, kites, rectangles, rhombi, and squares with the stretchies and analyzing the properties and relationship with other quadrilaterals.



☑ **Criteria-based process assessment:** Uses a prop to make a quadrilateral, parallelogram, trapezoid, kite, rhombus, rectangle, and square.

## 6. Guide students to create three specific quadrilaterals with stretchies in a small group of about four. Ask students to draw their shapes on Choreographers' Worksheets.

Music: "The Three Quadrilaterals" #14, *Math Dances* by Debbie Gilbert



Three Quadrilaterals Dance

▣ You can choose the groups in advance to keep the momentum of the class going. You can also list their names in the order of their groups to make assessing during the performance easier. You can choose to assess students as you observe and coach small groups during the rehearsal as well as during the performance.

▣ Display the task chart and distribute Choreographer's Worksheets and pencils.

- *Dancing Mathematicians, you will now be choreographers, the creators of a dance. With your small group, you will make three shapes. The first shape will be a quadrilateral that is not a parallelogram. The second shape will be a parallelogram that is not a square. The third shape will be a quadrilateral of your choice. As a group, choose your three shapes.*
- *I'll pass out Choreographer's Worksheets and pencils. Draw the three quadrilaterals your group has chosen for its dance.*
- *You can choose to make the same shapes as individuals with one stretchy making the shape or you can create the shapes as a group with four stretchies. Remember that the stretchies don't go around your necks. Plan your transitions from one shape to another so you can do them quickly and smoothly. Don't create a shape where you need to tie or wrap the stretchy in a complicated way around your body, because you won't have enough time to get into and out of the shape.*
- *You may choose to think about your formation, because that is another way dancers use math. Will you all stand in a line, a circle, or another formation when you make your shapes?*
- *Practice your sequence of three shapes with music several times. The music guides you to repeat your sequence three times.*

☑ Criteria-based teacher checklist: Using a prop, makes a shape of a quadrilateral that is not a parallelogram, a parallelogram that is not a square, and a quadrilateral of the dancer's choice. Draws the shape of a quadrilateral that is not a parallelogram, a parallelogram that is not a square, and a quadrilateral of the dancer's choice.

## 7. Facilitate performance of quadrilateral dances and response. Review performer and audience expectations.



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 with three quadrilaterals. Audience, I'll ask you to describe the quadrilaterals that you observed.*

☑ Criteria-based teacher checklist, peer assessment: Using a prop, makes a shape of a quadrilateral that is not a parallelogram, a parallelogram that is not a square, and a quadrilateral of the dancer's choice.

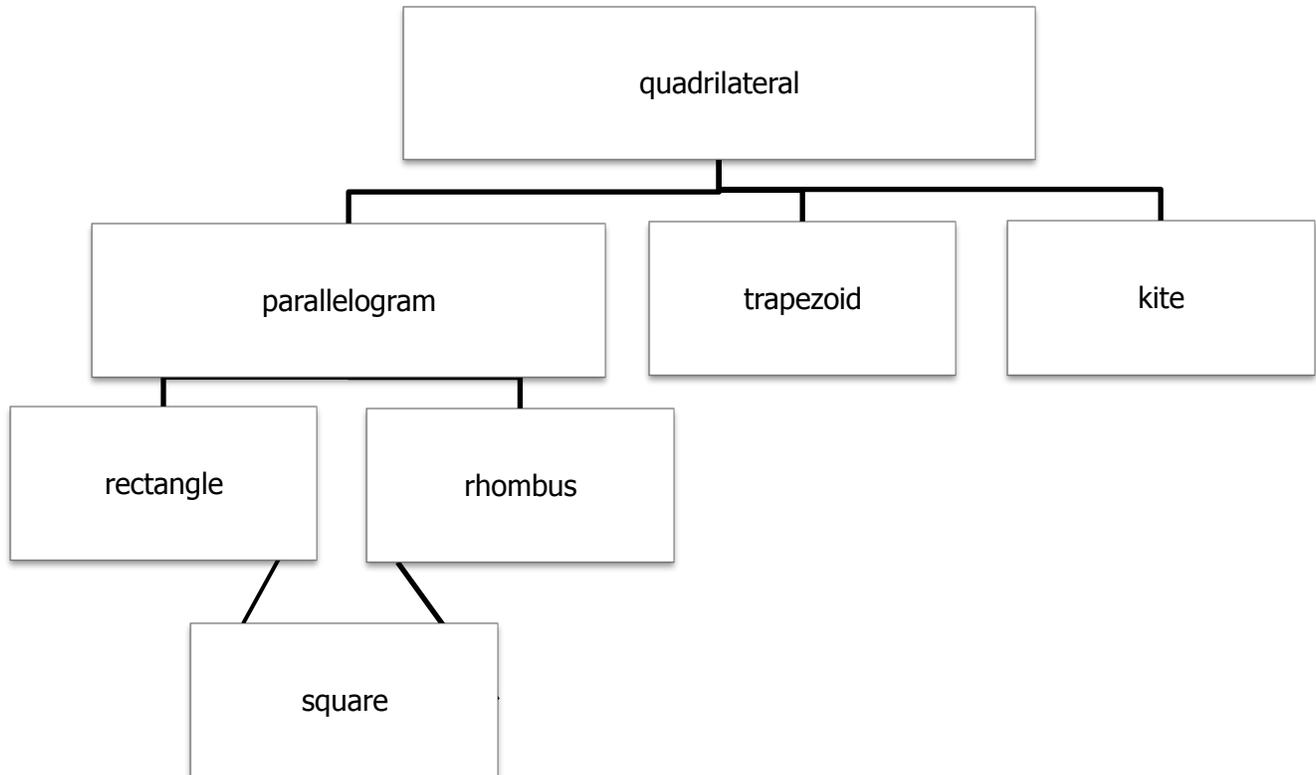
## 8. Lead reflection.

- *Dancing Mathematicians, what quadrilaterals did you see that were not parallelograms? What parallelograms did you see that were not squares. What other quadrilaterals did you see?*
- *The next time you analyze quadrilaterals in math, remember how you made them with your whole bodies and the stretchy math tool.*

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

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## Classifying Quadrilaterals Dance Quadrilateral Hierarchy Chart



## *Classifying Quadrilaterals Dance Choreography Task Chart*

- With your small group, you will choose and make three shapes.
- The first shape will be a quadrilateral that is not a parallelogram.
- The second shape will be a parallelogram that is not a square.
- The third shape will be a quadrilateral of your choice.

## Classifying Quadrilaterals Dance Choreographer's Worksheet

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Draw and label the shapes from your dance.

|  |  |
|--|--|
| first shape: a quadrilateral that is not a parallelogram |  |
| second shape: a parallelogram that is not a square       |  |
| third shape: a quadrilateral of your choice              |  |

**ARTS IMPACT LESSON PLAN Dance and Math Infusion**

Fifth Grade Lesson Two: *Classifying Quadrilaterals Dance*

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

**STUDENT SELF-ASSESSMENT WORKSHEET**

| Disciplines  | DANCE/MATH                                  |                                      |  | MATH  |                                      |  | Total<br>6 |
|--------------|---|--------------------------------------|--|---|--------------------------------------|--|------------|
| Concept      | Quadrilateral Choreography                  |                                      |  | Quadrilaterals                              |                                      |  |            |
| Criteria     | Using a prop, makes the following shapes:   |                                      |  | Draws the shape of:                         |                                      |  |            |
| Student Name | a quadrilateral that is not a parallelogram | a parallelogram that is not a square | a quadrilateral of the dancer's choice | a quadrilateral that is not a parallelogram | a parallelogram that is not a square | a quadrilateral of the dancer's choice |            |
|              |   |                                      |  |   |                                      |  |            |

**ARTS IMPACT LESSON PLAN Dance and Math Infusion**

Fifth Grade Lesson Two: *Classifying Quadrilaterals Dance*

**CLASS ASSESSMENT WORKSHEET**

| Disciplines  | DANCE/MATH                                  |                                      |  | MATH  |                                      |  | Total<br>6 |
|--------------|---|--------------------------------------|--|---|--------------------------------------|--|------------|
| Concept      | Quadrilateral Choreography                  |                                      |  | Quadrilaterals                              |                                      |  |            |
| Criteria     | Using a prop, makes the following shapes:   |                                      |  | Draws the shape of:                         |                                      |  |            |
| Student Name | a quadrilateral that is not a parallelogram | a parallelogram that is not a square | a quadrilateral of the dancer's choice | a quadrilateral that is not a parallelogram | a parallelogram that is not a square | a quadrilateral of the dancer's choice |            |
| 1.           |   |                                      |  |   |                                      |  |            |
| 2.           |   |                                      |  |   |                                      |  |            |
| 3.           |   |                                      |  |   |                                      |  |            |
| 4.           |   |                                      |  |   |                                      |  |            |
| 5.           |   |                                      |  |   |                                      |  |            |
| 6.           |   |                                      |  |   |                                      |  |            |
| 7.           |   |                                      |  |   |                                      |  |            |
| 8.           |   |                                      |  |   |                                      |  |            |
| 9.           |   |                                      |  |   |                                      |  |            |
| 10.          |   |                                      |  |   |                                      |  |            |
| 11.          |   |                                      |  |   |                                      |  |            |
| 12.          |   |                                      |  |   |                                      |  |            |
| 13.          |   |                                      |  |   |                                      |  |            |
| 14.          |   |                                      |  |   |                                      |  |            |
| 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: \_\_\_\_\_

DANCE AND MATH LESSON: *Classifying Quadrilaterals Dance*

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Dear Family:

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

- We talked about quadrilaterals and how we describe and classify them.
- We did the Math BrainDance to warm up our brains and bodies.
- We used stretchy bands to make large-scale quadrilaterals, parallelograms, trapezoids, kites, rectangles, rhombi, and squares.
- We worked with a small group to create a dance, which was a sequence of three quadrilaterals. One shape was a quadrilateral that is not a parallelogram. The second shape was a parallelogram that is not a square. The third shape was a quadrilateral of the dancer's choice.
- We thought about how making the shape with our full bodies will help us remember how to identify and classify quadrilaterals.

At home, you could look for quadrilateral shapes in the kitchen or living room. Ask your child why a square is a rectangle and why a rectangle is a parallelogram. Ask you child to teach you how to make different quadrilateral shapes with your body.

**Enduring Understanding**

Parallelograms, trapezoids, kites, rectangles, rhombi, and squares are quadrilaterals. Rectangles, rhombi, and squares are parallelograms. A square is a rectangle and a square is a rhombus.