

Dance and Math Infused Lesson

Lesson Three: *Triangle, Quadrilateral, Pentagon, and Hexagon Dances*

Author: Debbie Gilbert Grade Level: Second



Enduring Understanding

Number and type of angles, and number and length of sides can describe and identify shapes.

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

In this math and dance lesson, students discuss the properties of these geometric shapes: triangles, quadrilaterals, pentagons, and hexagons. With stretchy fabric, students make gigantic shapes and create a Four Shapes Dance with a small group. They perform the dance for each other and respond by describing the number of angles and sides in each shape.

Learning Targets and Assessment Criteria

Target: Creates a dance using a sequence of geometric shapes.

Criteria: Uses body shapes and a prop to represent a series of four shapes: triangle, quadrilateral, pentagon, hexagon. Repeats the sequence three times.

Target: Makes shapes with specific attributes.

Criteria: Draws a triangle, a quadrilateral, a pentagon, and a hexagon.

Vocabulary	Materials	Learning Standards
<p><u>Arts Infused:</u> Shape</p> <p><u>Math:</u> Angle Equal Polygon Hexagon Pentagon Quadrilateral Triangle Regular and Irregular Side</p> <p><u>Arts:</u> Sequence <u>Space bubble</u></p>	<p><u>Museum Artworks or Performance</u></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 Stretchies; Geometric shape manipulatives; <i>Math Dances</i> CD by Debbie Gilbert; CD player; White board or chart paper & markers; 8.5x11" white copy paper: copy Triangle, Quadrilateral, Pentagon, and Hexagon Dances Student Worksheet, one per student; Writing pencils; Class Assessment Worksheet</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: Shape 1.2.1 Skills and Techniques: Sequence 1.4.1 Audience Skills <u>2.1.1 Creative Process</u> 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> (2nd grade) 6. Learning about my world: Math: begin to understand how math is used in everyday life. Arts: try different types of movement and dance; pay attention to performances, and describe them to others.</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>2.G. Reason with shapes and their attributes. 2.G.1. Recognize shapes having specified attributes, such as a given number of angles. Identify triangles, quadrilaterals, pentagons, hexagons.</p> <p>CCSS Mathematical Practices MP.4. Model with mathematics. MP.5. Use appropriate tools strategically. MP.6. Attend to precision.</p>
	<p><i>continued</i></p>	

Pacific Northwest Ballet images:
Seth Orza and Carla Korbes in David
Dawson's *A Million Kisses to My Skin*



Mara Vinson in George Balanchine's
Agon; Choreography © The George
Balanchine Trust



©Angela Sterling

ICON KEY:

 = Indicates note or reminder for teacher

 = Embedded assessment points in the lesson

Pre-Teach

Practice the Math BrainDance, see lesson step 3. Use manipulatives to explore and classify shapes as triangles, quadrilaterals, pentagons, or hexagons. Discuss their properties.

Lesson Steps Outline

DAY ONE

1. Introduce dancing triangles, quadrilaterals, pentagons, and hexagons. Draw or display several examples of each type of polygon and ask students to identify the shapes and review the number of sides and angles in each. Analyze photos of dancers making shapes.

2. Remind students about agreements for appropriate dance behavior.

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

Music: "Math BrainDance (Second Grade)" #3, *Math Dances* by Debbie Gilbert

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

5. Lead exploration of triangles, quadrilaterals, pentagons, and hexagons with stretchies. Hand a stretchy to each student.

 Criteria-based process assessment, self-assessment: Demonstrates four shapes with a prop: triangle, quadrilateral, pentagon, and hexagon.

6. Guide choreography of the Four Shapes Dances.

Music: "Four Shapes Dances", #10, *Math Dances* by Debbie Gilbert

 Criteria-based teacher checklist: Uses body shapes and a prop to represent a series of four shapes: triangle, quadrilateral, pentagon, and hexagon. Repeats the sequence three times.

7. Lead performance of the first draft of the Four Shapes Dances and response. Discuss performer and audience behavior.

Criteria-based teacher checklist, peer assessment: Uses body shapes and a prop to represent a series of four shapes: triangle, quadrilateral, pentagon, and hexagon. Repeats the sequence three times.

8. Guide class reflection connecting dance and math.

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

DAY TWO

1. Review dancing triangles, quadrilaterals, pentagons, and hexagons. Ask students to draw or display several examples of each type of polygon and to identify the shapes and review the number of sides and angles in each.

2. Remind students about agreements for appropriate dance behavior.

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

Music: "Math BrainDance (Second Grade)" #3, *Math Dances* by Debbie Gilbert

4. Review triangles, quadrilaterals, pentagons, and hexagons with stretchies. Hand a stretchy to each student.

Criteria-based process assessment, self-assessment: Demonstrates four shapes with a prop: triangle, quadrilateral, pentagon, and hexagon.

5. Assist small groups as they rehearse the choreography of the Four Shapes Dances.

Music: "Four Shapes Dances", #10, *Math Dances* by Debbie Gilbert

Criteria-based teacher checklist, self-assessment: Uses body shapes and a prop to represent a series of four shapes: triangle, quadrilateral, pentagon, and hexagon. Repeats the sequence three times.

6. Lead performance of Four Shapes Dances and response. Discuss performer and audience behavior.

Criteria-based teacher checklist, peer assessment: Uses body shapes and a prop to represent a series of four shapes: triangle, quadrilateral, pentagon, and hexagon. Repeats the sequence three times.

7. Direct students to demonstrate understanding of shapes on a written worksheet.

Criteria-based teacher checklist, self-assessment: Draws a triangle, a quadrilateral, a pentagon, and a hexagon.

8. Guide class reflection connecting dance and math.

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 dancing triangles, quadrilaterals, pentagons, and hexagons. Draw or display several examples of each type of polygon and ask students to identify the shapes and review the number of sides and angles in each. Analyze photos of dancers making shapes.

- *This is a lesson that is a dance lesson and a math lesson at the same time. We'll be Dancing Mathematicians and identify and dance shapes or polygons. We will focus on triangles, quadrilaterals, pentagons, and hexagons.*

- ▣ Draw/display 3 or 4 triangles.

- *Tell me what you see that helps you to label these shapes. How are they alike? How are they different? How many sides do they have? How many angles do they have? What kind of polygon is this?*

- ▣ Repeat with quadrilaterals, pentagons, and hexagons.

▣ You may use these photos: Pacific Northwest Ballet: Seth Orza and Carla Korbes in David Dawson's *A Million Kisses to My Skin* and Mara Vinson in George Balanchine's *Agon*. You could also choose to find your own photos of dancers representing a variety of styles and cultures who are making shapes. You could review, for example, The UW World Dance Series, <http://uwworldseries.org/world-dance>.



- *Here are two pictures of Pacific Northwest Ballet dancers making shapes. What shapes do you see?*

2. Remind students about agreements for appropriate dance behavior.

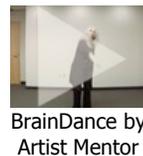
- *Remind me, how can you be creative and safe at the same time?*



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 (Second Grade)" #3, *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 make polygons in the BrainDance.*

Breath

- *Dancing Mathematicians, breathe calmly.*



Tactile

- *Tap from the top of your head all the way to your toes. We'll count by fives to eighty: 5, 10, 15 ... 80.*

Core-Distal

- *Grow into a huge quadrilateral shape and shrink into a small shape.*

Head-Tail

- *Curl your backbone forwards and backwards and from side to side. We'll count by tens starting at fifty and go to one hundred twenty: 50, 60, 70 ... 120.*

Upper Half

- *Smoothly move the whole top of your body while the lower half freezes. Draw giant three-digit numbers with your arms.*

Lower Half

- *Smoothly move the whole lower half of your body while the upper half freezes. Draw giant three-digit numbers with your legs.*

Body-Half Right

- *Move sharply with the right side of your body while the left side is frozen. Draw a huge triangle, a quadrilateral, a pentagon, and a hexagon.*

Body-Half Left

- *Move sharply with the left side of your body while the right side is frozen. Draw a huge triangle, a quadrilateral, a pentagon, and a hexagon.*

Eye-Tracking

- *Focus on your right thumb. Move it from one side to the other and up and down. Watch your left thumb moving from side to side and up and down.*

Cross-Lateral

- *Reach across your body up high, up high, down low, down low. We'll count by 100's starting at 100 and go to 1,600: 100, 200, 300 ... 1,600.*

Vestibular

- *Turn, then freeze in a triangle shape. Turn, then freeze in a quadrilateral shape. Turn, then freeze in a pentagon shape. Turn, then freeze in a hexagon shape.*

Breath

- *Breathe calmly, Dancing Mathematicians.*

4. Introduce the props for dancing shapes: 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 shapes. 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 we do with our props when we are listening to directions (e.g. place them on the floor in front of you, or sit criss-cross and make the stretchy disappear)?*

5. Lead exploration of triangles, quadrilaterals, pentagons, and hexagons with stretchies. Hand a stretchy to each student.



Prompting for Creativity

- *Show me a triangle with your stretchy. How do you know that is a triangle?*
- *Ask yourself, how many sides does your triangle have? How many angles does your triangle have?*
- *How is this triangle different from that triangle? How are they the same?*
- *Is this a regular triangle with equal sides and equal angles or an irregular triangle?*
- *Can a triangle have equal sides and not equal angles?*

▣ Repeat the process with quadrilaterals, pentagons, and hexagons.



Criteria-based process assessment, self-assessment: Demonstrates four shapes with a prop: triangle, quadrilateral, pentagon, and hexagon.

6. Guide choreography of the Four Shapes Dances.

Music: "Four Shapes Dances", #10, *Math Dances* by Debbie Gilbert



Four Shapes Dance

▣ To keep the momentum of the class going, you can determine the small groups for step 6 before you teach the lesson. Then you can list the students in that order on the assessment checklist. That will make assessment of the performance later much easier.

▣ 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.

- *We are going to be choreographers, that is, creators of dances. Your job will be to create a sequence of our four shapes: triangle, quadrilateral, pentagon, and hexagon. Then, you'll repeat that sequence three times. You can decide as a group how to do each shape and if the shapes will be regular with equal sides and equal angles, or irregular.*

a) Demonstrate with three student volunteers.

- *How should we make our triangle? We'll plan how long the sides will be and where the angles will be. Should we make one angle with a foot and two angles with our hands? Or two angles with two feet and one angle with a hand? Should any sides be equal? Let's try several different possibilities and make a choice.*
- *Next, we'll plan our quadrilateral, pentagon, and hexagon shapes.*
- *Finally, we'll practice them together in a sequence that we will repeat three times.*

b) Divide students into groups of about four and support them as they create and rehearse their dances.

- *Decide how you will make each shape. Think about how many sides and how many angles you have in each shape.*
- *Practice repeating your sequence of four shapes three times.*

Criteria-based teacher checklist: Uses body shapes and a prop to represent a series of four shapes: triangle, quadrilateral, pentagon, and hexagon. Repeats the sequence three times.

7. Lead performance of the first draft of the Four Shapes Dances and response.

Discuss performer and audience behavior.

Collect stretchies after each group performs.

- *Before we begin, what is the job of the audience? What is the job of the performers?*
- *Audience, after the performance, I'll ask you to describe the shapes the dancers did and to tell us how you knew they were triangles, quadrilaterals, pentagons, or hexagons.*

Criteria-based teacher checklist, peer assessment: Uses body shapes and a prop to represent a series of four shapes: triangle, quadrilateral, pentagon, and hexagon. Repeats the sequence three times.

8. Guide class reflection connecting dance and math.

- *What did you discover about triangles? What did you discover about quadrilaterals? What did you discover about pentagons? What did you discover about hexagons?*
- *The next time in math that you work with shapes, remember how you did them with your whole bodies and stretchies in movement, and it will help you remember how many angles and sides they have so you can identify and describe them.*

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

Day Two

1. Review dancing triangles, quadrilaterals, pentagons, and hexagons. Ask students to draw or display several examples of each type of polygon and to identify the shapes and review the number of sides and angles in each.

- *We'll be Dancing Mathematicians today and identify and dance shapes. We will focus again on triangles, quadrilaterals, pentagons, and hexagons.*
 - *Can I have some volunteers come up to the board and draw examples of each of the shapes?*
 - *Tell me what you see that helps you to label these shapes. How are they alike? How are they different? How many sides do they have? How many angles do they have? Are they regular or irregular? What kinds of polygons are they?*
-

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* 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 make polygons in the BrainDance.*
-

4. Review triangles, quadrilaterals, pentagons, and hexagons with stretchies. Hand a stretchy to each student.

- *Remind me, how do we move safely and creatively with the stretchies?*
- *Show me a triangle with your stretchy. How do you know that is a triangle?*
- *How is this triangle different from that triangle? How are they the same?*
- *Try making a different triangle. If you had a regular triangle, make it an irregular triangle. If you had an irregular triangle, make it a regular triangle.*

▣ Repeat the process with quadrilaterals, pentagons, and hexagons.

Criteria-based process assessment, self-assessment: Demonstrates four shapes with a prop: triangle, quadrilateral, pentagon, and hexagon.

5. Assist small groups as they rehearse and refine their choreography of the Four Shapes Dances.

Music: "Four Shapes Dances", #10, *Math Dances* by Debbie Gilbert

- *Find your groups. Your job will be to practice your sequence of our four shapes: triangles, quadrilaterals, pentagons, and hexagons. Work on how you transition or change from one shape to the next.*
- *Review each shape. Do you have the correct number of sides and angles in each shape?*

- *Practice repeating your sequence of four shapes three times.*

Criteria-based teacher checklist, self-assessment: Uses body shapes and a prop to represent a series of four shapes: triangle, quadrilateral, pentagon, hexagon. Repeats the sequence three times.

6. Lead performance of Four Shapes Dances and response. Discuss performer and audience behavior.

Collect stretchies after each group performs.

- *Before we begin, what is the job of the audience? What is the job of the performers?*
- *Audience, after the performance, I'll ask you to describe the shapes the dancers did and to tell us how you knew they were triangles, quadrilaterals, pentagons, or hexagons.*

Criteria-based teacher checklist, peer assessment: Uses body shapes and a prop to represent a series of four shapes: triangle, quadrilateral, pentagon, hexagon. Repeats the sequence three times.



Performer and Audience Expectations

7. Direct students to demonstrate understanding of shapes on a written worksheet.

- *Now, you can show you understanding of shape by drawing. On this worksheet, draw the shapes from your group's dance in the order you performed them.*

Criteria-based teacher checklist, self-assessment: Draws a triangle, a quadrilateral, a pentagon, and a hexagon.

8. Guide class reflection connecting dance and math.

- *Dancing Mathematicians, today you danced and drew shapes. Let's talk about what we discovered. Turn and talk to someone close to you. What did you discover about triangles? What did you discover about quadrilaterals? What did you discover about pentagons? What did you discover about hexagons?*
- *The next time in math that you work with shapes, remember how you did them with your whole bodies and stretchies in movement, and it will help you remember how many angles and sides they have so you can identify and describe them.*

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

Triangle, Quadrilateral, Pentagon, and Hexagon Dances Student Worksheet

Name: _____

Date: _____

Draw the shapes from your dance.

triangle	
quadrilateral	
pentagon	
hexagon	

ARTS IMPACT LESSON PLAN Dance and Math Infusion

Second Grade Lesson Three: *Triangle, Quadrilateral, Pentagon, and Hexagon Dances*

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

STUDENT SELF-ASSESSMENT WORKSHEET

Disciplines	DANCE/MATH					MATH				Total 9
Concept	Shapes					Shapes				
Criteria	Uses body shapes and a prop to represent a series of four shapes: triangle, quadrilateral, pentagon, hexagon. Repeats the sequence three times.					Draws a triangle, a quadrilateral, a pentagon, and a hexagon.				
Student Name	Tri	Quad	Pent	Hex	Repeat	Tri	Quad	Pent	Hex	

ARTS IMPACT LESSON PLAN Dance and Math Infusion

Second Grade Lesson Three: *Triangle, Quadrilateral, Pentagon, and Hexagon Dances*

CLASS ASSESSMENT WORKSHEET

Disciplines	DANCE/MATH					MATH				Total 9
Concept	Shapes					Shapes				
Criteria	Uses body shapes and a prop to represent a series of four shapes: triangle, quadrilateral, pentagon, hexagon. Repeats the sequence three times.					Draws a triangle, a quadrilateral, a pentagon, and a hexagon.				
Student Name	Tri	Quad	Pent	Hex	Repeat	Tri	Quad	Pent	Hex	
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: *Triangle, Quadrilateral, Pentagon, and Hexagon Dances*

Dear Family:

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

- We reviewed the properties of triangles, quadrilaterals, pentagons, and hexagons.
- We did the Math BrainDance to warm up our brains and bodies.
- We used stretchy bands to make gigantic shapes and create a Four Shapes Dance with a small group.
- We performed the dances for each other and responded by describing the number of angles and sides in each shape.
- We drew the shapes from our dance.
- We thought about how making the shape with our full bodies in movement will help us remember how many angles and sides it has so we can identify and describe it.

At home, you could look for objects that are triangles, quadrilaterals, pentagons, and hexagons. Ask your child to show you how to use your body to make a giant shape.

Enduring Understanding

Number and type of angles, and number and length of sides can describe and identify shapes.