

ARTS IMPACT LESSON PLAN

Dance and Math Infused Lesson

Lesson Three: *Inequalities and Variables Problem Dance*

Author: Debbie Gilbert Grade Level: Seventh

Enduring Understanding

Real-world situations, such as a choreographer's choices, can be represented by inequalities and variables.

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

In this dance and math lesson, students look at a choreographer's problem in which there is more than one possible solution. They write an inequality to represent the situation and create dances that show different values for the variable in the inequality.

Learning Targets and Assessment Criteria

Target: Demonstrates a value of x in an inequality: $6 + 3x < 23$.

Criteria: Creates a one, two, three, four, or five-count upper body isolation movement phrase.

Target: Choreographs a dance that represents the following inequality: $6 + 3x < 23$.

Criteria: Travels forward for six counts, repeats the upper body isolation movement phrase three times.

Vocabulary

Arts Infused:

Counts
Solution

Math:

Equation
Inequality
Variable

Arts:

Choreographer
Choreography
Direction
Formation
Isolation
Movement Phrase
Repetition

Materials

Museum Artworks or Performance

Seattle, WA

Pacific Northwest Ballet
UW World Series of Dance

Tacoma, WA

Broadway Center for the Performing Arts

Materials

Middle School Math Dances CD by Debbie Gilbert; White board, document camera, or chart paper & markers; Choreographer's Word Problem; Class Assessment Worksheet; Music player

Music:

"Middle School BrainDance," *Middle School Math Dances* by Debbie Gilbert
"Less Than Twenty-three," *Middle School Math Dances* by Debbie Gilbert

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, Direction
- 1.1.4 Principles of Choreography: Repetition
- 1.2.1 Skills and Techniques: Moves with Others in Spatial Formations
- 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

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>

- 7.EE. Solve real-life and mathematical problems using numerical and algebraic expressions and equations.
- 7.EE.4. Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.
- 7.EE.4.b. Solve word problems leading to inequalities of the form $px+q>r$ or $px+q < r$, where p , q , and r are specific rational numbers. Graph the solution set of an inequality and interpret it in the context of the problem.

continued

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.8. Look for and express regularity in repeated reasoning.

ICON KEY:

 = Indicates note or reminder for teacher

 = Embedded assessment points in the lesson

Pre-Teach

Introduce writing inequalities to represent situations and finding values of the variables. Do the Middle School Math BrainDance. Practice moving with one part of the body (isolation) and then with the whole body.

Lesson Steps Outline

1. Introduce dancing inequalities and variables.

2. Review expectations for movement.

3. Lead students in the *Middle School BrainDance* warm-up.

Music: "Middle School BrainDance," *Middle School Math Dances* by Debbie Gilbert

4. Facilitate as students create an inequality to represent the choreographer's word problem.

 Criteria-based process assessment: Creates an inequality that represents the situation in the choreographer's word problem. Finds the values of x .

5. Demonstrate choreographing a dance based on the choreographer's word problem.

Music: "Less Than Twenty-three," *Middle School Math Dances* by Debbie Gilbert

6. Guide students to choreograph dances based on the choreographer's word problem in small groups.

 Criteria-based teacher checklist, self-assessment: Creates a one, two, three, four, or five-count upper body isolation movement phrase. Travels forward for six counts, repeats the upper body isolation movement phrase three times.

7. Lead performance and response to choreographer's word problem dances. Discuss performer and audience behavior.

 Criteria-based teacher checklist, peer assessment: Creates a one, two, three, four, or five-count upper body isolation movement phrase. Travels forward for six counts, repeats the upper body isolation movement phrase three times.

8. Guide reflection.

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

LESSON STEPS

1. Introduce dancing inequalities and variables.

- *Dancing Mathematicians, today we are going to create dances based on a problem a choreographer, an inventor of dances, needs to solve in order to create a dance.*
 - *There is more than one solution to the choreographer's problem. So in order to solve the problem we are going to create an inequality rather than an equation.*
 - *What do you know about inequalities?*
 - *Tell me about how variables are used in an inequality.*
 - *How would a dancer dance a variable in an inequality?*
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2. Review expectations for movement.

- *Before we move, think about our expectations for dancing.*
 - *I am looking for focus and respect.*
 - *Keep empty space around yourself at all times and keep your eyes open and your body under control.*
 - *Have fun and learn simultaneously.*
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3. Lead students in the *Middle School 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: "Middle School BrainDance," *Middle School Math Dances* by Debbie Gilbert

▣ In the BrainDance music, you will hear the title of each pattern spoken. The prompts below are suggestions if you would like to give the students more detail. You can also adapt the prompts to meet the needs of your students and the lesson. If you prefer to have the prompts spoken for you, you can use the "Middle School BrainDance with narration."

- *Before we start moving, we are going to do a BrainDance to warm-up our brains and bodies in preparation for learning the dance.*
- *The BrainDance will take us through a series of patterns that help to wire the central nervous system. The movement will increase oxygen and blood flow to your brain and body, and help with balance, alignment, and coordination.*
- *Notice when we do the upper body section of the BrainDance, we'll be doing isolations. That means we'll only be moving one part of our bodies at a time, like heads, shoulders, or arms.*

Breath

- *Dancing Mathematicians, breathe quietly.*

Tactile

- *Energize the surface of your body, tapping from your head to your toes.*

Core-Distal

- *Expand from your core into a large shape, reaching to the limits of your distal edges.*
- *Shrink into a small shape pulling everything back towards your core.*

Head-Tail:

- *Curl your spine forwards and backwards and forwards and backwards.*
- *Curve from side to side.*

Upper Half

- *Freeze the lower half of your body. Move the upper half.*

Lower Half

- *Freeze the upper half of your body. Move the lower half.*

Body-Half Right

- *Dance with your whole right side while the left side is frozen.*

Body-Half Left

- *Dance with your whole left side while the right side is frozen.*

Cross-Lateral

- *Reach across your body with your arms on different levels.*

Vestibular

- *Turn. Freeze in a shape. Turn. Freeze in a shape. Turn. Freeze in a shape. Turn. Freeze in a shape.*

Breath

- *Breathe quietly, Dancing Mathematicians.*
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4. Facilitate as students create an inequality to represent the choreographer's word problem.

☞ You may want to use a document camera to project the choreographer's word problem.

- *In order to create our dance, we first need to find the solution set for a word problem about a choreographer, an inventor of dances.*
- *Here's our problem: Write an inequality that represents the following situation: The choreographer has been asked to create a dance that is less than 23 counts long. Six counts of the dance will be movements in a forward direction. The rest of the dance will be an upper body isolation movement phrase that is repeated three times. How many counts long is the upper body isolation phrase?*
- *Before we come up with an inequality, let's break down what happens in the dance. It has less than 23 counts total. It has six counts that move forward. It has an upper body isolation movement phrase that is repeated three times. An upper body isolation is a movement with just one part of your upper body. A movement phrase is a series of movements that can be repeated. So an upper body isolation movement phrase is a series of individual upper body movements. The whole upper body isolation movement phrase in this dance is repeated*

three times.

- *How can we represent this situation with an inequality? Discuss it with a partner.*
- *What did you discover from your conversations with your partner? (e.g. $6 + 3x < 23$)*
- *Can we agree on a strategy for representing the choreographer's situation with an inequality?*
- *What are the possible values of x ? Since we need to be able to dance this, let's say that x must be a whole number.*

Criteria-based process assessment: Creates an inequality that represents the situation in the choreographer's word problem. Finds the values of x .

5. Demonstrate choreographing a dance based on the choreographer's word problem.

Music: "Less Than Twenty-three," *Middle School Math Dances* by Debbie Gilbert

- *I'll create a dance that solves the choreographer's word problem.*
- *My dance will be less than 23 counts long. I am going to travel forward for six counts by doing step, kick, step, kick, step, kick.*
- *Look at our inequality, where do you see those six counts represented?*
- *I'll choose four as my value for x . That means I'll do a four-count upper body isolation movement phrase and repeat it three times.*
- *Look at our inequality, where do you see this represented?*
- *For my four-count phrase, I'll choose four upper body movements. I'll do shoulder, shoulder, head, head. I'll repeat that phrase four times.*
- *So my whole dance is:*
step, kick, step, kick, step, kick
shoulder, shoulder, head, head
shoulder, shoulder, head, head
shoulder, shoulder, head, head
- *I'll do my dance again. This time count my movements.*
- *Are my total counts less than 23? Did I solve the choreographer's word problem? How?*

6. Guide students to choreograph dances based on the choreographer's word problem in small groups.

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 on the assessment checklist to make assessing during the performance easier. Groups of about four work well.

- *In your small group, you will choreograph a dance that is less than 23 counts long.*
- *Create movement that travels forward for six counts.*

- *Choose a value of x .*
- *Create an upper body isolation movement phrase that has as many counts as your value of x .*
- *Repeat that upper body isolation movement phrase three times.*
- *Put it all together. Practice.*
- *Look at the inequality ($6 + 3x < 23$) Where is the "6" represented in your dance? What movements represent the "3x" in your dance?*
- *Ask yourselves, is your dance less than 23 counts long?*

Criteria-based teacher checklist, self-assessment: Creates a one, two, three, four, or five-count upper body isolation movement phrase. Travels forward for six counts, repeats the upper body isolation movement phrase three times.

7. Lead performance and response to choreographer's word problem dances. Discuss performer and audience behavior.

- *Now is your opportunity to show your solutions to the choreographer's word problem.*
- *Before we begin, performers, what do you want from your audience?*
- *Audience, what do you want from your performers?*
- *Audience, after the dance, I'll ask you what the dancers did to show you they solved the word problem.*
- *Were the dances less than 23 counts? How do you know?*
- *What were some of the different values of x that were demonstrated?*

Criteria-based teacher checklist, peer assessment: Creates a one, two, three, four, or five-count upper body isolation movement phrase. Travels forward for six counts, repeats the upper body isolation movement phrase three times.

8. Guide reflection.

- *Dancing Mathematicians, what did you discover about inequalities by dancing?*
- *The next time you work with inequalities and variables in math, remember how you used them with movement and it will help you understand.*

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

Inequalities and Variables Problem Dance
Choreographer's Word Problem

Write an inequality that represents the following situation:

The choreographer has been asked to create a dance that is less than 23 counts long.

Six counts of the dance will be movements in a forward direction.

The rest of the dance will be an upper body isolation movement phrase that is repeated three times.

How many counts long is the upper body isolation phrase?

ARTS IMPACT LESSON PLAN Dance and Math Infusion

Seventh Grade Lesson Three: *Inequalities and Variables Problem Dance*

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

STUDENT SELF-ASSESSMENT WORKSHEET

Disciplines	DANCE/MATH		DANCE/MATH		Total
Concept	Inequalities Variables Body Part Isolation		Inequalities Direction Body Part Isolation		3
Criteria	Creates a one, two, three, four, or five-count upper body isolation movement phrase.		Travels forward for six counts.	Repeats the upper body isolation movement phrase three times.	
Student Name					

ARTS IMPACT LESSON PLAN Dance and Math Infusion

Seventh Grade Lesson Three: *Inequalities and Variables Problem Dance*

CLASS ASSESSMENT WORKSHEET

Disciplines	DANCE/MATH		Total
Concept	DANCE/MATH		3
Criteria	Inequalities Variables Body Part Isolation	Inequalities Direction Body Part Isolation	
Student Name	Creates a one, two, three, four, or five-count upper body isolation movement phrase.	Travels forward for six counts.	Repeats the upper body isolation movement phrase three times.
1.			
2.			
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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: *Inequalities and Variables Problem Dance*

Dear Family:

Today your child participated in an **Arts and Math** lesson. We talked about how dancers can use inequalities and variables.

- We looked at a choreographer’s problem in which there was more than one possible solution.
- We wrote an inequality to represent the situation.
- We created dances that showed different values for the variable in our inequality.

At home, you could think of situations you could represent with an inequality, like how many text messages you could send per month, or the number of songs you could fit on your mp3 player. Ask your child to show you how to dance an inequality.

Enduring Understanding

Real-world situations, such as a choreographer’s choices, can be represented by inequalities and variables.