Dance and Math Infused Lesson

Lesson Two: *Number Line Dance*
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Enduring Understanding
A positive rational number can be represented by points or movements to the right of zero on a number line. A negative rational number can be represented by points or movements to the left of zero on a number line.

Lesson Description (Use for family communication and displaying student art)
In this dance and math lesson, students locate and label a series of positive and negative numbers on a number line. They calculate the distance between each number and use that information to determine the number of steps to the right or the left to create a line dance.

Learning Targets and Assessment Criteria

Target: Plots a series of numbers on a number line.
   Criteria: Locates and labels a series of four positive and negative numbers on a number line.

Target: Creates a number line dance.
   Criteria: Dances in a line formation performing steps to the right and left that correspond to the numbers on the number line.

Vocabulary

Arts Infused:
Direction
Line
Position
Series

Math:
Negative Integer
Number Line
Positive Integer
Rational Number

Arts:
Formation
Locomotor Movement

Materials

Museum Artworks or Performance

Seattle, WA
Pacific Northwest Ballet
UW World Series of Dance

Tacoma, WA
Broadway Center for the Performing Arts

Materials
White board and markers; Number Line Dance Student Worksheets & pencils; document camera & projector (optional); Class Assessment Worksheet; music player

Music:
"Middle School BrainDance," *Middle School Math Dances* by Debbie Gilbert
"Number Line Dance," *Middle School Math Dances* by Debbie Gilbert
"Student Number Line Dances," *Middle School Math Dances* by Debbie Gilbert

Learning Standards
WA Arts Learning Standards in Dance
For the full description of each standard, see:
http://www.k12.wa.us/Arts/Standards
Creating (Concept: Space. Principle of Choreography: Form. Skills: Moves with Others in Spatial Formations.)
1. Generate and conceptualize artistic ideas and work.
2. Organize and develop artistic ideas and work.
3. Refine and complete artistic work.
Performing/Presenting/Producing
4. Select, analyze, and interpret artistic work for presentation.
5. Develop and refine artistic techniques and work for presentation.
6. Convey meaning through the presentation of artistic work.
Responding
8. Interpret intent and meaning in artistic work.
9. Apply criteria to evaluate artistic work.
Connecting
10. Synthesize and relate knowledge and personal experiences to make art.

continued

<table>
<tr><td align="center">**ICON KEY:**

🖺 = Indicates note or reminder for teacher

☑ = Embedded assessment points in the lesson</td></tr>
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Pre-Teach

Review the concept of rational numbers. Introduce representing negative integers on a number line. Practice positioning positive and negative integers on a number line. Do the Middle School Math BrainDance. Practice dancing in a line formation.

Lesson Steps Outline

1. Introduce dancing positive and negative integers on a number line.

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. Demonstrate locating and labeling four positive and negative integers plus zero for the last number on a number line. Calculate the distance between each number in the series (e.g. from 4 to -2 is 6 steps).

5. Demonstrate creating a line dance using the series of numbers on the number line.
Music: "Number Line Dance," *Middle School Math Dances* by Debbie Gilbert

6. Divide students into groups of about four. Guide students to choose a series of four positive and negative integers and to locate and label them on a number line. (Zero will already be located and labeled.) Ask them to calculate the distance between each number in the series. Distribute worksheets.

☑ Criteria-based teacher checklist, self and peer assessment: Locates and labels a series of four positive and negative numbers on a number line.
☑ Criteria-based process assessment: Calculates distance between selected numbers on a number line.

7. Facilitate as students create and rehearse their Number Line Dances.
Music: "Student Number Line Dances," *Middle School Math Dances* by
Debbie Gilbert

☑ Criteria-based teacher checklist: Dances in a line formation performing steps to the right and left that correspond to the numbers on the number line.

8. Lead performance and response to Number Line Dances. Discuss performer and audience behavior.

☑ Criteria-based teacher checklist, peer assessment: Dances in a line formation performing steps to the right and left that correspond to the numbers on the number line.

9. Guide reflection.

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

LESSON STEPS_____

1. Introduce dancing positive and negative integers on a number line.

- *Dancing Mathematicians, we are going to use positive and negative integers on a number line to make a line dance.*

- *Point to the direction where you'll find positive numbers on a number line (right).*

- *Point to the direction where you'll find negative numbers on a number line (left).*

- *We'll be moving to the right and to the left matching a series of five numbers on the number line.*

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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 you do movements with your right and left sides.*

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. Demonstrate locating and labeling four positive and negative integers plus zero for the last number on a number line. Calculate the distance between each number in the series (e.g. from 4 to -2 is 6 steps).

📃 You can use a white board or project the Student Number Line Worksheet with a document camera. Leave the labeled number line on display so students can refer to it as they dance during lesson step six.

- *I have a series of five numbers: 4, -2, 2, -1, 0. I'll find them on the number line and label them.*

- *For my dance, I will be traveling to the right and to the left as if I were moving to those numbers on a giant number line.*

- *I'll start on zero.*

- *In order to figure out how many steps will be in my dance, I need to calculate the distance between zero and the first number, between the first and second number, between the second and third number, between the third and fourth number, and between the fourth number and zero.*

- *What is the distance between zero and the first number? (4) Are you moving in a positive or negative direction?*

- *What is the distance between the first and second number? (6) Are you moving in a positive or negative direction?*

- *What is the distance between the second and third number? (4) Are you moving in a positive or negative direction?*

- *What is the distance between the third and fourth number? (3) Are you moving in a positive or negative direction?*

- *What is the distance between the fourth number and zero? (1) Are you moving in a positive or negative direction?*

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5. Demonstrate creating a line dance using the series of numbers on the number line.
Music: "Number Line Dance," *Middle School Math Dances* by Debbie Gilbert

- *The distances we just calculated will tell us the number of steps to the side in our line dance.*

- *We can refer to our number line to see if we need to move in a positive or negative direction.*

- *So the mathematical work we just did tells us that our dance starts in the middle (0) and we move four steps to the right. Next we move six steps to the left. Then we move four steps to the right. Then move three steps to the left. Finally we move one step to the right.*

- *Let's do a clap every time we change directions.*

- *Let's try it. Freeze on zero. Four steps right, clap. Six steps left, clap. Four steps right, clap. Three steps left, clap. One step right, clap. Freeze.*

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6. Divide students into groups of about four. Guide students to choose a series of four positive and negative integers and to locate and label them on a number line. (Zero will already be located and labeled.) Ask them to calculate the distance between each number in the series. Distribute worksheets.

▤ 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.

- *In your group, you will select a series of four positive and negative integers.*

- *Locate and label them on the number line on your worksheet.*

- *Calculate and notate the distance between each number in the series.*

- *Check your work, then check with your group to make sure everyone agrees.*

☑ Criteria-based teacher checklist, self and peer assessment: Locates and labels a series of four positive and negative numbers on a number line.
☑ Criteria-based process assessment: Calculates distance between selected numbers on a number line.

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7. Facilitate as students create and rehearse their Number Line Dances.
Music: "Student Number Line Dances," *Middle School Math Dances* by Debbie Gilbert
(This music is the same beat as the previous music, but does not include the verbal counting cues.)

▤ When assessing the criteria in this lesson, any students who are not meeting criteria will be very clear to you, so you may want to use a reverse checklist, putting a "0" where students have not met criteria, rather than trying to notate every single one who has met criteria. You can go back later and give those who have met criteria a "1." This information will let you know who needs more practice, so you can repeat the exploration in the future.

- *Stand with your group in a line formation.*

- *To transform your calculations into a dance, your starting position is zero.*

- *Travel to the right or the left to match the distance between each number.*

- *Clap each time you change directions.*

- *End in a freeze at zero.*

- *Practice, practice, practice.*

▤ If students are able to clearly and confidently dance the numbers on the number line, you could challenge them to add upper body movements.

☑ Criteria-based teacher checklist: Dances in a line formation performing steps to the right and left that correspond to the numbers on the number line.

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8. Lead performance and response to Number Line Dances. Discuss performer and audience behavior.

▤ You may choose to have one group perform at a time or several groups perform simultaneously.

- *Now is your opportunity to show your Number Line Dance.*

- *Before we begin, performers, what do you want from your audience?*

- *Audience, what do you want from your performers?*

- *Performers, when you are done, tell us your number series.*

▤ You could display the number line worksheets if a document camera and projector are available.

- *Audience, what did the dancers do to show you where the numbers were on the number line and if they were positive or negative?*

☑ Criteria-based teacher checklist, peer assessment: Dances in a line formation performing steps to the right and left that correspond to the numbers on the number line.

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9. Guide reflection.

- *Dancing Mathematicians, what did you discover about positive and negative integers and the number line by dancing?*

- *The next time you work with positive and negative integers and the number line 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.
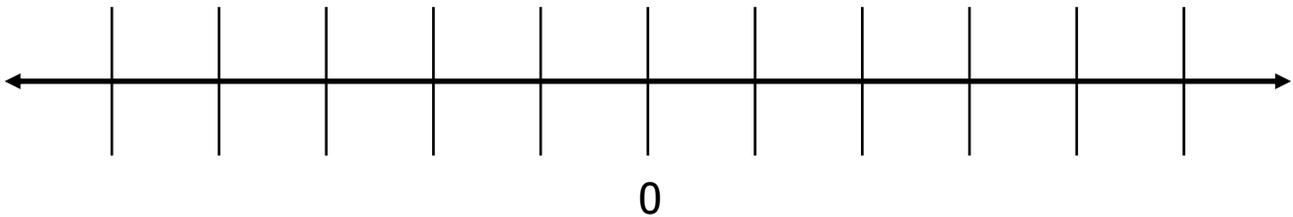

Number Line Dance Student's Worksheet

Name: _____   Date: _____

Select four numbers (no greater than 5 and no less than -5. Include both positive and negative integers).

_____, _____, _____, _____.   Zero is the fifth number.

Locate and label the numbers on the number line below.

0

What is the distance between zero and the first number? _____

What is the distance between the first and second number? _____

What is the distance between the second and third number? _____

What is the distance between the third and fourth number? _____

What is the distance between the fourth number and zero? _____

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

STUDENT SELF-ASSESSMENT WORKSHEET

Disciplines	MATH	DANCE/MATH	Total
Concept	**Positive and Negative Integers**	**Direction** **Positive and Negative Integers**	2
Criteria Student Name	Locates and labels a series of four positive and negative numbers on a number line.	Dances in a line formation performing steps to the right and left that correspond to the numbers on the number line.	

CLASS ASSESSMENT WORKSHEET

Disciplines	MATH	DANCE/MATH	Total 2
Concept	**Positive and Negative Integers**	**Direction** **Positive and Negative Integers**	
Criteria	Locates and labels a series of four positive and negative numbers on a number line.	Dances in a line formation performing steps to the right and left that correspond to the numbers on the number line.	
Student Name			
1.			
2.			
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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: **_Number Line Dance_**

Dear Family:

Today your child participated in an **Arts and Math** lesson. We talked about how positive numbers are located to the right on a number line and negative numbers are on the left.

- We located and labeled a series of positive and negative numbers on a number line.

- We calculated the distance between each number.

- We used that information to determine the number of steps to the right or the left.

- We put the steps to the right and the left together to make a line dance.

At home, you could do a line dance you already know and figure out how to how many steps go to the right and how many to the left. How would the numbers look on a number line?

Enduring Understanding

A positive rational number can be represented by points or movements to the right of zero on a number line. A negative rational number can be represented by points or movements to the left of zero on a number line.