

ARTS IMPACT LESSON PLAN

Dance and Math Infused Lesson

Lesson Two: *Hand Jive Squared and Cubed*

Author: Debbie Gilbert Grade Level: Eighth

Enduring Understanding

Squaring, cubing, and taking the square and cube root are inverse operations and can be used to solve equations in real-world situations like choreography.

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

In this dance and math lesson, students explore squaring and cubing numbers to determine the number of repetitions of a dance phrase. They learn the hand jive and repeat it for 2^2 , 2^3 , and 3^2 times. They represent the repetition in equations that show squaring, cubing, or finding square or cube roots. In small groups, students create their own hand jives, determine the number of repetitions, and perform. The audience analyzes whether the repetitions were 2^2 , 2^3 , or 3^2 .

Learning Targets and Assessment Criteria

Target: Learns the hand jive.

Criteria: Dances a 16-count pattern of pats, claps, taps, and hitchhikes.

Target: Dances the hand jive for 2^2 , 2^3 , and 3^2 repetitions.

Criteria: Repeats the 16-count body percussion pattern four, eight, and nine times.

Target: Creates a hand jive.

Criteria: Choreographs a 16-count body percussion pattern.

Target: Dances the new hand jive for 2^2 , 2^3 , or 3^2 repetitions.

Criteria: Repeats the choreographed 16-count body percussion pattern four, eight, or nine times.

Vocabulary

Arts Infused:

Count
Pattern

Math:

Cube Root
Inverse Operation
Square Root

Arts:

Body Percussion
Choreograph
Formation
Hand Jive
Movement
Phrase
Repetition
Rhythm

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; Class Assessment Worksheet; Music player

Music:

"Middle School BrainDance," *Middle School Math Dances* by Debbie Gilbert
"Born to Hand Jive" by Sha-Na-Na,
Grease Soundtrack

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>

- 1.1.2 Elements: Time, Rhythm
- 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
- 4.4.1 Cultural/Historical Connection

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>

- 8.EE. Work with radicals and integer components.

continued

8.EE.2. Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.

CCSS Mathematical Practices

MP.2. Reason abstractly and quantitatively.

MP.4. Model with mathematics.

MP.6. Attend to precision.

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 squaring and cubing and determining square and cube roots. Discuss how they are inverse operations. Do the Middle School BrainDance.

Lesson Steps Outline

1. Introduce squaring and cubing numbers to determine repetitions of a dance phrase.

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. Teach the hand jive.

Music: "Born to Hand Jive" by Sha-Na-Na, *Grease Soundtrack*

 Criteria-based teacher checklist: Dances a 16-count pattern of pats, claps, taps, and hitchhikes.

5. Facilitate determining the value of x in equations that use square or cube roots to represent repetitions of the hand jive.

 Criteria-based teacher checklist: Repeats the 16-count body percussion pattern four, eight, and nine times.

6. Guide students as they create original hand jives in small groups.

Music (optional): "Born to Hand Jive" by Sha-Na-Na, *Grease Soundtrack*

 Criteria-based teacher checklist, self-assessment: Choreographs a 16-count body percussion pattern.

7. Direct performances of original hand jives. Ask audience to analyze what they observe using square or cube root.

 Criteria-based teacher checklist, peer assessment: Repeats the choreographed 16-count body percussion pattern four, eight, or nine times.

8. Lead reflection.

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

LESSON STEPS

1. Introduce squaring and cubing numbers to determine repetitions of a dance phrase.

- *Dancing Mathematicians, we are going to be squaring or cubing numbers and taking the square or cube root of numbers to help us figure out the number of times we will repeat a dance phrase.*
 - *The dance phrase will be a hand jive. I'll teach you the classic hand jive and then you will create your own.*
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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.*
- *Rhythm is a key component in hand jives. Notice how rhythm is used in the BrainDance.*

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. Teach the hand jive.

Music: "Born to Hand Jive" by Sha-Na-Na, *Grease Soundtrack*

- *The hand jive is a rhythm and blues dance from the 1950's. You may have seen it in the musical Grease.*
- *Pat your hands on your legs twice (count 1, 2).*
- *Clap twice (count 3, 4).*
- *Cross your hands right over left twice (count 5, 6).*
- *Cross your hands left over right twice (count 7, 8).*
- *Make fists with your hands and tap twice with one hand on top (count 9, 10).*
- *Tap twice with the other hand on top (count 11, 12).*
- *Hitchhike: with your right thumb, point back over your right shoulder twice (count 13, 14).*
- *With your left thumb, point back over your left shoulder twice (count 15, 16).*
- *Let's practice the whole dance phrase slowly.*

- *When you have it down, we'll speed up the tempo.*

Criteria-based teacher checklist: Dances a 16-count pattern of pats, claps, taps, and hitchhikes.

5. Facilitate determining the value of x in equations that use square or cube roots to represent repetitions of the hand jive.

- *What is the value of x in this equation $x^2 = 4$?*
- *How do you know?*
- *Since the value of x could be -2 or 2 , we need to make a determination. Since we are going to use this equation to determine the number of repetitions of the dance pattern, which would be a reasonable value in this situation? Why?*
- *Let's do the hand jive 2^2 or four times. We'll need someone to keep track of our repetitions as we do this part of the lesson.*
- *What is the value of x in this equation $x^3 = 8$?*
- *How do you know?*
- *Let's do the hand jive 2^3 or eight times.*
- *Let's use the inverse operation for this one. What is the value of x in this equation $\sqrt{x} = 3$?*
- *How do you know?*
- *Let's do the hand jive nine times.*
- *What do you notice when we repeat a dance pattern by squaring or cubing a number?*

Criteria-based teacher checklist: Repeats the 16-count body percussion pattern four, eight, and nine times.

6. Guide students as they create original hand jives in small groups.

Music (optional): "Born to Hand Jive" by Sha-Na-Na, *Grease Soundtrack*

You can choose groups in advance to keep the momentum of the class going.

- *Now choreograph your own hand jive in a small group.*
- *Like the original hand jive, your dance will have a sixteen-count pattern.*
- *It should include a series of movements with your upper body, with each movement repeated two times.*
- *Some of the movements should be body percussion (like claps, taps, or pats).*
- *Explore ideas with your group. Make choices. Practice.*
- *Think about your spatial formation. Will you be in a line, a clump, or a circle?*

- *As you rehearse, ask yourselves if your pattern has sixteen counts and uses upper body actions repeated twice. Have you included body percussion?*
- *Decide how many repetitions of your whole pattern you will do. Your choices are four, eight, or nine. You may designate one dancer in your group to count the number of repetitions.*
- *Practice so that everyone in the group can perform the movements together, repeating the pattern the number of times you have selected.*

Criteria-based teacher checklist, self-assessment: Choreographs a 16-count body percussion pattern.

7. Direct performances of original hand jives. Ask audience to analyze what they observe using square or cube root.

- *Now is your opportunity to show your hand jives.*
- *Before we begin, performers, what do you want from your audience?*
- *Audience, what do you want from your performers?*
- *Audience, when the dance is done, I am going to ask you how many times the pattern was repeated and whether it represented 2^2 or 2^3 or 3^2 .*
- *What did you see? How do you know?*

Criteria-based teacher checklist, peer assessment: Repeats the choreographed 16-count body percussion pattern four, eight, or nine times.

8. Lead reflection.

- *Dancing Mathematicians, what did you discover about squaring and cubing, and using square and cube roots to calculate repetitions of movements?*
- *The next time you work with square and cube roots remember how you used them with movement and it will help you understand.*

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

ARTS IMPACT LESSON PLAN Dance and Math Infusion

Eighth Grade Lesson Two: *Hand Jive Squared and Cubed*

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

STUDENT SELF-ASSESSMENT WORKSHEET

Disciplines	DANCE	DANCE/MATH	DANCE	DANCE/MATH	Total
Concept	Body Percussion	Repetition Square and Cube Root	Choreography	Repetition Square and Cube Root	4
Criteria	Dances a 16-count pattern of pats, claps, taps, and hitchhikes.	Repeats the 16-count body percussion pattern four, eight, and nine times.	Choreographs a 16-count body percussion pattern.	Repeats the choreographed 16-count body percussion pattern four, eight, or nine times.	
Student Name					

ARTS IMPACT LESSON PLAN Dance and Math Infusion

Eighth Grade Lesson Two: *Hand Jive Squared and Cubed*

CLASS ASSESSMENT WORKSHEET

Disciplines	DANCE	DANCE/MATH	DANCE	DANCE/MATH	Total 4
Concept	Body Percussion	Repetition Square and Cube Root	Choreography	Repetition Square and Cube Root	
Criteria	Dances a 16-count pattern of pats, claps, taps, and hitchhikes.	Repeats the 16-count body percussion pattern four, eight, and nine times.	Choreographs a 16-count body percussion pattern.	Repeats the choreographed 16-count body percussion pattern four, eight, or nine times.	
Student Name					
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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: *Hand Jive Squared and Cubed*

Dear Family:

Today your child participated in an **Arts and Math** lesson. We talked about square roots, cube roots, and repeating movements.

- We learned the hand jive.
- We repeated it for 2^2 , 2^3 , and 3^2 times (that's 4, 8, and 9).
- We represented the repetitions in equations.
- We created original hand jives.
- We repeated them and our audience analyzed whether we did them 2^2 , 2^3 , or 3^2 times.

At home, you could research how construction workers, video game designers, engineers, architects, and artists could use square and cube roots. Create a hand jive with your child and repeat it 2^2 times.

Enduring Understanding

Squaring, cubing, and taking the square and cube root are inverse operations and can be used to solve equations in real-world situations like choreography.