



artsNOW

Integrated learning solutions

PROBLEM SOLVING WITH MOVEMENT

Grade Band: 6-8

Content Focus: Dance & Math



LEARNING DESCRIPTION

In this lesson, students will grasp and apply the order of operations to solve equations by developing choreography that illustrates each step of an equation.

LEARNING TARGETS

Essential Questions	"I Can" Statements
How can movement aid in the comprehension of order of operations and solving equations?	<p>I can represent the order of operations through movement.</p> <p>I can create choreography that represents each step of an equation using the order of operations.</p> <p>I can accurately use the order of operations to solve an equation.</p>



We bring learning to life.

GEORGIA STANDARDS

Curriculum Standards	Arts Standards
<p>Grade 6: 6.PAR.6: Identify, write, evaluate, and interpret numerical and algebraic expressions as mathematical models to explain authentic situations. 6.PAR.6.4 Evaluate expressions when given values for the variables, including expressions that arise in everyday situations.</p>	<p>Grade 6: MSD.CR.1 Demonstrate an understanding of the choreographic process. MSD.CR.2 Demonstrate an understanding of dance as a form of communication. MSD.PR.1 Identify and demonstrate movement elements, technique, and terminology in dance. MSD.CN.3 Demonstrate an understanding of dance as it relates to other area of knowledge.</p>

SOUTH CAROLINA STANDARDS

Curriculum Standards	Arts Standards
<p>Grade 6: 6.EEI.1 Write and evaluate numerical expressions involving whole-number exponents and positive rational number bases using the Order of Operations. 6.EEI.2 Extend the concepts of numerical expressions to algebraic expressions involving positive rational numbers. c. Evaluate real-world and algebraic expressions for specific values using the Order of Operations. Grouping symbols should be limited to parentheses, braces, and brackets. Exponents should be limited to whole-numbers. Grade 7: 7.EEI.3 Extend previous understanding of Order of Operations to solve multi-step real-world and mathematical problems involving rational numbers. Include fraction bars as a grouping symbol.</p>	<p>Anchor Standard 1: I can use movement exploration to discover and create artistic ideas and works. Anchor Standard 2: I can choreograph a dance. Anchor Standard 3: I can perform movements using the dance elements. Anchor Standard 7: I can relate dance to other arts disciplines, content areas, and careers.</p>

KEY VOCABULARY

Content Vocabulary	Arts Vocabulary
--------------------	-----------------



We bring learning to life.

- | | |
|---|---|
| <ul style="list-style-type: none"> ● <u>Order of operations</u> - A set of rules that dictates the sequence in which operations should be performed to ensure consistent and correct results; it is essential when an expression involves multiple operations like addition, subtraction, multiplication, division, exponents, and parentheses | <ul style="list-style-type: none"> ● <u>Movement phrase</u> - A series of movements linked together to make a distinctive pattern ● <u>Non-locomotor</u> - This refers to a movement that does not travel through space ● <u>Locomotor</u> - This refers to a movement that travels through space ● <u>Steady beat</u> - An unchanging, continuous pulse ● <u>Space</u> - An element of movement involving direction, level, size, focus, and pathway ● <u>Level</u> - One of the aspects of the movement element space; in dance, there are three basic levels: high, middle, and low ● <u>Choreography</u> - The art of composing dances and planning and arranging the movements, steps, and patterns of dancers ● <u>Choreographer</u> - A person who creates dances ● <u>Shape</u> - This refers to an interesting and interrelated arrangement of body parts of one dance; the visual makeup or molding of the body parts of a single dancer; the overall visible appearance of a group of dancers |
|---|---|

MATERIALS

- Sound source and music with a steady beat
- Equations on cards that require students to use the order of operations

INSTRUCTIONAL DESIGN

Opening/Activating Strategy



We bring learning to life.

Classroom Tips: Set up chairs and tables in a circular format to maximize students' engagement and ability to see their peers during the activity and performance. Also establish parameters for acceptable movement choices and discuss audience behavior/etiquette with students.

- Begin the lesson by engaging students in movement that introduces students to the Elements of Dance: Body, action, space, time and energy.
 - Have students arrange themselves in the classroom with enough personal space to move freely without touching a neighbor.
 - Turn on instrumental music with a steady beat.
 - First, have students bring awareness to their bodies by leading them through gentle stretches starting from the head and moving to the toes (e.g., head circles, shoulder shrugs, toe touches, etc.).
 - Next, bring students' awareness to the rhythm of the music by having them march in place to the beat with high knees, swinging their arms side to side.
 - Now, direct students to explore energy variations with different movement qualities such as sharp movements—quick, precise actions like punches or snaps, and smooth movements—slow, flowing actions like waves or circles with arms.
 - Finally, bring students' attention to levels (high, middle, low) and directions (forward, backward, sideways) with movements such as stretching up high and moving on tiptoes, moving low to the ground and crawling forwards and backwards, and bouncing in place at a medium level.
 - Have students return to their seats.

Work Session

- Review order of operations with students.
- Break the class into groups.
- Assign each group one of the following: Parenthesis, exponents, multiplication, division, addition, or subtraction.
 - Each group should create a movement that demonstrates their operation.
 - Remind students to think about the movements from the warm-ups and how their levels and body shapes can communicate their concept.
 - Each group will teach their movement to the class.
 - Then, the whole class will perform the choreography together in the correct order of operations.
- Assign each group an equation that requires students to use the order of operations in order to be solved.
- Ask students to begin by solving their equation mathematically.
 - Next, ask students to create choreography in the order that is needed to solve an equation with the order of operations.
 - For example, if the equation is $19 + 40 \div 5 - (8 + 5) = X$, students would create a movement to represent $(8 + 5)$; $40 \div 5$; $19 + 8$; and finally $27 - 13$.
 - Encourage students to incorporate the movements from the order of operations choreography in their equation choreography.

Closing/Reflection

- The students will perform their movement phrases for their classmates. Discuss appropriate audience participation and etiquette prior to performances.
- Turn up the volume of the music and help students find the steady beat again by tapping their toe on the floor.



We bring learning to life.

- After each performance, students will share and post their equation with ordered sections in how they solved the problem and related it to the sections of choreography they created.

ASSESSMENTS

Formative

Teachers will assess students' understanding of the content throughout the lesson by observing students' participation in the activator, ability to express the order of operations through movement, and ability to use the order of operations to solve an equation.

Summative

CHECKLIST

- Students can represent the order of operations through movement.
- Students can create choreography that represents each step of their equation using the order of operations.
- Students can accurately use order of operations to solve their equation.

DIFFERENTIATION

Acceleration: Challenge students to create their own equation and create choreography to represent it using the order of operations.

Remediation: Assign each group a section of the equation to choreograph. Then, have students put their equation together to solve it using the order of operations.

ADDITIONAL RESOURCES

NA

**This integrated lesson provides differentiated ideas and activities for educators that are aligned to a sampling of standards. Standards referenced at the time of publishing may differ based on each state's adoption of new standards.*

Ideas contributed by: Melissa Dittmar-Joy. Updated by Katy Betts.

ATLANTA BALLET

Centre for Dance Education

Revised and copyright: June 2024 @ ArtsNOW



We bring learning to life.



We bring learning to life.

10 Glenlake Parkway, Suite 130, Atlanta, GA 30328
www.artsnowlearning.org