BRAINworks
OFFICIAL CURRICULUM

Grade: 2
Subjects: Dance and Mathematics
Math Movement

Lesson Overview	This lesson is an introductory lesson on math and movement. Students will learn interpretive movements to mathematical equations while exploring the relationship between addition and subtraction. They will then create interpretive movements to represent a mathematical equation they choose.
Rationale	Math and dance fit together seamlessly. According to Christopher Bergland's article, *"Motor Skills, Movement, and Math Performance Are Intertwined"* in Psychology Today, "Learning mathematics while engaging the full body through physical movement can improve math performance for first graders, according to a new study from Denmark." Not only does the combination improve students' academic performance, it increases their creativity, enhances visual learning and boosts decision-making skills. The students are able to learn the material through multiple means of representation and many exposures. They are making connections between oral, auditory, and kinesthetic movements which solidifies the material in their memory. The students are also using their creativity and decision-making skills to create movements to represent mathematical concepts. Students are given multiple access points to better understand the content.
Assessment of Student Learning	

Massachusetts Learning Standards	Evidence	Collection Strategy
Grades 1-2. Dance. Performing. 6. Convey meaning through the presentation of artistic work. Move in ways that match cues, directions and artistic interpretations. 1-2.D.P.06	The students will be able to: ● perform a sequence of movement including two out of three of the movement vocabulary (space, size and/or levels) ● discuss how the movements they create demonstrate their math equation	● Observe dance/movement sequence ● Teacher will record the students' reflection on how their piece relates to the math equation
Grade 2. Math. Numbers and Operations in Base 10.	The students will be able to:	● observe dance/movement sequence

	Explain why addition and subtraction strategies work, using place value and the properties of operations. 2.NBT.9.	● represent their math equations using movement while explaining the reasoning behind their choices. ● recognize other students math equations by watching/listening to the movement/sound	● Teacher will record the students' reflection on how their piece relates to the math equation ● Teacher's checklist
Essential Questions	● How does finding the common characteristics among similar problems help me to be a more efficient problem solver? ● How does movement create meaning? ● How do mathematical operations relate to each other? ● How can mathematics be represented by movement?		
Enduring Understandings	● Addition and subtraction can be solved by following rules of math strategies. ● Movement can create meaning. ● Dance can be represented to explain mathematical concepts.		
Materials and Needs	● equation cards (teacher will create or download from internet) ● vocabulary chart/ visual ● large enough space for students to move		
Advancing Vocabulary	Math Vocabulary: ● addends ● addition ● difference ● equals ● fact family ● subtraction ● sum Arts Vocabulary: ● levels of movement ● locomotor ● non-locomotor ● size ● space		

Support & Accommodations Inspired by Universal Design for Learning	- terms and definitions posted for students to refer to and cycle back to throughout the lesson - explicit teaching of vocabulary with modeling - gradual release of responsibility - addition of sound with the movement to help visually impaired student access the lesson
Lesson Plan Progression Details	**Warm-up - 15 minutes** - In a circle, the teacher will ask the students to show the number two, modeling holding two fingers up. Then she/he/they will try this with more examples using four, seven, nine, one, and three. In the circle, students will then choose their own number and how they would like to represent it. The teacher will model by saying "If I choose four, I may represent it by stomping my feet four times or spinning around four times." The teacher will model this activity and give ideas of different movements that could be done using the specific terms. - As the teacher models, students will try out the different movements. The terms locomotor and non-locomotor will be highlighted and explained with examples of each. The space used for the movement will be discussed along with levels and size. (Teacher will model the levels of dance for the students). Each movement will include sound of some type to help accommodate for our visually impaired learner. The teacher will know to move on when she/he/they sees each student representing their number correctly with the correct number of sounds. (**DOK 1 - match and identify**) **Exploration - 45 minutes** - Next the students will be asked to think of an addition problem. The teacher will ask the students "What does a problem need to have to be an **addition** problem?" They should be able to come up with two numbers (**addends** or parts), an **addition** (plus) sign, an **equal** sign and a **sum** (whole). If they are unable to come up with all of the components the teacher can prompt them and go over any necessary vocabulary. They can reference the vocabulary visual as needed. (**DOK 2 - categorize**) - The teacher will explain to the class that they will create a class addition problem, calling two volunteers to recreate their movements in the middle of the circle. The rest of the class will work to add the two numbers together to get the **sum**. A different student will come into the circle to represent the sum with movement. They can either copy the two original movements in sequence or create another movement to represent the correct number. Two other students will make movements for the plus sign and equal sign. Sample movements for adding may be physically creating a plus sign with their arms or pushing their arms together as if they were joining two things together. Once they have practiced the movement a couple times, they will present their number sentence to the class. The class will try to do the dance along with them after the presentation. The class will discuss the different movements they noticed and what they think the reasoning was behind those movements, then the students who presented will share their thinking. (**DOK 2- interpret and apply, and DOK 3 - reasoning**)

- In groups of five, students will create their own addition equation dance to perform for the class. Students will choose from a hat of preselected addition sentences and will be given five minutes to practice their dance. The class will try to guess the equation after the presentation, so they should be kept secret. During this time, the teacher will walk around to observe the students' progress and gauge their understanding. Now is the time to clear up any confusion a student may be having.
- After the students present their problem, the class will have the chance to guess what equation they think the group created. We will discuss what we saw, focusing on both the equation and the movements observed. Were they **locomotor** or **non-locomotor**? (**DOK 2 - classify**) What levels did the group use? What sizes? How much space did they use? (**DOK 3 - describe**)

- After everyone has presented, the teacher will go back to a whole-group discussion similar to earlier. This time the focus will be on the components of a subtraction problem. What does a **subtraction** problem need to include? The students should be able to come up with a whole, two parts, a **subtraction** sign (minus) and an equal sign. They should know that the whole needs to be in front of the **subtraction** sign because we are taking away from the largest number. If they are unable to come up with all of the components the teacher can prompt them and go over any necessary vocabulary. They can reference the vocabulary visual as needed. (**DOK 1 - recall**)

- The teacher will review the whole group addition dance that was created earlier in the lesson and challenge the students to think of this problem in terms of a subtraction sentence. What would look different? What would stay the same?* Once the class has worked through this problem together, the students who volunteered last time will come up and reverse the problem making a subtraction sentence. The class will reflect what has happened and the reasoning behind it. (**DOK 3 - reasoning**)
-

*Sample questions can be given to better guide students with their reflection.

Conclusion - (20 minutes)
- The groups will be asked to take their addition sentence and now create a dance that represents both addition and subtraction with the same numbers. They can use the same dance or create a new one. They will be reminded to think about **locomotor** vs. **non-locomotor** movements, space, size and levels as they create their challenge dance. During this time, the teacher will walk around to observe the students' progress and gauge their understanding. Now is the time to clear up any confusion a student may be having.
- Once each group has had about 8 minutes to practice, they will present their final dance to the class. Again the class will discuss what has happened and why they think that group made those choices. The

	groups will have a chance to share their reasoning and process with the class. (**DOK 4 - create and reflect**)
Resources	Bergland, Christopher. (2017) "Motor Skills, Movement, and Math Performance Are Intertwined." *Psychology Today* , Sussex Publishers, https://www.psychologytoday.com/us/blog/the-athletes-way/201702/motor-skills-movement-and-math-performance-are-intertwined
Appendix	*Plan written by Bethany Kelley* *Plan edited by BRAINworks Curriculum Review Committee* *Stamp design by AGRAND.ie*