ARTS IMPACT—ARTS-INFUSED INSTITUTE LESSON PLAN (YR2-AEMDD)

LESSON TITLE: Translations and Reflections of Triangles: Transformation Dances Dance and Math Lesson Inspired by a lesson written by dance specialist Laura Miltner

Artist-Mentor – Debbie Gilbert Grade Level: Fifth Grade

Examples:

Enduring Understanding

Flipping a figure into a mirror image creates a reflection.
Sliding a figure without turning or flipping creates a translation.
Recognizing the degrees of the angles identifies the type of triangle.

Target: Creates a dance with a prop that shows a triangle with three transformations.
Criteria: With a small group and stretchy bands, creates a three-sided shape with 3 acute angles (<*90°*)—an acute triangle, 1 right angle (*90°*)—a right triangle, or 1 obtuse angle (>*90°*)—an obtuse triangle, makes a reflection (flips) the shape, and makes a translation (slides) the shape as listed on the transformation dance card.

Target: Notates choreography, showing understanding of triangles, reflections, and translations.
Criteria: Identifies a three-sided shape, and draws flips and slides as listed on the transformation dance card.

Teaching and Learning Strategies

Introduction to Arts-Infused Concepts through Classroom Activities:

Arts-Infused Concepts: Translations, Reflections, Angles, Triangles Congruence

☐ Do the BrainDance.
☐ Introduce dancing safely with stretchies.
☐ Introduce how to label the vertices of polygons to show flips/reflections.

If time is available, explore concepts in everyday life:
Reflections: notice when you do flips with all or part of your body during the day (think of flips in a mathematical sense (mirror image) rather than a gymnastic sense.
☐ Translations: slide sideways across the gym or playground.

1. **Prepares students for dancing flips and slides** by discussing translations and reflections in dance, math, and everyday living. *Prompts: This is an arts-infused lesson about translations (slides) and reflections (flips) that links dance and math. What do you know about translations?* (translations: sliding a figure from one position to another without turning or flipping the figure). *Do a slide with your hands. What do you know about reflections?* (reflections: flipping a figure to produce a mirror image) *Do a flip with your hands. Where do you see translations in this room? Reflections?*
Student: Considers and discusses the shared concepts of translations and reflections in math and dance and life. Bases the discussion on prior knowledge.

2. **Leads students in *BrainDance* warm-up.** (Originally developed by Anne Green Gilbert, reference: *Brain-Compatible Dance Education,* video: *BrainDance, Variations for Infants through Seniors*). Music: "Geometry BrainDance (5th grade)" #5, *Geometry Dances*. *Prompts: The BrainDance is designed to warm up your body and make your brain work better at the same time. We'll use a few examples of math concepts as we do the BrainDance. Look for symmetry, parallel and perpendicular lines, angles, translations, and reflections.* **Demonstrates the dance using the following sequence of movement patterns:**

Breath: Inhales and exhales. Repeats. *Prompts: Your muscles and your brain need oxygen, so inhale through your nose and exhale through your mouth*.

Tactile: Rubs hands. Taps body lightly from head to toe. Stomps feet. Prompts: *Use both hands tapping together equally on each side of your body creating **symmetrical** movement. When you stomp your feet are you doing symmetrical movement?*

Core-Distal: Gradually increases the size of the body, growing from the center of the body into a **large symmetrical shape** and then shrinking back into a small shape. Repeats. *Prompts: Make a big **symmetrical triangle** shape. How many **vertices** are you showing? Shrink into a small shape. Grow into a big **symmetrical quadrilateral** shape. How many **vertices** are you showing? Shrink into a small shape. Grow into a big **symmetrical pentagon** shape. How many **vertices** are you showing? Shrink into a small shape.*

Head-Tail: Curls the body forward and backward with head and tailbone holding arms in parallel lines overhead. Repeats. Curls from side to side with arms making perpendicular lines. Repeats. *Prompts: Curl forward and back while reaching your arms up in **parallel lines**. That's **symmetrical** movement. Curl from side to side with your arms in **perpendicular lines**. Is that symmetrical?*

Upper Half and Lower Half: Stabilizes the lower half of the body and only the upper half dances, drawing **parallel and perpendicular lines** with different body parts. *Prompts: The top half of your body is in motion, while the lower half is frozen. Draw parallel lines in the air with your hands, then with your elbows. Draw perpendicular lines with your arms.* Stabilizes the upper half of the body, and only the lower half dances, staying in one spot, drawing **parallel and perpendicular lines** with different body parts. *Prompts: The lower half of your body is in motion, while the upper half is frozen. Draw parallel lines on the ground with your feet, then in the air with your knees. Draw perpendicular lines on the ground with your feet, then in the air with your legs.*

Body-Half Right and Left: Stabilizes the left side of the body and only the right side dances, making **angles** with an arm and/or a leg. Repeats on the opposite side. *Prompts: Your left side is frozen and only the right side dances. Use your arm or leg and the side of your body to make angles. Can you make a 90° angle? 60°? 45°? 30°? Obtuse? Now the right side is frozen and the left half dances. Make angles with the left side.*

Cross-Lateral: Reaches across the body with one hand and then the other. Crosses the center of the body, defining a 45° **angle** between the arm and body. Repeats several times with arms. **Flips** (makes a reflection) shape from side to side. Like opening and closing a book. *Prompts: This is the cross-lateral dance. Reach your arm across your body. Notice you are making a 45° angle between your arm and your body. Alternate arms. Now flip, make a reflection, like opening and closing a book. Flip. Flip. Flip.*

Vestibular: Makes a **shape** with whole body. Makes a translation. **Slides** the shape to the right, left, right, left. Does four 90° turns. **Slides** the shape to the right, left, right, left. Does two 180° turns. **Slides** the shape to the right, left, right, left. Does one 360° turn. *Prompts: Make a shape. Make a translation. Slide it right, left, right, left. Four 90° turns: 1,2,3,4. Make a shape. Make a translation. Slide it right, left, right, left. Two 180° turns: 1,2. Make a shape. Make a translation. Slide it right, left, right, left. One 360° turn: 1.*

Inhale. Exhale. Inhale. Exhale.
Prompts: When did you use reflections and translations in the BrainDance?
Student: Participates in warm-up according to teacher prompts.

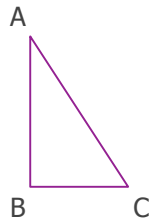
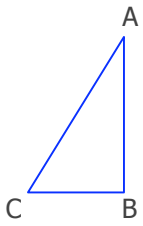
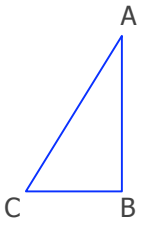
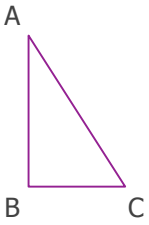
3. **Introduces dancing with a prop: stretchy bands**. (The stretchies are strips of 4-way stretch fabric about 3 inches wide and 4-6 feet long and tied tightly together to make a loop.) Discusses how to move safely and appropriately with them. *Prompts: How can we dance safely with the stretchy bands? When you start moving, remember to keep empty space around you. Find different ways of working with the prop. Do not wrap it around your neck. What should we do with our props when we are listening to directions* (e.g. on the floor in front of you, or "sit criss-cross and make the stretchy disappear")? Hands a stretchy band to each student.
Student: Shares strategies for dancing safely with the stretchies.
Embedded Assessment: Criteria-based room scan and self-assessment

4. **Directs students in making acute, right, and obtuse triangle shapes, translations (slides), and reflections (flips) with the stretchies.**

a. **Leads shape-making and describes angles.** *Prompts: How many angles are in a triangle? How would you make a triangle with the stretchy? Think about the three angles, three vertices, and three sides in the triangle. How can you use your body with the stretchy to show the angles?* Describes a few of the different angles in the triangles created by the students. *Here is a **right or 90° angle**. If your largest angle is a 90° angle, you have a **right triangle**. Here is an **acute or less than 90° angle**. If your largest angle is less than 90°, you have an **acute triangle**. Here is an **obtuse or greater than 90° angle**. If your largest angle greater than a 90° angle and less than 180°, you have an **obtuse triangle**.*
b. **Guides exploration of making translations (sliding) and reflections (flipping) the polygons**. *Prompts: Make a triangle with your stretchy. Slide the shape one time. You've made a **translation**. Make sure you are moving in empty space. You are traveling, so it's a **locomotor** movement. Now flip your shape. You've made a **reflection**. Make sure your shape stays **congruent** during and after your transformation movement.* Optional: Accompanies with drum.

Student: Explores making triangles with right, acute, and obtuse angles with the prop. Makes a translation (slide) and makes a reflection (flip) with the triangle shapes.
Embedded Assessment: Criteria-based room scan and self-assessment

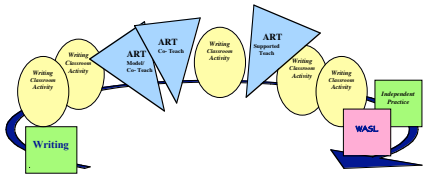
5. **Assists students in Creating Transformation Dances. Describes the process and demonstrates how to fill out the worksheet.** Hint: An effective strategy to clearly show a flip is to label each vertex of the triangle with a capital letter. Then when the triangle has been reflected, the labels can show that the figure has been flipped. *Prompts: Transformation is another word for making reflections (flips) and translations (slides) with a shape. In a small group, you are going to choreograph a transformation dance with your stretchies. I'll give you a card with a type of triangle on it and a series of three transformations. Identify the type of triangle. Draw the translation (slide) and reflection (flip). With your group, practice making your triangle and dancing the transformations on your card. Work on keeping your shape congruent as you make reflections and translations.* Divides students into groups of 3-5. Directs each of them to notate the dance on the card and then to work as a team to create their dances and practice. Music: "Transformation Dances" #6, *Geometry Dances*.

Is the triangle below a right, acute, or obtuse triangle? <u>right</u>	1. reflection/flip 2. translation/slide 3. reflection/flip
	Draw the transformations. 1.  2.  3. 

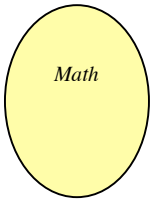
<u>Student</u>: With a small group notates and creates transformation dances with the prop. Rehearses.
<u>Embedded Assessment</u>: Criteria-based room scan and self-assessment

6. **Guides students in performances of Transformation Dances followed by a responding process.** Reviews performer and audience behavior. After each group performs, asks the audience to analyze the dance. *Prompts: Audience--What type of triangle did you see? How did you know? What was their sequence of translations and reflections? How did you know?*
<u>Student</u>: Performs and responds.
<u>Embedded Assessment</u>: Criteria-based teacher checklist; criteria-based class critique; criteria-based group reflection

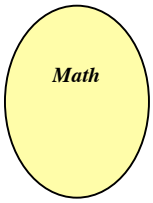
7. **Reflects on the relationship of dance and math.** *Prompts: How can dancing translations, reflections, and angles help you in math?*
<u>Student</u>: Considers translations, reflections, and angles in math and dancing and responds.
<u>Embedded Assessment</u>: Criteria-based group reflection



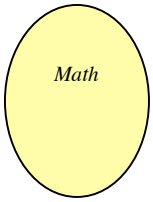
<u>After DANCE lesson and before INDEPENDENT PRACTICE</u>:



1. Repeat the BrainDance to reinforce the learning.



2. Explore the math concepts using your math curriculum.



If time is available, explore the concepts in other ways:

3. Use "hand dances" to help remember translations, reflections, angles, and triangles.
4. Repeat Transformation Dances, but students create their own sequences of movements rather than using the ones assigned on the cards. Then they draw and label the triangle and the transformations.
5. Repeat Transformation Dances with other polygons.

Independent Practice: Hand dance it! Draw it on paper! Acute angle—less than 90˚. An obtuse angle—more than 90˚. A right angle–exactly 90˚.
Translation—slide. Reflection—flip.

Vocabulary	Materials and Community Resource	WA Essential Learnings & Frameworks
Arts: locomotor movement non-locomotor movement shape Arts Infused: acute congruent flip lines of symmetry obtuse parallel parallelogram pentagon perpendicular polygon quadrilateral rectangle reflection right slide square symmetrical translation triangle	**Museum Artworks or Performance:** Broadway Center for the Performing Arts, Tacoma, WA: *Do Jump, Peking Acrobats* **Art Materials or Performance Materials:** stretchies CD player *Music for Creative Dance, Volume II* *Geometry Dances* drum BrainDance chart Transformation Dance Cards (one for each student) pencils assessment checklist	*AEL 1.1 concepts:* shape, space *AEL 1.1.2 principles of organization:* improvises, creates a simple dance *AEL 1.2 skills and techniques:* performs dance AEL 1.4: audience skills *AEL 2.1 applies creative process:* organizes elements into a creative work *AEL 2.3: describes, analyzes* *AEL 4.2: dance and math connection* *MEL 1.3.1 geometric sense:* understands properties of angles and polygons *MEL 1.3.4 geometric sense:* applies understanding of translations (slides) or reflections (flips) to congruent figures **Math State Frameworks** *Grade 5:* identifies properties of angles and triangles, constructs a geometric shape using geometric properties, draws congruent figures and shapes in multiple orientations using a transformation

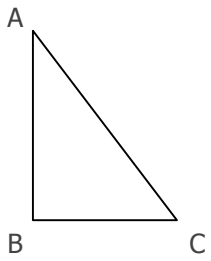
The following are instructions on copying the Transformation Dance Cards with your students:

- **When you copy the cards, you'll need one per student. Page 4-21 is for students in group one, with two card masters per page. So if you have 4 students in group one, you'll need to copy page 4-21 twice for a total of four cards. Page 4-22 is for group 2. Page 4-23 is for group 3, etc. There are card masters for a total of 6 groups.**

Transformation Dance Cards

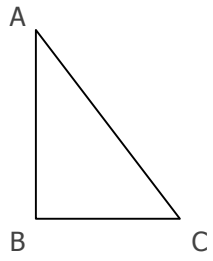
Name: _____ Date: _____

Group one

Is the triangle below a right, acute, or obtuse triangle? _____	1. flip (reflection)	2. slide (translation)	3. flip (reflection)
	Draw the transformations. 1.	2.	3.

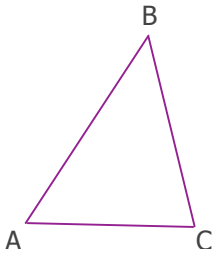
Name: _____ Date: _____

Group one

Is the triangle below a right, acute, or obtuse triangle? _____	1. flip (reflection)	2. slide (translation)	3. flip (reflection)
	Draw the transformations. 1.	2.	3.

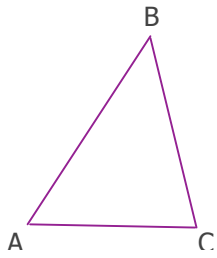
Name: _____ Date: _____

Group two

Is the triangle below a right, acute, or obtuse triangle? _____	1. flip (reflection)	2. slide (translation)	3. slide (translation)
	Draw the transformations. 1.	2.	3.

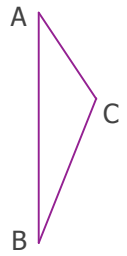
Name: _____ Date: _____

Group two

Is the triangle below a right, acute, or obtuse triangle? _____	1. flip (reflection)	2. slide (translation)	3. slide (translation)
	Draw the transformations. 1.	2.	3.

Name: _____ Date: _____

Group three

Is the triangle below a right, acute, or obtuse triangle? _____	1. slide (translation)	2. slide (translation)	3. flip (reflection)
	Draw the transformations. 1.	2.	3.

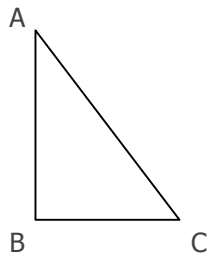
Name: _____ Date: _____

Group three

Is the triangle below a right, acute, or obtuse triangle? _____	1. slide (translation)	2. slide (translation)	3. flip (reflection)
	Draw the transformations. 1.	2.	3.

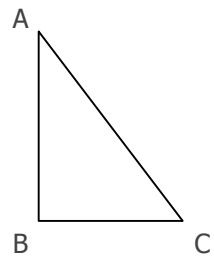
Name: _____ Date: _____

Group four

Is the triangle below a right, acute, or obtuse triangle? _____	1. flip (reflection)	2. flip (reflection)	3. slide (translation)
	Draw the transformations. 1.	2.	3.

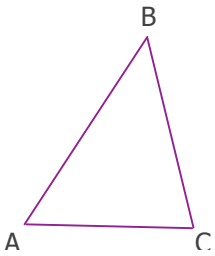
Name: _____ Date: _____

Group four

Is the triangle below a right, acute, or obtuse triangle? _____	1. flip (reflection)	2. flip (reflection)	3. slide (translation)
	Draw the transformations. 1.	2.	3.

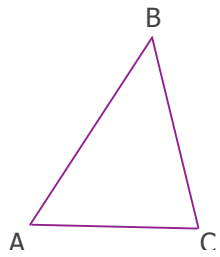
Name: _____ Date: _____

Group five

Is the triangle below a right, acute, or obtuse triangle? _____	1. slide (translation)	2. flip (reflection)	3. flip (reflection)
	Draw the transformations. 1.	2.	3.

Name: _____ Date: _____

Group five

Is the triangle below a right, acute, or obtuse triangle? _____	1. slide (translation)	2. flip (reflection)	3. flip (reflection)
	Draw the transformations. 1.	2.	3.

Name: _____ Date: _____

Group six

Is the triangle below a right, acute, or obtuse triangle? _____	1. slide (translation)	2. flip (reflection)	3. slide (translation)
	Draw the transformations. 1.	2.	3.

Name: _____ Date: _____

Group six

Is the triangle below a right, acute, or obtuse triangle? _____	1. slide (translation)	2. flip (reflection)	3. slide (translation)
	Draw the transformations. 1.	2.	3.

ARTS IMPACT—ARTS-INFUSED INSTITUTE LESSON PLAN (YR2-AEMDD)

LESSON TITLE: Transformation Dances – Translations, Reflections, Angles

ASSESSMENT WORKSHEET

Disciplines	DANCE AND MATH				MATH			Total 7
Concept	TRANSLATIONS AND REFLECTIONS **Transformation Dance**				TRANSLATIONS AND REFLECTIONS **Transformation Dance Card**			
Student	With a small group and stretchy bands, creates a three-sided shape with 3 acute angles (<90°)–an acute triangle, 1 right angle (90°)–a right triangle, or 1 obtuse angle (>90°)–an obtuse triangle, makes a reflection (flips) the shape, and makes a translation (slides) the shape as listed on the transformation dance card.				Identifies a three-sided shape, and draws flips and slides as listed on the transformation dance card			
	Makes a three-sided shape	Shows correct angles	Flips shape	Slides shape	Identifies	Flips	Slides	
1.								
2.								
3.								
4.								
5.								
6.								
7.								
8.								
9.								
10.								
11.								
12.								
13.								
14.								
15.								
16.								
17.								
18.								
19.								
20.								
21.								
22.								
23.								
24.								
25.								
26.								
27.								
28.								
Total								
Percentage								

Criteria-based Reflection Questions: (Note examples of student reflections.)

Self-Reflection: *How can dancing translations, reflections, and angles help in math?*

Peer to Peer: *What type of triangle did you see? How did you know? What was the sequence of translations and reflections? How did you know?*

Thoughts about Learning:

Which prompts best communicated concepts? Which lesson dynamics helped or hindered learning?

Lesson Logistics:

Which classroom management techniques supported learning?

Teacher: _____ Date: _____

ARTS IMPACT—ARTS-INFUSED LEARNING FAMILY LETTER

DANCE AND MATH LESSON - Transformation Dances – Translations, Reflections, and Angles

Dear Family:

Today your child participated in a **dance and math** lesson. We talked about how you can make a **reflection** (flip) or make a **translation** (slide) with **triangles** in dance and in math. We talked about how you can identify a triangle by the size and type of its **angles**.

- We made gigantic **acute** triangles**, right** triangles, and **obtuse** triangles with a stretchy band.
- We did reflections (flips) and translations (slides) with the triangles.
- We created, notated, and analyzed dances with a triangle and a sequence of translations (slides) and reflections (flips).
- We learned how dancing translations (slides), reflections (flips), and angles help us understand and use them in math.

You could create instant dances with your hands to show sliding and flipping triangles. How many different triangles can you make with your body?

Enduring Understanding

Flipping a figure into a mirror image creates a reflection.
Sliding a figure without turning or flipping creates a translation.
Recognizing the degrees of the angles identifies the type of triangle.