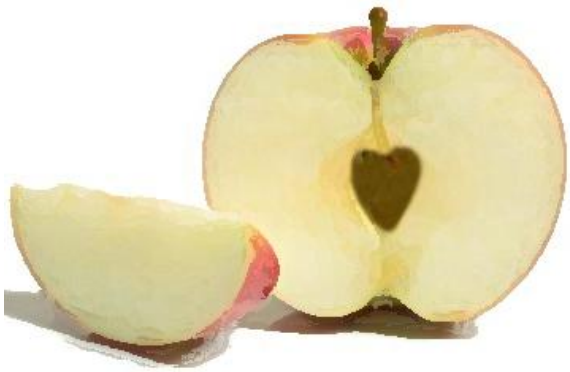

Getting to the Core

Geometry

Unit 1 - Basic Definitions & Rigid Motions

Updated on May 3, 2013

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Unit 1 – Basic Definitions & Rigid Motions

Table of Contents

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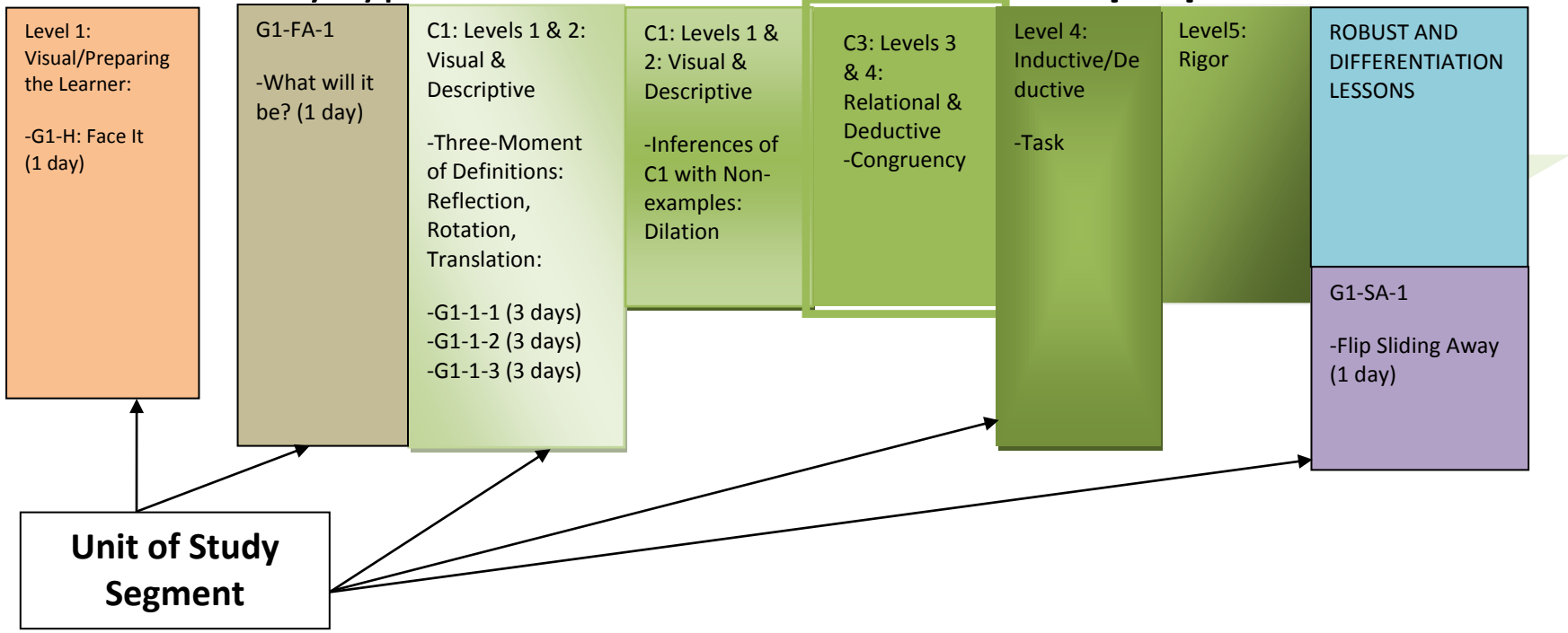
Santa Ana Unified School District Common Core Unit Planner-Mathematics

Unit Title:	**G1-Basic Definitions and Rigid Motions**	
Grade Level/Course:	Geometry	**Time Frame:** Entire Unit might be about 4 weeks. This Unit of Study segment requires 10 days
Big Idea (Enduring Understandings):	Rigid motions transform figures.	
Essential Questions:	How do rigid motions affect images? How can you design a process to predict the effect of a given rigid motion on a given figure?	

Instructional Activities: Activities/Tasks

Units have many types of lessons that have different **purposes**



Designing for Opportunities for Standards for Mathematical Practice happen at the Unit Level
Integrated lessons based on the Van Hiele Model of Geometric Thought & Bloom's Taxonomy

21st Century Skills:	**Learning and Innovation:** ☒ Critical Thinking & Problem Solving ☒ Communication & Collaboration ☒ Creativity & Innovation **Information, Media and Technology:** ☐ Online Tools ☐ Software ☐ Hardware		
Essential Academic Language:	**Tier II:** Describe Explain Analyze	**Tier III:** Reflection Rotation Translation	
What pre-assessment will be given? **Formative Assessment** -What will it be? **Summative Assessment** -Flip Sliding Away		**How will pre-assessment guide instruction?** **Formative Assessment** -to determine prior knowledge and to address the area of weakness in order to differentiate. **Summative Assessment** -MARS task to demonstrate learned knowledge and modeling with mathematics.	
Standards		**Assessment of Standards** (include formative and summative)	
Common Core Learning Standards Taught and Assessed (*include one or more standards for one or more of the areas below. Please write out the complete text for the standard(s) you include.)*		**What assessment(s) will be utilized for this unit?** *(include the types of both formative assessments (***F***) that will be used throughout the unit to inform your instruction and the summative assessments (***S***) that will demonstrate student mastery of the standards.)*	**What does the assessment tell us?**
Common Core Mathematics Content Standard(s): **Concept 1:** **Experiment with transformations in the plane** **G.CO.2 –** Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as			

function that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch). **G.CO.5 –** Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another. **G.CO.3 –** Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself. **G-CO 1 –** Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc. **Concept 2:** **G-CO 1 –** Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc. **G.CO.4 –** Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. **G.CO.2 –**Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as function that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus stretch **G.CO.6 –** Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.		

G.CO.2 –Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as function that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not **G-CO 1 –**Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc. Concept 4 **Concept 3** **G.CO.7 –**Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent. **G.CO.2 –**Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as function that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch). **G.CO.6 –** Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent. **G.CO.8 –**Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.		

Opportunities for listening, speaking, reading, writing, and thinking (*Cite Literacy Standards (as applicable):* **Bundled Language Standards:** 3. Use knowledge of language and its conventions when writing, speaking, reading, or listening. 6. Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases, including those that signal contrast, addition, and other logical relationships (e.g., however, although, nevertheless, similarly, moreover, in addition) **Bundled Speaking and Listening Standards:** 1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics and texts, building on others' ideas and expressing their own clearly. a. Come to discussions prepared having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion. b. Follow agreed-upon rules for discussions and carry out assigned roles. c. Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others. d. Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions. 4. Report on a topic or text, or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.		

Standards of Mathematical Practice:	(*Check all that apply*) ☒ 1. Make sense of problems and persevere in solving them. ☒ 2. Reason abstractly and quantitatively. ☒ 3. Construct viable arguments and critique the reasoning of others. ☒ 4. Model with mathematics. ☒ 5. Use appropriate tools strategically.	**Opportunities for Observable Data** *(How will students demonstrate these Mathematical Practices?)* 1. Students will make sense of given direction to perform a task. 2. Students will describe a relationship between the figure and its images. 3. Students will listen to the arguments of others and ask

	☒ 6. Attend to precision. ☒ 7. Look for and make use of structure. ☒ 8. Look for and express regularity in repeated reasoning.	useful questions to determine if an argument makes sense as in Concept Development lessons. 4. Students will create visual models to represent information. 5. Students will use tools such as ruler, patty paper, or mirrors to development understanding of precision of vocabulary. 6. Students will identify patterns and see relationships in reflection, rotation, and translation under the rigid motion experiments. 7. Students will recognize generalizations among problems and apply their knowledge to similar situations.
Resources/ Materials:	**Text(s) Titles:** **Mathematical Tools:** **Media/Technology:** **Supplementary Materials:** **Supplies:** Patty papers	
Interdisciplinary Connections:	**Cite several interdisciplinary or cross-content connections made in this unit of study (i.e. literature, science, social studies, art, etc.)**	
Differentiated Instruction:	**Based on desired student outcomes, what instructional variation will be used to address the needs of English Learners by language proficiency level?** -	**Based on desired student outcomes, what instructional variation will be used to address the needs of students with special needs, including gifted and talented?** **Special Needs-** -vocabulary cards -structure for collaboration and communication -QTEL philosophy with accompanying strategies **GATE-**

SAUSD Common Core Lesson Planner Mathematics Teacher:_____

Unit: G1 **Lesson:** **G1-H**	**Grade Level/Course:** Geometry	**Duration: Day 1 of 1 Period of 50 Minutes** **Date:**
Common Core and Content Standards	Focus at the Cluster level: Experiment with transformations in the plane **G.CO.5** Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.	
Materials/ Resources/ Lesson Preparation	Hook: Transformations – Task 1 Handout Hook: Transformations – Task 2 Handout Hook: Transformations – Task 3 Handout Hook: Transformations – Task 4 Handout Hook: Transformations – Base Group – Part 2 Handout	
Objectives	**Content:** Students are introduced to experimenting different transformations in the plane. Some students may know of one type of transformation better than the other. (Each student is expected to be an expert on one transformation).	**Language:** Students will be able to communicate (orally, in writing, and through other representations) the comparisons of shapes on the basis of the their appearances as a whole via the motions. Students use informal language to communicate their observations.
Depth of Knowledge Level	☐ **Level 1: Recall** ☒ **Level 2: Skill/Concept** ☐ **Level 3: Strategic Thinking** ☐ **Level 4: Extended Thinking**	
Standards for Mathematical Practice	☐ **1. Make sense of problems and persevere in solving them.** ☐ **2. Reason abstractly and quantitatively.** ☒ **3. Construct viable arguments and critique the reasoning of others.** ☐ **4. Model with mathematics.** ☒ **5. Use appropriate tools strategically** ☒ **6. Attend to precision.** ☐ **7. Look for and make use of structure.** ☒ **8. Look for and express regularity in repeated reasoning.**	
Common Core Instructional Shifts in Mathematics	☒ **Focus on the Standards** ☒ **Coherence within and across grade levels** ☒ **Rigor (Balance of conceptual understanding, procedural skill & fluency, and application of skills)**	
ca bul ary (Ti TEAC HER SIMPL E EXPL	**KEY WORDS ESSENTIAL TO UNDERSTANDING**	**WORDS WORTH KNOWING**

		Observe Describe Explain	
	STUDENTS FIGURE OUT THE MEANING	Reflect Rotate Translate	Flip Turn Move Slide
Pre-teaching Considerations		First introduction to rigid transformation. Collaborative group work experience is essential in learning this lesson.	

Lesson Delivery

Instructional Methods	**Check method(s) used in the lesson:** ☒ **Modeling** ☐ **Guided Practice** ☒ **Collaboration** ☐ **Independent Practice** ☒ **Guided Inquiry** ☐ **Reflection**
	Prior Knowledge, Context, and Motivation: Collaborative Conversations and group work.

Lesson Continuum

Body of the Lesson:
Activities/ Questioning/ Tasks/ Strategies/ Technology/ Engagement

Lesson Overview

Day 1 of 1

Hook Lesson/Preparing the Learner Lesson

Preparations: Students are divided in groups of 4 to perform a unique transformation task via the Jigsaw activity. They are to perform the task and match the action with the mathematical terminology. Please see below for the structure of the Jigsaw activity.

Structure of Jigsaw Activity.

- Students are in groups of four. This group is called the **Base Group**. Each student in this Base/Expert group is provided with a task to become an expert later on in this activity.
- Students move to Experts group. Members in the Expert Group work together to become experts in the task given hand.
- Once each student in the group has learned and become an expert in the task that they were given in their **Expert Group**, they are to share with the Base Group what they learned and make the rest of the team "experts" just like themselves.

20 Minutes
Hook: Transformation – Tasks 1 – 4 handouts
DOK Level 3 – Strategic Thinking

- **Independent Group Effort: Collaboration and Communication**
- **Mathematical Practice(s) Being Monitored:**
  3 Construct viable arguments and critique the reasoning of others
  1 Make sense of problem and persevere in solving them
  Objective: Students are to make sense of the problem and figure out a strategy on how to perform the task and teach each other how this task could be done.

Differentiated Instruction:

English Learners:

Teacher may refer to Students Who Need Additional Support section to provide additional support for Tier II words.

Students Who Need Additional Support:
Provide vocabulary cards with simple definitions:
Reflection=flip
Rotation= spin or turn
Translation= slide

Teacher, paraprofessional of student study buddy read aloud the question if needed.

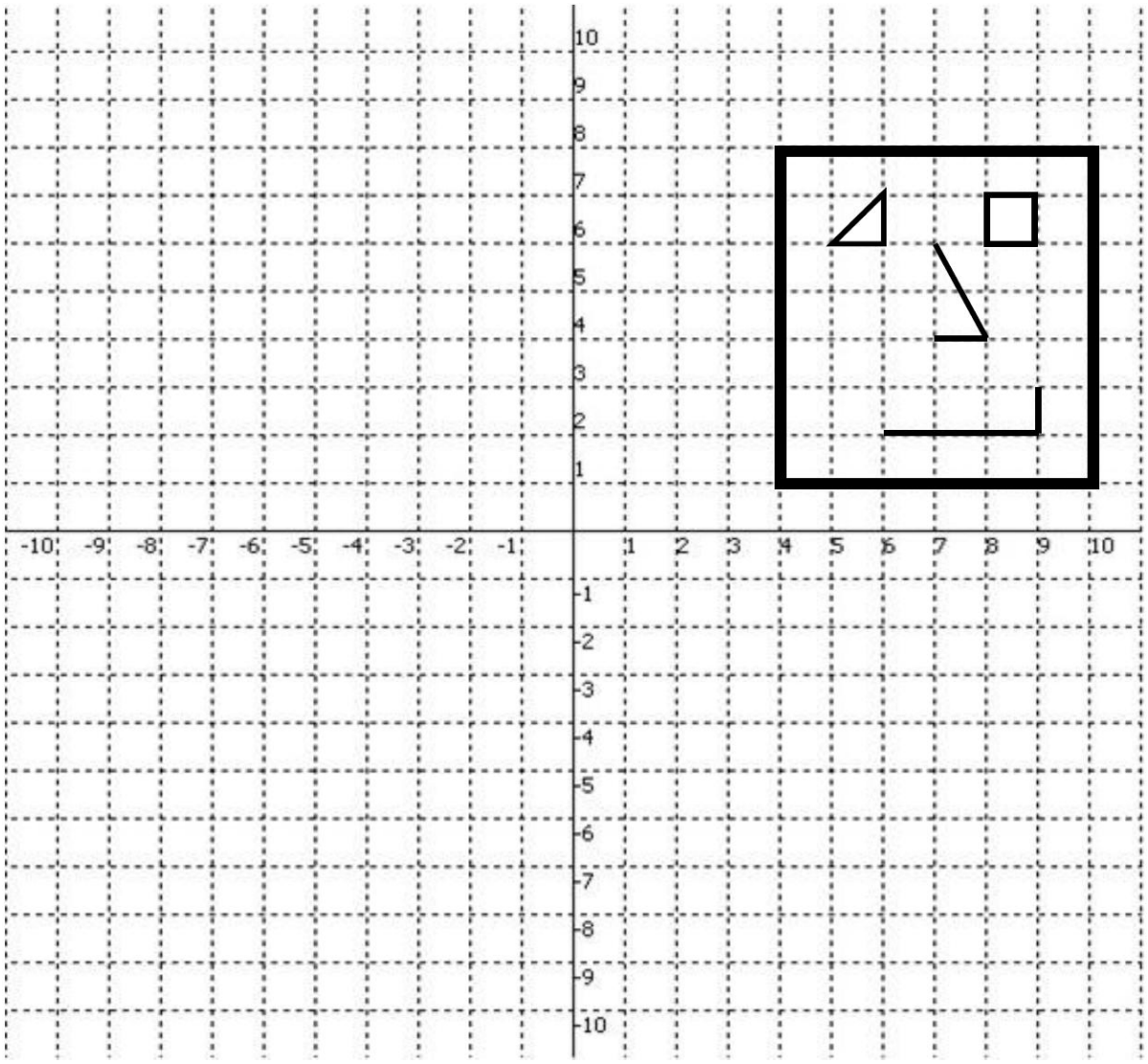
Write or project all sentence frames

	Teacher: Have students form Base Groups of 4 each. Each student is to choose a task from: • Hook: Transformation – Task 1 (Reflection) • Hook: Transformation – Task 2 (Rotation 180°) • Hook: Transformation – Task 3 (Translation) • Hook: Transformation – Task 4 (Rotation 90° **Teacher:** While students are deciding their task, please have 8 different stations label Task 1, Task 2, Task 3, and Task 4 as Expert Group stations. **Teacher:** After students have had their task chosen, have them break out and go to their Experts Group according to the Task number labeled at each station and the number they chose. **Students:** Are to find their station and meet with their Expert Group members to perform the task at hand. **Teacher:** Provide students about 15 minutes to work on the task given at the Expert Group stations. In the meantime, teacher is to circulate quickly to all stations to make sure students understand the task and what they are to perform in the next 15 minutes. **Teacher:** It is recommended that you may stay with a few groups at this point to be able to listen to their reasoning while performing the task. Once you have an idea of where the group is heading and if that's the right direction, you may move another group. **Students:** Are to work together in answering the questions written at the bottom of each page. Students are suggested to ask each other questions and critique the reasoning of each others by asking themselves the following questions. • What does x' mean? How do we find out what it says? • What does x' = y mean? How do we know what to do with each other pair? • Do both equations apply to all points regardless x or y? Or just one to some while the other to the others? • How do we determine how to use this direction? **Teacher:** After students have struggled on making sense of the problem and wonder about the equations and how they apply to this problem, you may hint them on the fact that x' = y means "the image of x is obtained by using its y-value" Students: Are to make sense of the task and become an expert on how to arrive to the answer. Students are allowed to record what they did and get ready to share once they return to their Base Group. **20 Minutes** • **Guided Inquiry to support Understanding & Mathematical Understanding: Communication** • **Mathematical Practice(s) Being Monitored:** 3 Construct viable arguments and critique the reasoning of others Objective: Students are to actively listen to the Experts for each task to learn how to perform the task; also students are to attend to the reasoning of the Experts and critique the reasoning of others if they find false assumptions. **Teacher:** Have students go back to their Base Group and share what they've learned to become an expert on. **Students:** Are to go back to their Base Group and take turn to share what they've learn. Students may go in the order of Task 1, 2, 3, and 4. • Task 1 – Students learned to reflect the points to get a new image • Task 2 – Students learned to rotate the points 180° to get a new image • Task 3 – Students learned to translate to get a new image • Task 4 – Students learned to rotate the points 90° to get a new image **Teacher:** Once all students have a chance to share their expertise, have the team work on the Hook: Transformations – Base Group Part 2 Activity **Students:** Each is expected to answer their each question using their own knowledge of how Reflection/Rotation/Translation happened.	**Accelerated Learners:**

	Teacher: May provide the following sentence frames to help students organize their responses: • Task 1: The rule was written as _____ in order to communicate that the image is a flip of _____ • Task 2: The rule as written as _____ in order to communicate that the image is a _____ of _____. • Task 3: The rule was written as _____ in order to communicate that the image is a _____ of _____. • Task 4: The rule was written as _____ in order to communicate that the image is a _____ of _____. **10 Minutes:** **DOK Level 1: Memorization** • **Guided Inquiry to support Precision & Mathematical Understanding: Communication** • **Mathematical Practice(s) Being Monitored:** 6 Attend to precision Objective: Students are to attend to the precision of vocabulary. **Teachers:** Have representative of each team share their sentences and help generalize the Base Group understanding by providing the academic content vocabulary to the whole class as • Task 1: When you "flip", there is a mathematical terminology for it which is called "reflect" or "reflection". • Task 2: When you "turn", there is a mathematical terminology for it which is called "rotate" or "rotation" of ____ • Task 3: When you "move", there is a mathematical terminology for it which is called "translate" or "translation". • Task 4: When you "turn", there is a mathematical terminology for it which is called "rotate" or "rotation" of ____ • There is a small difference from Task 2 and Task 4. Please share with each other how they are different and how they are the same. **Students:** Are to share the differences in their Base Group and come to a conclusion that the difference is the degrees of turn and the similarity is that they are both turned/rotated.	
Lesson Reflection		
Teacher Reflection Evidenced by Student Learning/ Outcomes		

Base Group Tasks 1 – 4 **Names** _____

Hook: Transformations: Task 1



Coordinates of image (x, y)

Outline: (4,1), (4,8), (10,8), (10,1)

Mouth: (9,3), (9,2) (6,2)

Nose: (7,6), (8,4), (7,4)

Left Eye: (5,6), (6,6), (6,7)

Right Eye: (8,6), (8,7), (9,7), (9,6)

In your team, for each order pair provided on the left, transform the face by applying the following rule to each point

$x' = -x$

$y' = y$

Coordinates of new image (x', y')

Outline:

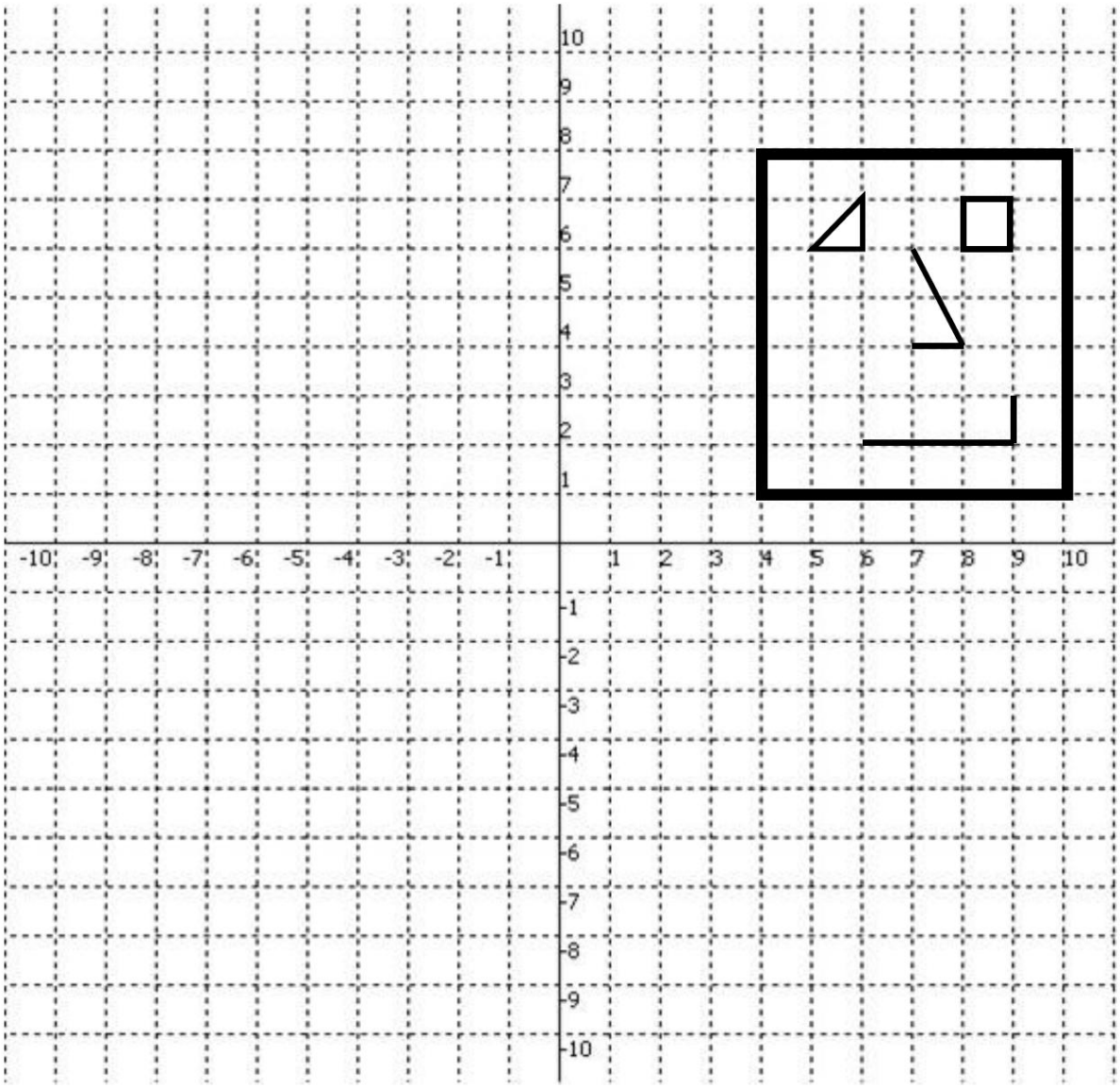
Mouth:

Nose:

Left Eye:

Right Eye:

Hook: Transformations – Task 2



Coordinates of image (x, y)

Outline: (4,1), (4,8), (10,8), (10,1)

Mouth: (9,3), (9,2) (6,2)

Nose: (7,6), (8,4), (7,4)

Left Eye: (5,6), (6,6), (6,7)

Right Eye: (8,6), (8,7), (9,7), (9,6)

In your team, for each order pair provided on the left, transform the face by applying the following rule to each point

$x' = -y$

$y' = -x$

Coordinates of new image (x', y')

Outline:

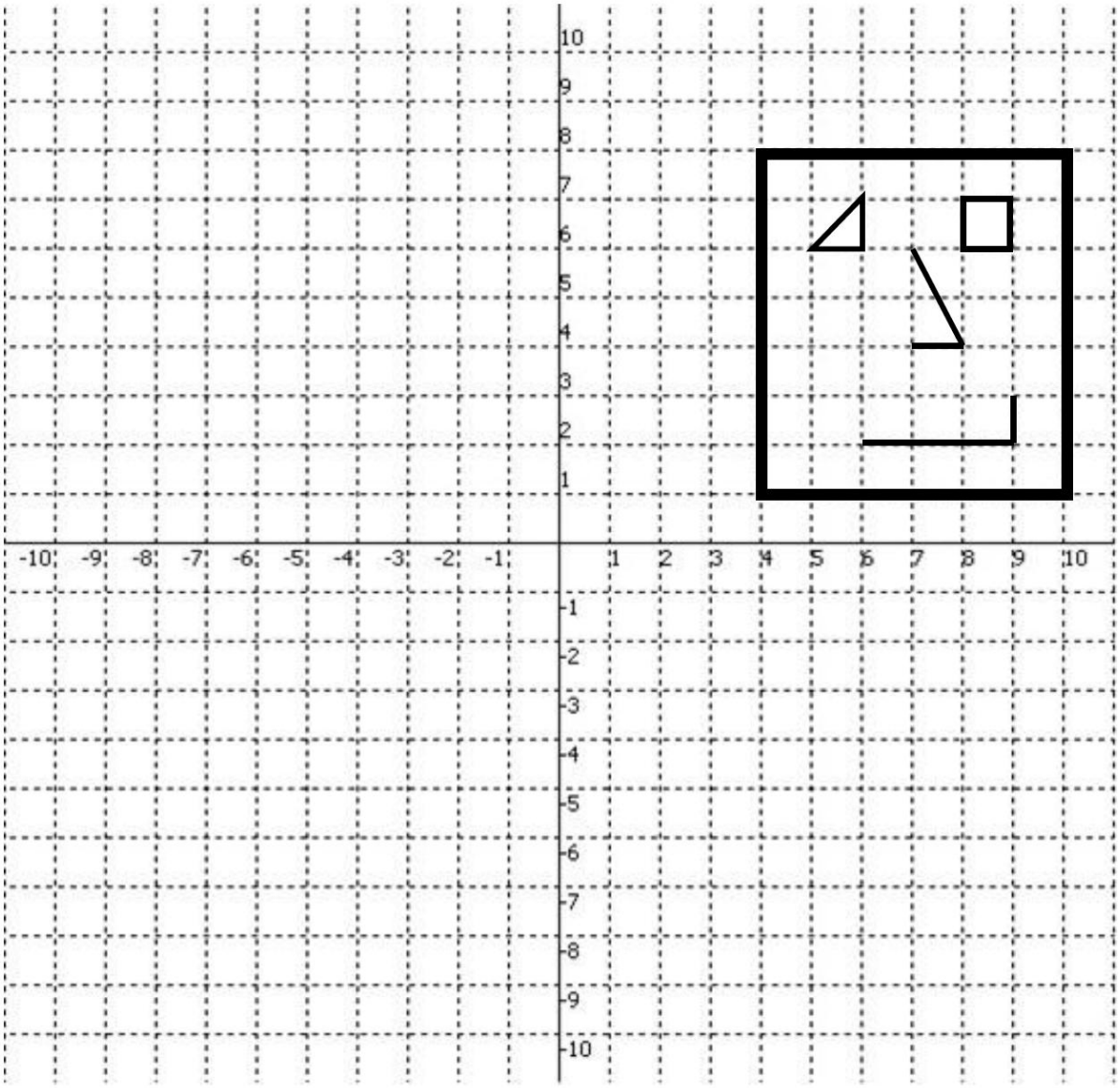
Mouth:

Nose:

Left Eye:

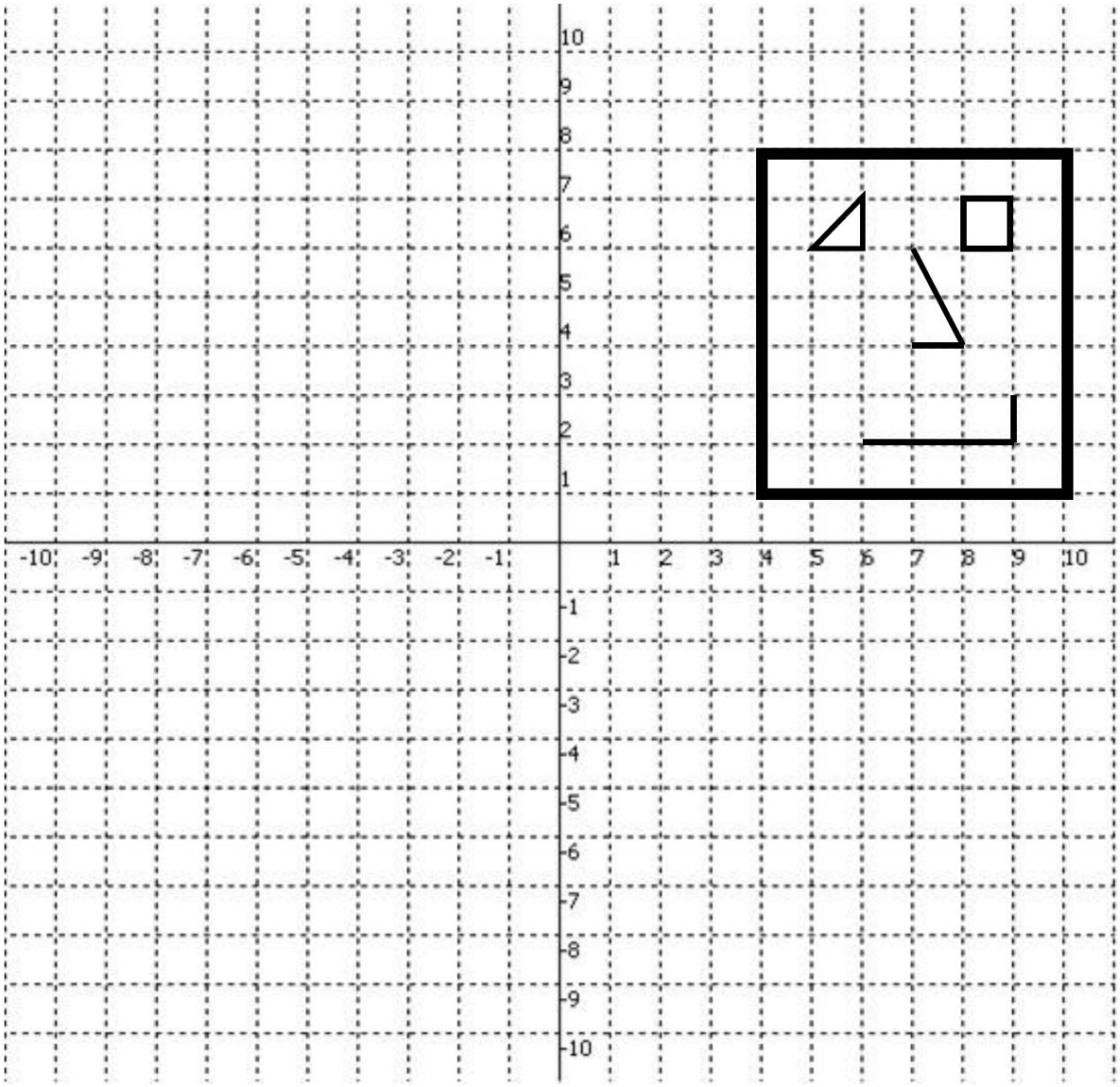
Right Eye:

Hook: Transformations – Task 3



Coordinates of image (x, y)	In your team, for each order pair provided on the left, transform the face by applying the following rule to each point $x' = y$ $y' = -x$	Coordinates of new image (x', y')
Outline: (4,1), (4,8), (10,8), (10,1)		Outline:
Mouth: (9,3), (9,2) (6,2)		Mouth:
Nose: (7,6), (8,4), (7,4)		Nose:
Left Eye: (5,6), (6,6), (6,7)		Left Eye:
Right Eye: (8,6), (8,7), (9,7), (9,6)		Right Eye:

Hook: Transformations – Task 4



Coordinates of image (x, y)

Outline: (4,1), (4,8), (10,8), (10,1)

Mouth: (9,3), (9,2) (6,2)

Nose: (7,6), (8,4), (7,4)

Left Eye: (5,6), (6,6), (6,7)

Right Eye: (8,6), (8,7), (9,7), (9,6)

In your team, for each order pair provided on the left, transform the face by applying the following rule to each point

$x' = x-7$

$y' = y+2$

Coordinates of new image (x', y')

Outline:

Mouth:

Nose:

Left Eye:

Right Eye:

Hook: Transformations – Base Group – Part 2

In your team, answer each of the following questions using the information you've learned from the Experts in your Base Group. Your answer should include all Experts' answers.

Describe your transformation rule: _____

_____
_____
_____
_____
_____
_____

Compare the original face with the new face (its image): _____

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Summarize how your face has changed in complete sentences: _____

_____
_____
_____
_____
_____

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SAUSD Common Core Lesson Planner Mathematics **Teacher:_____**

Unit: G1 **Lesson:** **G1-FA**	**Grade Level/Course:** Geometry	**Duration: Day 1 of 1 (50 Min.) Lesson** **Date:**
Common Core and Content Standards	**Concept 1:** **Experiment with transformations in the plane** **G.CO.2 –** Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as function that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch). **G.CO.5 –** Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another. **G.CO.3 –** Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself. **G-CO 1 –** Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.	
Materials/ Resources/ Lesson Preparation	Formative Assessment	
Objectives	**Content:** Students are provided the opportunity to learn and be an expert in Reflection, Rotation, and Translation of Rigid Motions.	**Language:** Students are to communicate orally and in written format to learn, explain, and become an expert.
Depth of Knowledge Level	☒**Level 1: Recall** ☒**Level 2: Skill/Concept** ☒ **Level 3: Strategic Thinking** ☒ **Level 4: Extended Thinking**	
Standards for Mathematical Practice	☐ **1. Make sense of problems and persevere in solving them.** ☐ **2. Reason abstractly and quantitatively.** ☒ **3. Construct viable arguments and critique the reasoning of others.** ☐ **4. Model with mathematics.** ☒ **5. Use appropriate tools strategically** ☒ **6. Attend to precision.** ☐ **7. Look for and make use of structure.** ☒ **8. Look for and express regularity in repeated reasoning.**	
Common Core Instructional Shifts in Mathematics	☒ **Focus on the Standards** ☒ **Coherence within and across grade levels** ☒ **Rigor (Balance of conceptual understanding, procedural skill & fluency, and application of skills)**	

Academic Vocabulary (Tier II & Tier III)	**PROVIDES TEACHER SIMPLE EXPLANATION**	**KEY WORDS ESSENTIAL TO UNDERSTANDING**	**WORDS WORTH KNOWING**
			Flip Turn Move Slide
	STUDENTS FIGURE OUT THE MEANING		
Pre-teaching Considerations			

Lesson Delivery

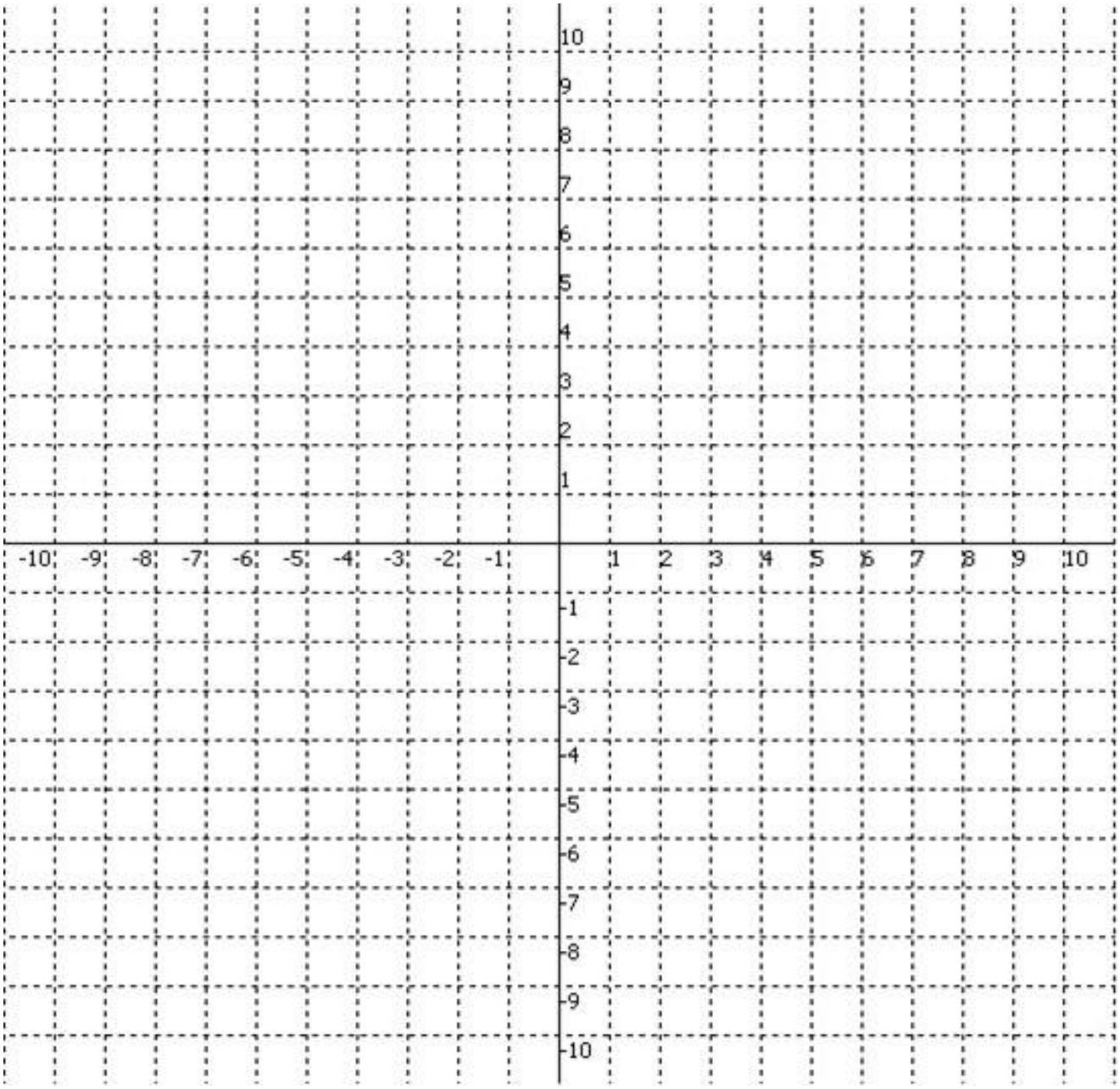
Instructional Methods	**Check method(s) used in the lesson:** ☐ **Modeling** ☐ **Guided Practice** ☒ **Collaboration** ☒ **Independent Practice** ☐ **Guided Inquiry** ☒ **Reflection**	
	Prior Knowledge, Context, and Motivation:	
Body of the Lesson: Activities/ Questioning/ Tasks/ Strategies/ Technology/ Engagement	**Lesson Overview** **Teacher:** May have students work either individually or in pairs on this Formative Assessment. The assessment will help teacher and students identify the area of weakness and to pick the correct lesson to differentiate. Use the Jig Saw activity below to help students become experts in all Rigid Motions. Students will be differentiated in different groups to learn either Reflection, Rotation, or Translation. Once students are assigned to the appropriate group, perform the appropriate lessons provided (G1-1-1 Reflection, G1-1-2 Rotation, and/or G1-1-3 Translation).	**Differentiated Instruction:** -Identify students' area of weakness to assign the appropriate lesson(s): Reflection, Rotation, or Translation. **English Learners:** -Think-Write-Pair-Share -Multiple opportunities to speak -cooperative groups **Students Who Need Additional Support:** -Think-Write-Pair-Share -Multiple opportunities to speak -cooperative groups **Accelerated Learners:**

Lesson Reflection

Teacher Reflection Evidenced by Student Learning/ Outcomes	

Lesson Continuum

What will it be?



Directions: Plot the point (0,2), then create new points according to the following transformations. You must go in order, otherwise your picture will not come out correct. Connect the points **after** you have plotted every transformation according to the order given to the right of the table.

Transformation	New Coordinate
1. Translate up 5 and right 3	(,)
2. Reflect over the y-axis	(,)
3. Translate down 10	(,)
4. Reflect over x-axis	(,)
5. Rotate 180°	(,)
6. Reflect over x-axis	(,)
7. Translate (x-2,y-1)	(,)
8. Reflect over y-axis	(,)
9. Translate (x+4,y-1)	(,)
10. Reflect over y-axis	(,)
11. Translate left 1 and down 2	(,)
12. Rotate 90° counterclockwise	(,)
13. Translate up 3 and right 3	(,)
14. Rotate 90° clockwise	(,)
15. Translate (x+1,y+6)	(,)

Connect the coordinates in this order:

1, 6, 7, 9, 13, 5, 12, 14,3, 11, 10, 8, 4, 2, 15

Extra points for _____

(-2,1), (-1,1), (-1, 0)

Extra points for _____

(2,1), (1,1), (1, 0)

Extra points for _____

(-1,-1), (1,-1), (0, -2)

Extra points for _____

(-3,-2), (-2,-3), (-1, -3), (0,-2), (1,-3), (2,-3), (3,-2)

SAUSD Common Core Lesson Planner Mathematics Teacher:_____

<table>
<tr><td>Unit: G1
Lesson:
G1-1-1A</td><td colspan="2">Grade Level/Course:
Geometry</td><td>Duration: <u>Day 1 of 3 of (50 min.) Lesson</u>
Date:</td></tr>
<tr><td>Common Core and Content Standards</td><td colspan="3">G.CO.6 Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure.
Unpacked - Focus: Use descriptions of Reflections to predict the effects rigid motion has on figures in the coordinate plane.</td></tr>
<tr><td>Materials/ Resources/ Lesson Preparation</td><td colspan="3">Patty Paper (Tracing Paper)
Straightedge
Markers and Construction Paper
Student Handouts
Checklist and Three Step Interview Activity directions posted on the Whiteboard</td></tr>
<tr><td>Objectives</td><td colspan="2">Content:
Students will be able to develop their own understanding of Reflections as how:
• It is one type of transformation
• Has its own distinct characteristics
• It impacts rigid figures</td><td>Language:
Students will be able to justify their own understanding of Reflections as how:
• It is one type of transformation
• Has its own distinct characteristics
• It impacts rigid figures</td></tr>
<tr><td>Depth of Knowledge Level</td><td colspan="3">☐ Level 1: Recall ☒ Level 2: Skill/Concept
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☒ 3. Construct viable arguments and critique the reasoning of others.
☒ 4. Model with mathematics.
☐ 5. Use appropriate tools strategically
☒ 6. Attend to precision.
☒ 7. Look for and make use of structure.
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New Image
A prime
A double-prime
A triple-prime</td><td>Symmetry (Fold line)
Coordinates</td></tr>
<tr><td>STUDENTS FIGURE OUT THE MEANING</td><td>Reflections</td><td></td></tr>
</table>

Pre-teaching Considerations	This lesson requires students to be able to communicate their understanding and findings with peers.

Lesson Delivery

Instructional Methods	**Check method(s) used in the lesson:** ☒ **Modeling** ☐ **Guided Practice** ☒ **Collaboration** ☐ **Independent Practice** ☐ **Guided Inquiry** ☒ **Reflection**
	Prior Knowledge, Context, and Motivation: **Prior Knowledge:** Students know how to name quadrilaterals, triangles, and polygons by their vertices **Context:** Students are to derive their own definition for reflections and to demonstrate its effect on rigid figures **Motivation:** Students are able to analyze that reflections: a) are one type of transformations, b) have distinct characteristics, and c) have no effect on the size and shape of rigid figures

Lesson Continuum

Body of the Lesson:
Activities/ Questioning/ Tasks/ Strategies/ Technology/ Engagement

Lesson Overview
All explorations are collaborative in nature:

Exploration of Reflection Student Handout

Teacher: While students are working in groups, teacher should serve as a facilitator, walking from group to group to provide clarification.
Student: Work in groups of 2 - 4 (see structure outlined below) to respond to the questions provided. The goal is for students to develop their own meaningful understanding s of the topic being explored.

Structure: **Option 1 – Assign Group Roles:**
Roles may be teacher-assigned, randomly assigned or self-selected and adjusted as necessary.

- **Recorder** – serves as the Secretary who records the thoughts and hypotheses of group members; ensures all members contribute to the discussion (including self)
- **Reader/Interpreter** – Reads the question and interprets what the group is asked to do for each question; determines and defines key vocabulary for all members; and ensures every team member has the same understanding
- **Sergeant of Arms** – Serves as norm monitor and quality control; keeps each team member on task; ensures task is completed on a timely manner; and monitors time to ensure the team has ample time to answer all assigned questions
- **Supply General** – Obtains supplies for each team member; leads the team to action; and empowers, monitors and maintains responsibilities of each member

Structure: **Option 2 – Pair-share/Dyad to Group of 4**

- **Students work as elbow partners** to ensure all members contribute to the discussion; have ample time to develop meaningful conjectures, and can clarify key vocabulary for one another
- Once each pair has come to an agreement on their findings**, they then share/compare their conjectures with other members in their group of 4 or more**
- **If pairs disagree on their findings,** further discussion must take place

Differentiated Instruction:

English Learners:

Students Who Need Additional Support:

Provide vocabulary cards with simple definitions for academic vocabulary.

Project or provide handout to group of role names and descriptions for Option 1.

Teacher, paraprofessional or student study buddy read aloud the questions on Exploration of Reflections handout as needed.

Accelerated Learners:

to finalize all conjectures
- **Provides ample validation of ideas**

Day 1:

20 Minutes:

- **Independent Group Effort: Collaboration**
- **Mathematical Practice(s) Being Monitored:**
  3 Construct viable arguments and critique the reasoning of others
  5 Use appropriate tools strategically

Teacher: Have students form collaborative groups (Option 1 or 2). Students use **Patty Paper** (tracing paper) and **Straightedge** to trace the figures as they follow the journey from Figure A to Figure A triple-prime (situation #1 – 3) and to respond to the questions provided. Teacher should also clarify that student responses must incorporate key transformation vocabulary (Reflection, Fold Line) to describe each rigid movement as it applies.

Note: The purpose of the tracing paper is to reinforce:
- Reflections do not affect size and shape
- Students will have to physically "flip" the figure in order to match it up with A′
- The paper may be folded on the "Fold Line" to create the New Image, if necessary

Students will naturally discover this purpose as they complete the activities.

Checklist:

The **Suggestion Checklist** should be posted on the whiteboard to serve as a written reminder. Such items for the checklist should include:
- Did you include key transformation vocabulary (Reflection, Fold Line) when and if it applies?
- Did you include size and shape in your description of the journey?
- Did you include lengths of sides and angle measure in your description of the journey?
- Are your responses full complete sentences?

Students: Students may be seated in groups of 4, but for situations #1 – 4, it is preferable to work first with an elbow partner/dyad to form conjectures about dilated figures. Students should read the suggestion checklist to ensure thorough responses.

20 Minutes:

- **Independent Group Effort: Collaboration**
- **Mathematical Practice(s) Being Monitored:**
  3 Construct viable arguments and critique the reasoning of others

Teacher: Introduce question #5 with the following statements:
- "Each diagram in #1 – 3 are examples of Reflections or Reflected Figures. For #5 let's see if you can develop your own definition of what these terms mean."
- "This time, I want you to work independently. In a few minutes, you'll have a chance to share your responses with your partner."
- "Be sure to refer to the checklist posted on the whiteboard."

Students: Work independently on #5.

	Quick-write with a Three-Step Interview Activity to respond to question #5**:** **Teacher:** Introduce the Quick-write with a Three-Step Interview Activity directions with the following statements: • "Now that you have your definition, work with your elbow partner to see how your statements compare." • "This activity is called a **Three –Step Interview Activity** (directions should be posted on the whiteboard)" • Teacher reviews the directions to ensure complete understanding: • **Step 1 -** Student A asks Student B the question. Student B responds. Student A must listen carefully because s/he will have to repeat it to the table group. **Step 2 -** Student B now asks Student A the question. Student A responds. Student B must listen carefully because s/he will have to repeat it to the table group. **Step 3** – Share, in a round robin format at the table group, the partners' response to the quick-write. **Students:** Follow as directed. **10 Minutes: Closure** • **Mathematical Practice(s) Being Monitored:** 3 Construct viable arguments and critique the reasoning of others 6 Attend to precision 8 Look for and express regularity in repeated reasoning **Teacher:** Reminds students to compare each student's responses with each other and against the posted checklist to finalize one group response. Next direct students to use a marker to write their formal definition on construction paper. **Students:** Compare the various responses (with each other and against the checklist) to decide if changes need to be made. If so, students should amend their personal responses. When all students have come to an agreement, a formal group definition should be written on the construction paper.	
Lesson Reflection		
Teacher Reflection Evidenced by Student Learning/ Outcomes		

SAUSD Common Core Lesson Planner Mathematics Teacher:_____

Unit: G1 **Lesson:** **G1-1-1B**	**Grade Level/Course:** Geometry	**Duration: <u>Part 2 of 3 (50 min.) Lesson</u>** **Date:**
Common Core and Content Standards	**Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure.** **Unpacked - Focus:** Use descriptions of Reflections to predict the effects rigid motion has on figures in the coordinate plane	
Materials/ Resources/ Lesson Preparation	Patty Paper (Tracing Paper) Straightedge Student Handouts Text/Workbook Checklist and Reading Comprehension Directions	
Objectives	**Content:** Students will be able to develop their own understanding of Reflections as how: • It is one type of transformation • Has its own distinct characteristics • It impacts rigid figures	**Language:** Students will be able to justify their own understanding of Reflections as how: • It is one type of transformation • Has its own distinct characteristics • It impacts rigid figures
Depth of Knowledge Level	☐ **Level 1: Recall** ☒ **Level 2: Skill/Concept** ☒ **Level 3: Strategic Thinking** ☐ **Level 4: Extended Thinking**	
Standards for Mathematical Practice	☒ **1. Make sense of problems and persevere in solving them.** ☒ **2. Reason abstractly and quantitatively.** ☒ **3. Construct viable arguments and critique the reasoning of others.** ☒ **4. Model with mathematics.** ☐ **5. Use appropriate tools strategically** ☒ **6. Attend to precision.** ☒ **7. Look for and make use of structure.** ☒ **8. Look for and express regularity in repeated reasoning.**	
Common Core Instructional Shifts in Mathematics	☒ **Focus on the Standards** ☒ **Coherence within and across grade levels** ☒ **Rigor (Balance of conceptual understanding, procedural skill & fluency, and application of skills)**	
Academic Vocabulary (Tier II & Tier III) **PROVIDES TEACHER SIMPLE EXPLANATION**	**KEY WORDS ESSENTIAL TO UNDERSTANDING**	**WORDS WORTH KNOWING**
	Transform New Image A prime A double-prime A triple-prime	Symmetry (Fold line) Coordinates Vertices

	STUDENTS FIGURE OUT THE MEANING	Reflections Line of Reflection	Perpendicular Bisector
Pre-teaching Considerations		This lesson requires students to be able to communicate their understanding and findings with peers.	

Lesson Delivery

Instructional Methods	**Check method(s) used in the lesson:** ☒ **Modeling** ☐ **Guided Practice** ☒ **Collaboration** ☐ **Independent Practice** ☐ **Guided Inquiry** ☒ **Reflection**
	Prior Knowledge, Context, and Motivation: **Prior Knowledge:** Students know how to name quadrilaterals, triangles, and polygons by their vertices **Context:** Students are to derive their own definition for reflections and to demonstrate its effect on rigid figures **Motivation:** Students are able to analyze that reflections: a) are one type of transformations, b) have distinct characteristics, and c) have no effect on the size and shape of rigid figures

Lesson Continuum

Body of the Lesson: Activities/ Questioning/ Tasks/ Strategies/ Technology/ Engagement

Lesson Overview
All explorations are collaborative in nature:

Reflection Student Handout

Teacher: While students are working in groups, teacher should serve as a facilitator, walking from group to group to provide clarification.
Student: Work in groups of 2 - 4 (see structure outlined below) to respond to the questions provided. The goal is for students to develop their own meaningful understanding s of the topic being explored.

Structure: **Option 1 – Assign Group Roles:**
Roles may be teacher-assigned, randomly assigned or self-selected and adjusted as necessary.

- **Recorder** – serves as the Secretary who records the thoughts and hypotheses of group members; ensures all members contribute to the discussion (including self)
- **Reader/Interpreter** – Reads the question and interprets what the group is asked to do for each question; determines and defines key vocabulary for all members; and ensures every team member has the same understanding
- **Sergeant of Arms** – Serves as norm monitor and quality control; keeps each team member on task; ensures task is completed on a timely manner; and monitors time to ensure the team has ample time to answer all assigned questions
- **Supply General** – Obtains supplies for each team member; leads the team to action; and empowers, monitors and maintains responsibilities of each member

Structure: **Option 2 – Pair-share/Dyad to Group of 4**

- **Students work as elbow partners** to ensure all members contribute to the discussion; have ample time to develop meaningful conjectures, and

Differentiated Instruction:

English Learners:

Students Who Need Additional Support:

Provide vocabulary cards with simple definitions for academic vocabulary.

For Gallery Walk, provide handout or project on board the prompts for student tasks.

For Decoding the Definition, display sentence frames or give handouts.

Accelerated Learners:

can clarify key vocabulary for one another

- Once each pair has come to an agreement on their findings**, they then share/compare their conjectures with other members in their group of 4 or more**
- **If pairs disagree on their findings,** further discussion must take place to finalize all conjectures
- **Provides ample validation of ideas**

Day 2:

10 Minutes – Gallery Walk

- **Independent Group Effort: Collaboration**
- **Mathematical Practice(s) Being Monitored:**
  3 Construct viable arguments and critique the reasoning of others

Teacher: Direct students to post group definition posters about the room in preparation for a Gallery Walk. (See the structure posted below).
Students: Follow as directed to evaluate and develop the class definition of Reflections.

Gallery Walk Structure:

- Each group will display their poster
- Each group selects a group member to be the docent to answer questions or provide clarifications/explanations
- The other group members examines, explores, reviews the other groups' posters
- There will be time for each group to re-assemble and discuss the information shared in the groups' posters
- Please remind gallery walk norms and be respectful of the work and information shared.

Teacher: Please assign tasks for the rest of the team to pay attention to while performing the walk. Assign a purpose for each observant. Prompts: Student 1: What is a method that is found common across teams? Student 2: What is a unique method that is very different from the rest of the team? Student 3: Pick one method/poster that gives a different answer from yours. Evaluate that method in comparison to yours.

10 Minutes – Textbook Definition Comparison

- **Independent Group Effort: Collaboration**
- **Mathematical Practice(s) Being Monitored:**
  6 Attend to Precision

Teacher: Direct students to copy the textbook definition and mathematical formula in the space provided on handout. (see Holt text, page 825; Holt Review for Mastery Workbook, page 151)
Students: Follow as directed (#6) to validate the class definition and to obtain an even more precise definition of Reflections.

20 Minutes – Decoding the Definition

- **Independent Group Effort: Reading Comprehension and Collaboration**
- **Mathematical Practice(s) Being Monitored:**
  1 Make sense of problems and persevere in solving them

	Teacher: Have students decipher the textbook definition of Reflections using the process provided below. **Students:** In groups of 4, student 1 reads out loud while the rest of the team is following along. Student 2 is to state the key vocabulary of the definition. Student 3 is to draw meaning to the definition. Student 4 is to state the main idea. All students note their understanding of the main idea in Question #7. **Teacher:** Provide the following sentence frames to assist students: • I think this definition means _____. • A new vocabulary word _____was used. I think it means _____. • My definition was correct because _____. • This definition introduces new information _____. **Students:** May work first in dyads to share ideas, then to table groups to reinforce understandings. **Teacher:** Reinforce Reflections by calling on group representatives to present one sentence frame. Record their ideas on the whiteboard. Repeat the process until all sentence frames are utilized. **Students:** Amend their personal responses to incorporate all understandings. **10 Minutes: Application Activity** • **Independent Group Effort: Collaboration** • **Mathematical Practice(s) Being Monitored:** 2 Reason Abstractly and Quantitatively 4 Modeling with Mathematics 7 Look for and make use of Structure **Teacher:** Have students solidify their understanding by completing #8. Remind students to **include the Line of Reflection/Perpendicular Bisector of imaginary segments linking the image with the pre-image** (to reinforce the formal definition). Students may also refer to the text or workbook for examples and/or similar models. **Students:** Create their own Dilated Figures by naming and applying the appropriate scale factor. Students may work in dyads to share and confirm ideas.	
Lesson Reflection		
Teacher Reflection Evidenced by Student Learning/ Outcomes		

SAUSD Common Core Lesson Planner Mathematics Teacher:_____

<table>
<tr><td>Unit: G1
Lesson:
G1-1-1C</td><td>Grade Level/Course:
Geometry</td><td colspan="2">Duration: <u>Day 3 of 3 (50 min.) Lesson</u>
Date:</td></tr>
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Straightedge
Student Handouts
Text/Workbook as reference
Checklist as reference</td></tr>
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• Has its own distinct characteristics
• It impacts rigid figures</td><td>Language:
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A double-prime
A triple-prime, etc.</td><td>Symmetry (Fold line)
Coordinates
Vertices</td></tr>
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	STUDENTS FIGURE OUT THE MEANING	Reflections Line of Reflection	Perpendicular Bisector
Pre-teaching Considerations		This lesson requires students to be able to communicate their understanding and findings with peers.	

Lesson Delivery

Instructional Methods

Check method(s) used in the lesson:

☒ **Modeling** ☐ **Guided Practice** ☒ **Collaboration**

☐ **Independent Practice** ☒ **Guided Inquiry** ☒ **Reflection**

Prior Knowledge, Context, and Motivation:

Prior Knowledge: Students know how to name quadrilaterals, triangles, and polygons by their vertices

Context: Students apply their own understanding of reflections to accurately create and define new reflected images.

Motivation: Students are able to analyze that reflections: a) are one type of transformations, b) have distinct characteristics, and c) have no effect on the size and shape of rigid figures

Lesson Continuum

Body of the Lesson:
Activities/ Questioning/ Tasks/ Strategies/ Technology/ Engagement

Lesson Overview
All explorations are collaborative in nature:

Strengthening Reflections

Teacher: While students are working in groups, teacher should serve as a facilitator, walking from group to group to provide clarification.
Student: Work in groups of 2 - 4 (see structure outlined below) to respond to the questions provided. The goal is for students to develop their own meaningful understanding s of the topic being explored.

Structure: **Option 1 – Assign Group Roles:**
Roles may be teacher-assigned, randomly assigned or self-selected and adjusted as necessary.

- **Recorder** – serves as the Secretary who records the thoughts and hypotheses of group members; ensures all members contribute to the discussion (including self)
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- **Supply General** – Obtains supplies for each team member; leads the team to action; and empowers, monitors and maintains responsibilities of each member

Structure: **Option 2 – Pair-share/Dyad to Group of 4**

- **Students work as elbow partners** to ensure all members contribute to

Differentiated Instruction:

English Learners:

Students Who Need Additional Support:

Provide vocabulary cards with simple definitions for academic vocabulary and symbols if applicable.

For # 7-8, scaffolding questions might include: "When you are reflecting over y=x, what do you think you should do first?" or "Do you remember what y=x looks like and how to put that on the graph?" "How about y=-x? What can you do to help yourself remember what that looks like?" (possible response: make a t-chart and graph the points)

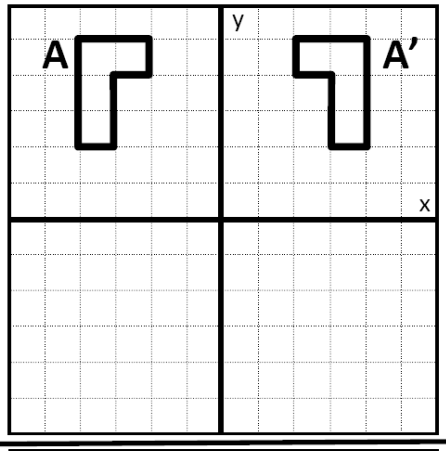
	the discussion; have ample time to develop meaningful conjectures, and can clarify key vocabulary for one another • Once each pair has come to an agreement on their findings**, they then share/compare their conjectures with other members in their group of 4 or more** • **If pairs disagree on their findings,** further discussion must take place to finalize all conjectures • **Provides ample validation of ideas** **Day 3:** **40 Minutes – Collaborative Group Work** • **Independent Group Effort: Reading Comprehension and Collaboration** • **Mathematical Practice(s) Being Monitored:** 5 Use appropriate tools strategically 6 Attend to precision **Teacher:** Have students work in groups of 2-4 students (see Option 1 or 2). Direct students to use Patty Paper and Straightedge to complete the Reflection Activity. Remind them to refer to the text/workbook definition and previous work. Teacher monitors and facilitates group activity. To introduce the activity, teacher states: • "We have spent the last two days exploring Reflections or Reflected Figures. Now, let's apply what we have learned with today's activity." • "Let's take a look at #1 to make sure everyone has a clear understanding." **Guided Inquiry: Teacher provides verbal directions while students lead each other to solve each problem.** • "Using your Patty Paper and Straightedge, trace Figure ABC." [Pause for students to trace figure] • "Given the y-axis as the **Line of Reflection**, reflect your Patty Paper figure." [Silently check to see if students are correctly flipping the paper] • "Be sure to connect the vertices between the New Image and its Pre-Image to verify accuracy." [Silently check for accuracy – remind students, if necessary, that the Line of Reflection is the Perpendicular Bisector of the segments that connect the vertices of the two figures] • "Finally, name the coordinates of your New Image. How do we name these new vertices?" [Do a quick check or random call to obtain A prime notation] • "In the spaces provided, name the coordinates of your New Image."[Select three groups to name one vertex to allow students to check their work] • "Now let's proceed. For each problem, you need to re-create the New Image from the previous problem. For #2, first you need to draw A′ from #1, then you need to reflect it." • "Remember to use your **math tools** (hold up **Patty Paper** and **Straightedge**), **Checklist** (point to the Whiteboard) and **Text/Workbook** to provide hints and to draw your figures with precision." Assign problems #1 – 4 and direct students to do the student activity presented below.	**Accelerated Learners:**

	Students: Complete each problem, manipulating the Patty Paper to strategize with a partner/group the most appropriate placement and solution. • Work initially on problems #1 – 4 in dyads. • Next, have students share their responses with their entire table group • When consensus is formed, verify answers with another group to validate understanding. If differences result, students must convince the other group who is correct and amend all erroneous responses. • Next, complete #5 – 8. • Repeat student verification if time allows. **5 – 10 Minutes: Strengthening Reflections/Frayer Model** • **Closure:** Essential Understanding of this Lesson. • **Mathematical Practice(s) Being Monitored:** 7 Look for and make use of structure 8 Look for and express regularity in repeated reasoning **Teacher:** Have students complete Quadrant II of the Frayer Model. Be sure to remind students to view the Checklist posted on the Whiteboard to derive thorough answers. If time allows, they may also do quadrant I. **Students:** Complete activity independently, making sure they have met all criteria of the Checklist. **Note: This activity may be used as an on-going Formative Assessment (each day completing the remaining quadrants) or reserved as a comparison (particularly Quadrant 4) following Rotations and Translations.**	
Lesson Reflection		
Teacher Reflection Evidenced by Student Learning/ Outcomes		

Exploration of Reflections Name _____Period ___

For each pairs of figures, compare the figures A and A', where A' is the new image of A.
Denote: A' is read as "A prime"; A'' is read as "A double-prime".

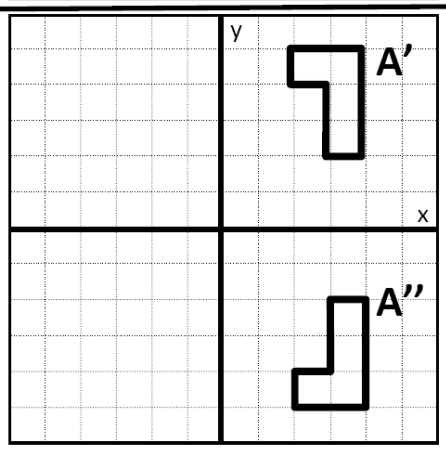
1



a) Describe how A is transformed to A'. (Explain how to move A to A'.)

b) How are the key features of the shape of figure A alike or different from figure A'?

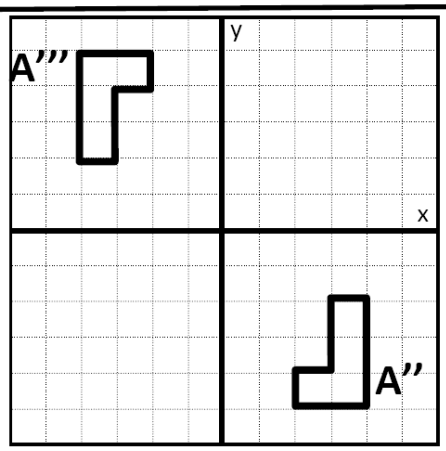
2



a) Describe how A' is transformed to A''.

b) How are the key features of the shape of figure A alike or different from figure A'?

3



a) Describe how A'' is transformed to A'''.

b) How are the key features of the shapes of figure A, A', A'', and A''' all alike or different from each other?

4

Describe the relationship between Figures A and A'''. Describe the journey of how Figure A is transformed to Figure A''' during the three steps above.

5

In your own words, describe your understanding of reflection or reflected figures.

6

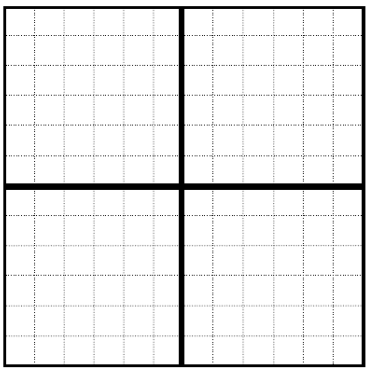
Formal Definition:

7

Evaluate your definition above in 5 in comparison to the formal definition in 6. What are the similarities and differences between the two definitions?

8

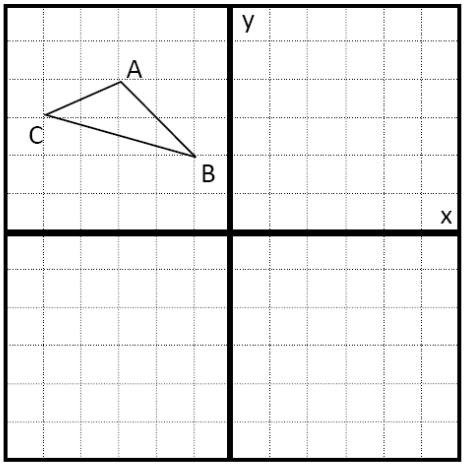
Draw your own figure and reflect it. Describe the reflection.



Reflections

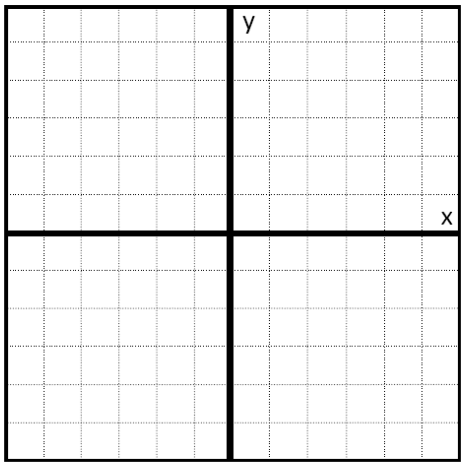
Name _____ Period _____

1) Reflect triangle A about the y-axis to create triangle A'. What are the coordinates of A'?



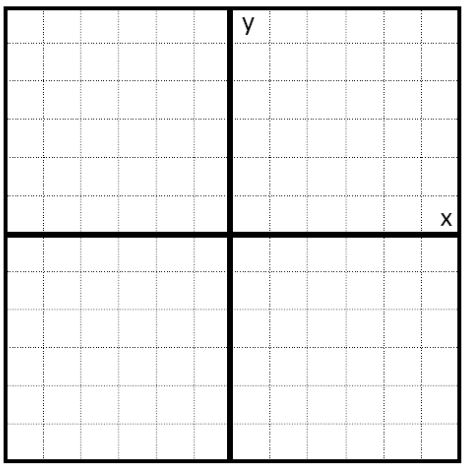
_____, _____, _____,

2) Draw A' (from #1) on the grid below and then reflect it about the x-axis to create triangle A''. What are the coordinates of A''?



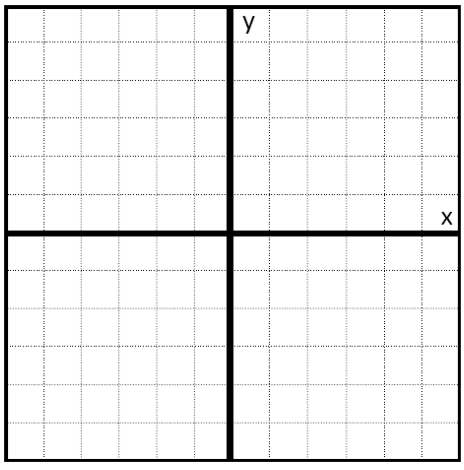
_____, _____, _____,

3) Reflect A'' about x = 1 to create triangle A'''. What are the coordinates of A'''?



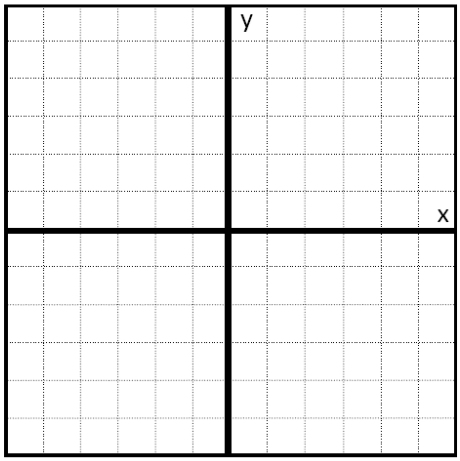
_____, _____, _____,

4) Reflect A''' about y = 1 to create triangle A''''. What are the coordinates of A''''?



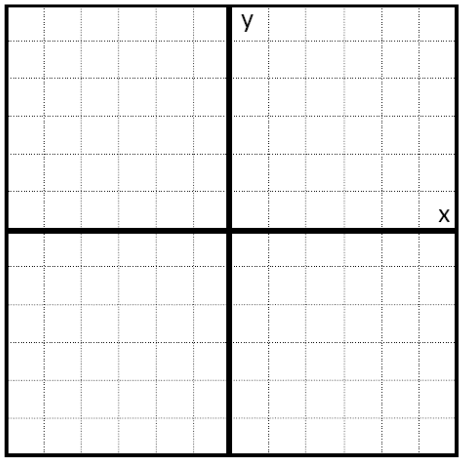
_____, _____, _____,

5) Reflect A’’’’ about x = -3 to create triangle A’’’’’. What are the coordinates of A’’’’’?



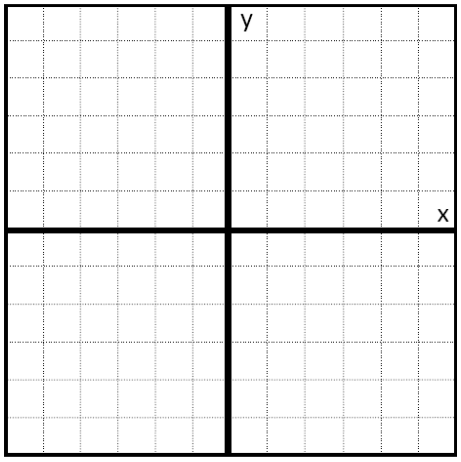
_____, _____, _____,

6) Reflect A’’’’’ about y = -2 to create triangle A’’’’’’. What are the coordinates of A’’’’’’?



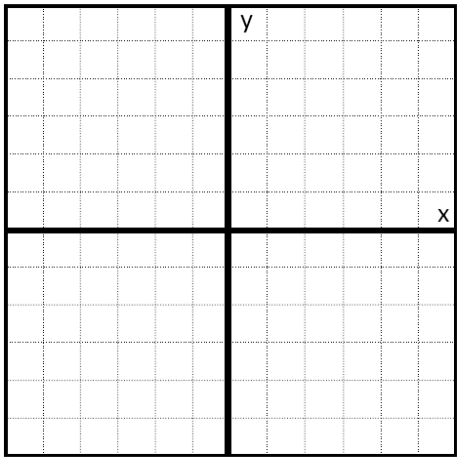
_____, _____, _____,

7) Reflect A’’’’’’ about y = x to create triangle A’’’’’’’. What are the coordinates of A’’’’’’’?



_____, _____, _____,

8) Reflect A’’’’’’’ about y = -x to create triangle A’’’’’’’’. What are the coordinates of A’’’’’’’’?



_____, _____, _____,

Strengthening Reflections Name _____Period _____

Definition in your own words

Facts/ Characteristics
(Symbols, representations, traits)

Reflection

Examples
(What does it look like? – model, Illustration, diagram)

Non-Examples
(What does it look like?)

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SAUSD Common Core Lesson Planner Mathematics Teacher:_____

<table>
<tr><td>Unit: G1
Lesson:
G1-1-2A</td><td colspan="2">Grade Level/Course:
Geometry</td><td>Duration: <u>Day 1 of 3 (50 min.) Lesson</u>
Date:</td></tr>
<tr><td>Common Core and Content Standards</td><td colspan="3">Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure.
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<tr><td rowspan="3">Academic Vocabulary (Tier II & Tier III)</td><td>PROVIDES TEACHER SIMPLE EXPLANATION</td><td>KEY WORDS ESSENTIAL TO UNDERSTANDING</td><td>WORDS WORTH KNOWING</td></tr>
<tr><td></td><td>Transform
New Image
A prime
A double-prime
A triple-prime</td><td>Point of Reference
Coordinates
Degrees
Origin</td></tr>
<tr><td>STUDENTS FIGURE OUT THE MEANING</td><td>Rotations
Clockwise
Counter Clockwise</td><td></td></tr>
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Pre-teaching Considerations	This lesson requires students to be able to communicate their understanding and findings with peers.

Lesson Delivery

Instructional Methods	**Check method(s) used in the lesson:** ☒ **Modeling** ☐ **Guided Practice** ☒ **Collaboration** ☐ **Independent Practice** ☐ **Guided Inquiry** ☒ **Reflection**
	Prior Knowledge, Context, and Motivation: **Prior Knowledge:** Students know how to name quadrilaterals, triangles, and polygons by their vertices **Context:** Students are to derive their own definition for rotations and to demonstrate its effect on rigid figures **Motivation:** Students are able to analyze that Rotations: a) are one type of transformations, b) have distinct characteristics, and c) have no effect on the size and shape of rigid figures

Lesson Continuum

Body of the Lesson:
Activities/ Questioning/ Tasks/ Strategies/ Technology/ Engagement

Lesson Overview

All explorations are collaborative in nature:

Exploration of Rotations Student Handout

Teacher: While students are working in groups, teacher should serve as a facilitator, walking from group to group to provide clarification.
Student: Work in groups of 2 - 4 (see structure outlined below) to respond to the questions provided. The goal is for students to develop their own meaningful understanding s of the topic being explored.

Structure: **Option 1 – Assign Group Roles:**
Roles may be teacher-assigned, randomly assigned or self-selected and adjusted as necessary.

- **Recorder** – serves as the Secretary who records the thoughts and hypotheses of group members; ensures all members contribute to the discussion (including self)
- **Reader/Interpreter** – Reads the question and interprets what the group is asked to do for each question; determines and defines key vocabulary for all members; and ensures every team member has the same understanding
- **Sergeant of Arms** – Serves as norm monitor and quality control; keeps each team member on task; ensures task is completed on a timely manner; and monitors time to ensure the team has ample time to answer all assigned questions
- **Supply General** – Obtains supplies for each team member; leads the team to action; and empowers, monitors and maintains responsibilities of each member

Structure: **Option 2 – Pair-share/Dyad to Group of 4**

- **Students work as elbow partners** to ensure all members contribute to the discussion; have ample time to develop meaningful conjectures, and can clarify key vocabulary for one another
- Once each pair has come to an agreement on their findings**, they then share/compare their conjectures with other members in their group of 4 or more**
- **If pairs disagree on their findings,** further discussion must take place

Differentiated Instruction:

English Learners:

Students Who Need Additional Support:

Provide vocabulary cards with simple definitions for academic vocabulary and symbols or diagram if applicable.

Project or provide handout to group of role names and descriptions for Option 1.

Teacher, paraprofessional or student study buddy read aloud the questions on Exploration of Rotations handout as needed.

Accelerated Learners:

to finalize all conjectures
- **Provides ample validation of ideas**

Day 1:

20 Minutes:

- **Independent Group Effort: Collaboration**
- **Mathematical Practice(s) Being Monitored:**
  3 Construct viable arguments and critique the reasoning of others
  5 Use appropriate tools strategically

Teacher: Have students form collaborative groups (Option 1 or 2). Students use Patty Paper (tracing paper) and straight-edge to trace the figures as they follow the journey from Figure A to Figure A triple-prime (situation #1 – 3) and to respond to the questions provided. **As students trace the figure A, have students also indicate the location of the origin**. **They may even find it helpful to connect corresponding vertices of each figure with the origin.** This will assist them to understand that Rotations involve a point of reference.

Note: The purpose of the tracing paper is to reinforce that:
- Rotations do not affect size and shape
- Students will have to physically rotate the figure in order to match it up with A′
- The Point of Reference serves as an "anchor" for the Rotation.

Students will naturally discover this purpose as they complete the activities.

Teacher should also clarify that student responses must incorporate key transformation vocabulary (Rotation, direction, point of reference) to describe each rigid movement as it applies.

Checklist:

The **Suggestion Checklist** should be posted on the whiteboard to serve as a written reminder. Such items for the checklist should include:
- Did you include key transformation vocabulary (Rotation, direction, point of reference) when and if it applies?
- Did you include size and shape in your description of the journey?
- Did you include lengths of sides and angle measure in your description of the journey?
- Are your responses full complete sentences?

Students: Students may be seated in groups of 4, but for situations #1 – 4, it is preferable to work first with an elbow partner/dyad to form conjectures about dilated figures. Students should read the suggestion checklist to ensure thorough responses.

20 Minutes:

- **Independent Group Effort: Collaboration**
- **Mathematical Practice(s) Being Monitored:**
  3 Construct viable arguments and critique the reasoning of others

Teacher: Introduce question #5 with the following statements:
- "Each diagram in #1 – 3 is an example of a Rotation or Rotated Figures. For #5 let's see if you can develop your own definition of what these terms mean."
- "This time, I want you to work independently. In a few minutes, you'll have a chance to share your responses with your partner."

	• "Be sure to refer to the checklist posted on the whiteboard." **Students:** Work independently on #5. **Quick-write with a Three-Step Interview Activity** to respond to question #5**:** **Teacher:** Introduce the Quick-write with a Three-Step Interview Activity directions with the following statements: • "Now that you have your definition, work with your elbow partner to see how your statements compare." • "This activity is called a **Three –Step Interview Activity** (directions should be posted on the whiteboard)" • Teacher reviews the directions to ensure complete understanding: • **Step 1 -** Student A asks Student B the question. Student B responds. Student A must listen carefully because s/he will have to repeat it to the table group. **Step 2** - Student B now asks Student A the question. Student A responds. Student B must listen carefully because s/he will have to repeat it to the table group. **Step 3** – Share, in a round robin format at the table group, the partners' response to the quick-write. **Students:** Follow as directed. **10 Minutes: Closure** • **Mathematical Practice(s) Being Monitored:** 3 Construct viable arguments and critique the reasoning of others 6 Attend to precision 8 Look for and express regularity in repeated reasoning **Teacher:** Reminds students to compare each student's responses with each other and against the posted checklist to finalize one group response. Next direct students to use a marker to write their formal definition on construction paper. **Students:** Compare the various responses (with each other and against the checklist) to decide if changes need to be made. If so, students should amend their personal responses. When all students have come to an agreement, a formal group definition should be written on the construction paper.	
Lesson Reflection		
Teacher Reflection Evidenced by Student Learning/ Outcomes		

SAUSD Common Core Lesson Planner Mathematics Teacher:_____

Unit: G1 **Lesson:** **G1-1-2B**	**Grade Level/Course:** Geometry	**Duration: Day 2 of 3 (50 min.) Lesson** **Date:**
Common Core and Content Standards	**Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure.** **Unpacked - Focus:** Use descriptions of Rotations to predict the effects rigid motion has on figures in the coordinate plane	
Materials/ Resources/ Lesson Preparation	Patty Paper (Tracing Paper) Straightedge Student Handouts Text/Workbook Checklist and Reading Comprehension Directions	
Objectives	**Content:** Students will be able to develop their own understanding of Rotations as how: • It is one type of transformation • Has its own distinct characteristics • It impacts rigid figures	**Language:** Students will be able to justify their own understanding of Rotations as how: • It is one type of transformation • Has its own distinct characteristics • It impacts rigid figures
Depth of Knowledge Level	☐ **Level 1: Recall** ☒ **Level 2: Skill/Concept** ☒ **Level 3: Strategic Thinking** ☐ **Level 4: Extended Thinking**	
Standards for Mathematical Practice	☒ **1. Make sense of problems and persevere in solving them.** ☒ **2. Reason abstractly and quantitatively.** ☒ **3. Construct viable arguments and critique the reasoning of others.** ☒ **4. Model with mathematics.** ☐ **5. Use appropriate tools strategically** ☒ **6. Attend to precision.** ☒ **7. Look for and make use of structure.** ☒ **8. Look for and express regularity in repeated reasoning.**	
Common Core Instructional Shifts in Mathematics	☒ **Focus on the Standards** ☒ **Coherence within and across grade levels** ☒ **Rigor (Balance of conceptual understanding, procedural skill & fluency, and application of skills)**	
Academic Vocabulary (Tier II & Tier III) **PROVIDES TEACHER SIMPLE EXPLANATION**	**KEY WORDS ESSENTIAL TO UNDERSTANDING**	**WORDS WORTH KNOWING**
	Transform New Image A prime A double-prime A triple-prime	Point of Reference Coordinates Degrees

	STUDENTS FIGURE OUT THE MEANING	Rotations Clockwise Counter-clockwise	Center of Rotation Angle of Rotation 90 degrees 180 degrees 270 degrees
Pre-teaching Considerations	This lesson requires students to be able to communicate their understanding and findings with peers.		

Lesson Delivery

Instructional Methods	**Check method(s) used in the lesson:** ☒ **Modeling** ☐ **Guided Practice** ☒ **Collaboration** ☐ **Independent Practice** ☐ **Guided Inquiry** ☒ **Reflection**
	Prior Knowledge, Context, and Motivation: **Prior Knowledge:** Students know how to name quadrilaterals, triangles, and polygons by their vertices **Context:** Students are to derive their own definition for rotations and to demonstrate its effect on rigid figures **Motivation:** Students are able to analyze that rotations: a) are one type of transformations, b) have distinct characteristics, and c) have no effect on the size and shape of rigid figures

Lesson Continuum

Body of the Lesson: Activities/ Questioning/ Tasks/ Strategies/ Technology/ Engagement

Lesson Overview
All explorations are collaborative in nature:

Rotations Student Handout

Teacher: While students are working in groups, teacher should serve as a facilitator, walking from group to group to provide clarification.
Student: Work in groups of 2 - 4 (see structure outlined below) to respond to the questions provided. The goal is for students to develop their own meaningful understanding s of the topic being explored.

Structure: **Option 1 – Assign Group Roles:**
Roles may be teacher-assigned, randomly assigned or self-selected and adjusted as necessary.

- **Recorder** – serves as the Secretary who records the thoughts and hypotheses of group members; ensures all members contribute to the discussion (including self)
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Structure: **Option 2 – Pair-share/Dyad to Group of 4**

- **Students work as elbow partners** to ensure all members contribute to the discussion; have ample time to develop meaningful conjectures, and

Differentiated Instruction:

English Learners:

Students Who Need Additional Support:

Provide vocabulary cards with simple definitions for academic vocabulary and symbols or diagram if applicable.

For Gallery Walk, provide handout or project on board the prompts for student tasks.

For Decoding the Definition, display sentence frames or give handouts.

	can clarify key vocabulary for one another • Once each pair has come to an agreement on their findings**, they then share/compare their conjectures with other members in their group of 4 or more** • **If pairs disagree on their findings,** further discussion must take place to finalize all conjectures • **Provides ample validation of ideas** **Day 2:** **10 Minutes – Gallery Walk** • **Independent Group Effort: Collaboration** • **Mathematical Practice(s) Being Monitored:** 3 Construct viable arguments and critique the reasoning of others **Teacher:** Direct students to post group definition posters about the room in preparation for a Gallery Walk. (See the structure posted below). **Students:** Follow as directed to evaluate and develop the class definition of Reflections. **Gallery Walk Structure:** • Each group will display their poster • Each group selects a group member to be the docent to answer questions or provide clarifications/explanations • The other group members examines, explores, reviews the other groups' posters • There will be time for each group to re-assemble and discuss the information shared in the groups' posters • Please remind gallery walk norms and be respectful of the work and information shared. **Teacher:** Please assign tasks for the rest of the team to pay attention to while performing the walk. Assign a purpose for each observant. Prompts: Student 1: What is a method that is found common across teams? Student 2: What is a unique method that is very different from the rest of the team? Student 3: Pick one method/poster that gives a different answer from yours. Evaluate that method in comparison to yours. **10 Minutes – Textbook Definition Comparison** • **Independent Group Effort: Collaboration** • **Mathematical Practice(s) Being Monitored:** 6 Attend to Precision **Teacher:** Direct students to copy the textbook definition and mathematical formula in the space provided on handout. (see Holt text, page 840; Holt Review for Mastery Workbook, page 155) **Students:** Follow as directed (#6) to validate the class definition and to obtain an even more precise definition of Rotations. **20 Minutes – Decoding the Definition** • **Independent Group Effort: Reading Comprehension and Collaboration** • **Mathematical Practice(s) Being Monitored:**	**Accelerated Learners:**

	1 Make sense of problems and persevere in solving them **Teacher:** Have students decipher the textbook definition of Rotations using the process provided below. **Students:** In groups of 4, student 1 reads out loud while the rest of the team is following along. Student 2 is to state the key vocabulary of the definition. Student 3 is to draw meaning to the definition. Student 4 is to state the main idea. All students note their understanding of the main idea in Question #7. **Teacher:** Provide the following sentence frames to assist students: • I think this definition means _____. • A new vocabulary word _____was used. I think it means _____. • My definition was correct because _____. • This definition introduces new information _____. **Students:** May work first in dyads to share ideas, then to table groups to reinforce understandings. **Teacher:** Reinforce Rotations by calling on group representatives to present one sentence frame. Record their ideas on the whiteboard. Repeat the process until all sentence frames are utilized. **Students:** Amend their personal responses to incorporate all understandings. **10 Minutes: Application Activity** • **Independent Group Effort: Collaboration** • **Mathematical Practice(s) Being Monitored:** 2 Reason Abstractly and Quantitatively 4 Modeling with Mathematics 7 Look for and make use of Structure **Teacher:** Have students solidify their understanding by completing #8. Remind students to **include the Center and Angle of Rotation** (to reinforce the formal definition). Students may also refer to the text or workbook for examples and/or similar models. **Students:** Create their own Rotated Figures by naming and applying the Center and Angle of Rotations. Students may work in dyads to share and confirm ideas.	
Lesson Reflection		
Teacher Reflection Evidenced by Student Learning/ Outcomes		

SAUSD Common Core Lesson Planner Mathematics Teacher:_____

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	STUDENTS FIGURE OUT THE MEANING	Rotations Clockwise Counter Clockwise	Center of Rotation Angle of Rotation 90 degrees 180 degrees 270 degrees
Pre-teaching Considerations		This lesson requires students to be able to communicate their understanding and findings with peers.	

Lesson Delivery

Instructional Methods

Check method(s) used in the lesson:

☒ **Modeling** ☐ **Guided Practice** ☒ **Collaboration**

☐ **Independent Practice** ☒ **Guided Inquiry** ☒ **Reflection**

Prior Knowledge, Context, and Motivation:

Prior Knowledge: Students know how to name quadrilaterals, triangles, and polygons by their vertices

Context: Students apply their own understanding of reflections to accurately create and define new reflected images.

Motivation: Students are able to analyze that reflections: a) are one type of transformations, b) have distinct characteristics, and c) have no effect on the size and shape of rigid figures

Body of the Lesson:
Activities/ Questioning/ Tasks/ Strategies/ Technology/ Engagement

Lesson Continuum

Lesson Overview

All explorations are collaborative in nature:

Strengthening Rotations Student Handout

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Structure: **Option 2 – Pair-share/Dyad to Group of 4**

- **Students work as elbow partners** to ensure all members contribute to

Differentiated Instruction:

English Learners:

Students Who Need Additional Support:

Provide vocabulary cards with simple definitions for academic vocabulary and symbols or diagram if applicable.

Accelerated Learners:

the discussion; have ample time to develop meaningful conjectures, and can clarify key vocabulary for one another

- Once each pair has come to an agreement on their findings**, they then share/compare their conjectures with other members in their group of 4 or more**
- **If pairs disagree on their findings,** further discussion must take place to finalize all conjectures
- **Provides ample validation of ideas**

Day 3:

40 Minutes – Collaborative Group Work

- **Independent Group Effort: Reading Comprehension and Collaboration**
- **Mathematical Practice(s) Being Monitored:**
  5 Use appropriate tools strategically
  6 Attend to precision

Teacher: Have students work in groups of 2-4 students (see Option 1 or 2). Direct students to use Patty Paper and Straightedge to complete the Rotation Activity. Remind them to refer to the text/workbook definition and previous work. Teacher monitors and facilitates group activity.

To introduce the activity, teacher states:

- "We have spent the last two days exploring Rotations or Rotated Figures. Now, let's apply what we have learned with today's activity."
- "Let's take a look at #1 to make sure everyone has a clear understanding."

Guided Inquiry: Teacher provides verbal directions while students lead each other to solve each problem.

- "Using your Patty Paper and Straightedge, trace Figure ABC." [Pause for students to trace figure]
- "Given the origin as the Center of Rotation and 90 degrees (right angle) as the Angle of Rotation, rotate your Patty Paper figure." [Silently check to see if students are correctly flipping the paper]
- "Be sure to rotate in the proper direction and connect one set of corresponding vertices to the Center of Rotation in order to verify the proper Angle of Rotation. To be precise, you should use your protractor." [Silently check for accuracy]
- "Finally, name the coordinates of your New Image. How do we name these new vertices?" [Do a quick check or random call to obtain A prime notation]
- "In the spaces provided, name the coordinates of your New Image."[Select three groups to name one vertex to allow students to check their work]
- "Now let's proceed. For each problem, you need to re-create the New Image from the previous problem. For #2, first you need to draw A′ from #1, then you need to rotate it."
- "Remember to use your **math tools** (hold up **Patty Paper, Straightedge and Protractor**), **Checklist** (point to the Whiteboard) and **Text/Workbook** to provide hints and to draw your figures with precision."

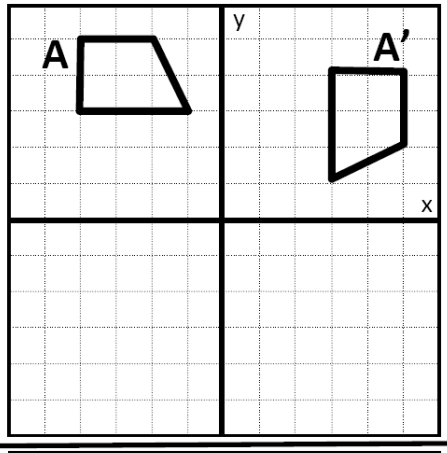
Assign problems #1 – 4 and direct students to do the student activity presented below.

	Students: Complete each problem, manipulating the Patty Paper to strategize with a partner/group the most appropriate placement and solution. • Work initially on problems #1 – 4 in dyads. • Next, have students share their responses with their entire table group • When consensus is formed, verify answers with another group to validate understanding. If differences result, students must convince the other group who is correct and amend all erroneous responses. • Next, complete #5 – 8. Repeat student verification if time allows. **5 – 10 Minutes: Strengthening Reflections/Frayer Model** • **Closure:** Essential Understanding of this Lesson. • **Mathematical Practice(s) Being Monitored:** 7 Look for and make use of structure 8 Look for and express regularity in repeated reasoning **Teacher:** Have students complete Quadrant II of the Frayer Model. Be sure to remind students to view the Checklist posted on the Whiteboard to derive thorough answers. If time allows, they may also do quadrant I. **Students:** Complete activity independently, making sure they have met all criteria of the Checklist. **Note: This activity may be used as an on-going Formative Assessment (each day completing the remaining quadrants) or reserved as a comparison (particularly Quadrant 4) following Rotations and Translations.** **Extension: Students should now go back to their reflection Frayer Model to complete Quadrant IV – What it is not? The goal is to constantly spiral back to earlier Transformations for reinforcement and additional clarification.**	
Lesson Reflection		
Teacher Reflection Evidenced by Student Learning/ Outcomes		

Exploration of Rotations Name _____Period___

For each pair of figures, compare the figures A and A', where A' is the new image of A.
Denote: A' is read as "A prime"; A'' is read as "A double-prime".

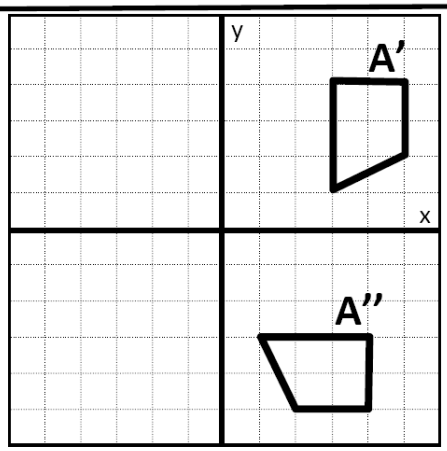
1



a) Describe how A is transformed to A'. (Explain how to move A to A'.)

b) How are the key features of the shape of figure A alike or different from figure A'?

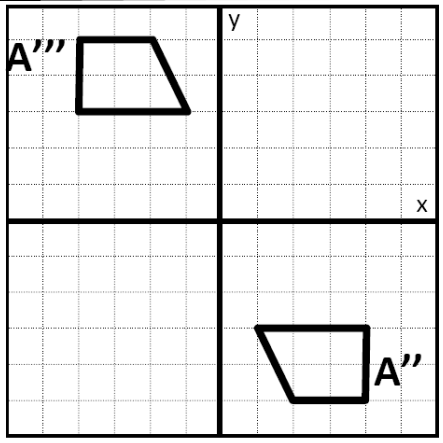
2



a) Describe how A' is transformed to A''

b) How are the key features of the shape of figure A alike or different from figure A'?

3



a) Describe how A'' is transformed to A'''.

b) How are the key features of the shapes of figure A, A', A'', and A''' all alike or different from each other?

4

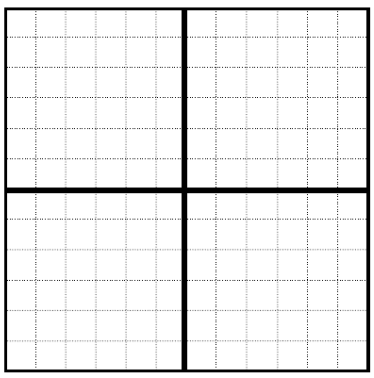
Describe the relationship between Figures A and A'''. Describe the journey of how Figure A is transformed to Figure A''' during the three steps above.

5 In your own words, define a rotation:

6 Formal Definition:

7 Evaluate the differences and similarities in your definition and the formal definition above.

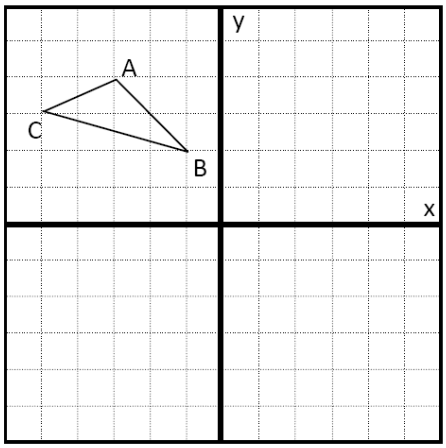
8 Draw your own figure and rotate it. Describe its rotation.



Rotations

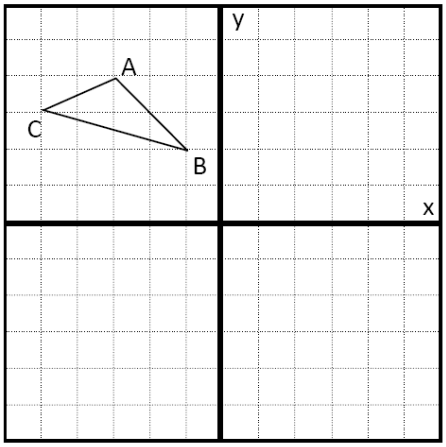
Name _____ Period _____

1) Rotate triangle ABC 90 degrees clockwise to create triangle DEF. State the coordinates.



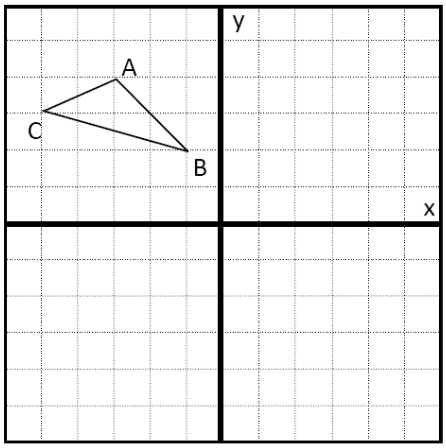
_____, _____, _____,

2) Rotate triangle ABC 90 degrees counterclockwise to create triangle GHI. State the coordinates.



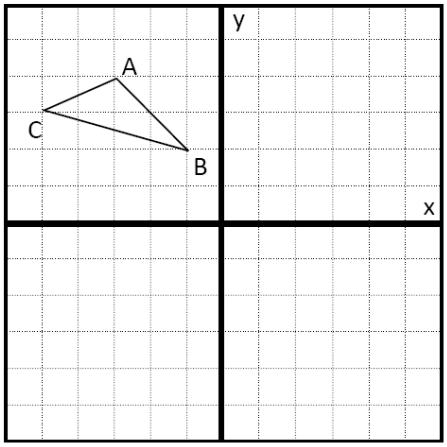
_____, _____, _____,

3) Rotate triangle ABC 180 degrees about the origin to create triangle JKL. State the coordinates.



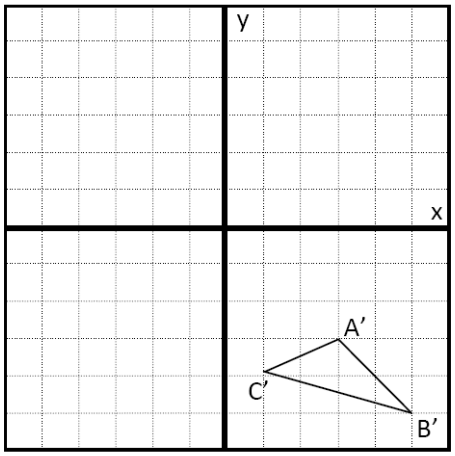
_____, _____, _____,

4) Rotate triangle ABC 270 degrees counterclockwise to create triangle MNO. State the coordinates.



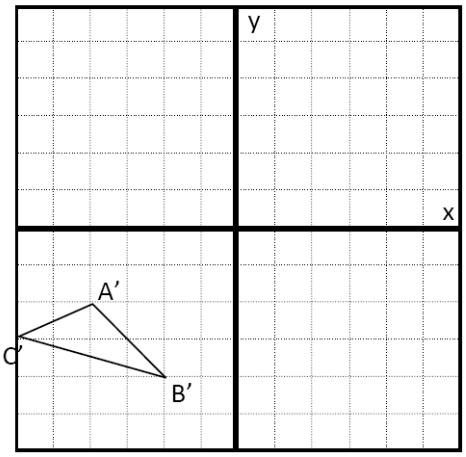
_____, _____, _____,

5) If the below triangle A'B'C' is the result of a triangle that was rotated 180 degrees about the origin, state the coordinates of the original triangle ABC.



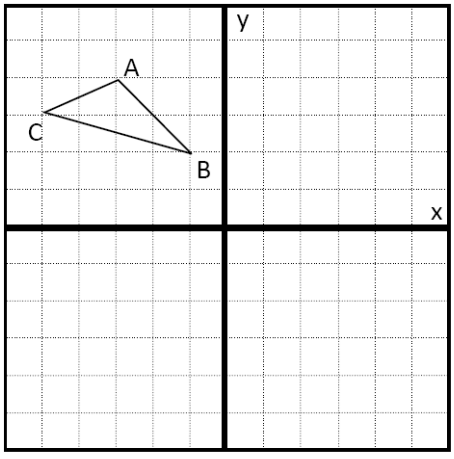
_____, _____, _____,

6) If the below triangle A'B'C' is the result of a triangle that was rotated 90 degrees counterclockwise, state the coordinates of the original triangle ABC.



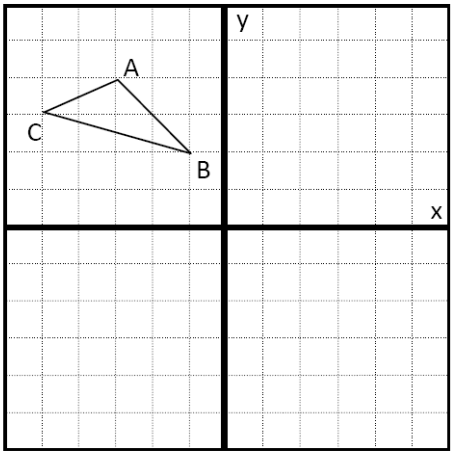
_____, _____, _____,

7) Rotate triangle ABC 45 degrees clockwise to create triangle XYZ. State the coordinates.



_____, _____, _____,

8) Rotate triangle ABC 45 degrees counterclockwise to create triangle XYZ. State the coordinates.



_____, _____, _____,

Strengthening Rotations Name _____Period _____

Definition in your own words

Facts/ Characteristics
(Symbols, representations, traits)

Rotation

Examples
(What does it look like? – model, Illustration, diagram)

Non-Examples
(What does it look like?)

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SAUSD Common Core Lesson Planner Mathematics Teacher:_____

<table>
<tr><td>Unit: G1
Lesson:
G1-1-3A</td><td colspan="2">Grade Level/Course:
Geometry</td><td>Duration: <u>Day 1 of 3 (50 min.) Lesson</u>
Date:</td></tr>
<tr><td>Common Core and Content Standards</td><td colspan="3">Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure.
Unpacked - Focus: Use descriptions of Translations to predict the effects rigid motion has on figures in the coordinate plane.</td></tr>
<tr><td>Materials/ Resources/ Lesson Preparation</td><td colspan="3">Patty Paper (Tracing Paper)
Straightedge
Markers and Construction Paper
Student Handouts
Checklist and Three Step Interview Activity directions posted on the Whiteboard</td></tr>
<tr><td>Objectives</td><td colspan="2">Content:
Students will be able to develop their own understanding of Translation as how:
• It is one type of transformation
• Has its own distinct characteristics
• It impacts rigid figures</td><td>Language:
Students will be able to justify their own understanding of Translations as how:
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• Has its own distinct characteristics
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☒ 4. Model with mathematics.
☐ 5. Use appropriate tools strategically
☒ 6. Attend to precision.
☒ 7. Look for and make use of structure.
☒ 8. Look for and express regularity in repeated reasoning.</td></tr>
<tr><td>Common Core Instructional Shifts in Mathematics</td><td colspan="3">☒ Focus on the Standards
☒ Coherence within and across grade levels
☒ Rigor (Balance of conceptual understanding, procedural skill & fluency, and application of skills)</td></tr>
<tr><td rowspan="3">Academic Vocabulary (Tier II & Tier III)</td><td>PROVIDES TEACHER SIMPLE EXPLANATION</td><td>KEY WORDS ESSENTIAL TO UNDERSTANDING</td><td>WORDS WORTH KNOWING</td></tr>
<tr><td></td><td>Transform
New Image
A prime
A double-prime
A triple-prime</td><td>Vector
Horizontal and Vertical Movement</td></tr>
<tr><td>STUDENTS FIGURE OUT THE MEANING</td><td>Translations</td><td></td></tr>
</table>

Pre-teaching Considerations	This lesson requires students to be able to communicate their understanding and findings with peers.

Lesson Delivery

Instructional Methods	**Check method(s) used in the lesson:** ☒ **Modeling** ☐ **Guided Practice** ☒ **Collaboration** ☐ **Independent Practice** ☐ **Guided Inquiry** ☒ **Reflection**
	Prior Knowledge, Context, and Motivation: **Prior Knowledge:** Students know how to name quadrilaterals, triangles, and polygons by their vertices **Context:** Students are to derive their own definition for translations and to demonstrate its effect on rigid figures **Motivation:** Students are able to analyze that translations: a) are one type of transformations, b) have distinct characteristics, and c) have no effect on the size and shape of rigid figures

Lesson Continuum

Body of the Lesson:
Activities/ Questioning/ Tasks/ Strategies/ Technology/ Engagement

Lesson Overview

All explorations are collaborative in nature:

Exploration of Translations Student Handout

Teacher: While students are working in groups, teacher should serve as a facilitator, walking from group to group to provide clarification.
Student: Work in groups of 2 - 4 (see structure outlined below) to respond to the questions provided. The goal is for students to develop their own meaningful understanding s of the topic being explored.

Structure: **Option 1 – Assign Group Roles:**
Roles may be teacher-assigned, randomly assigned or self-selected and adjusted as necessary.

- **Recorder** – serves as the Secretary who records the thoughts and hypotheses of group members; ensures all members contribute to the discussion (including self)
- **Reader/Interpreter** – Reads the question and interprets what the group is asked to do for each question; determines and defines key vocabulary for all members; and ensures every team member has the same understanding
- **Sergeant of Arms** – Serves as norm monitor and quality control; keeps each team member on task; ensures task is completed on a timely manner; and monitors time to ensure the team has ample time to answer all assigned questions
- **Supply General** – Obtains supplies for each team member; leads the team to action; and empowers, monitors and maintains responsibilities of each member

Structure: **Option 2 – Pair-share/Dyad to Group of 4**

- **Students work as elbow partners** to ensure all members contribute to the discussion; have ample time to develop meaningful conjectures, and can clarify key vocabulary for one another
- Once each pair has come to an agreement on their findings**, they then share/compare their conjectures with other members in their group of 4 or more**

Differentiated Instruction:

English Learners:

Students Who Need Additional Support:

Provide vocabulary cards with simple definitions for academic vocabulary and symbols or diagram if applicable.

Project or provide handout to group of role names and descriptions for Option 1.

Teacher, paraprofessional or student study buddy read aloud the questions on Exploration of Translations handout as needed.

Accelerated Learners:

- **If pairs disagree on their findings,** further discussion must take place to finalize all conjectures
- **Provides ample validation of ideas**

Day 1:

20 Minutes:

- **Independent Group Effort: Collaboration**
- **Mathematical Practice(s) Being Monitored:**
  3 Construct viable arguments and critique the reasoning of others
  5 Use appropriate tools strategically

Teacher: Have students form collaborative groups (Option 1 or 2). Students use **Patty Paper** (tracing paper) and **Straightedge** to trace the figures as they follow the journey from Figure A to Figure A triple-prime (situation #1 – 3) and to respond to the questions provided. Teacher should also clarify that student responses must incorporate key transformation vocabulary (Reflection, Fold Line) to describe each rigid movement as it applies.

Note: The purpose of the tracing paper is to reinforce:

- Translations do not affect size and shape
- Students will have to physically move the figure horizontally and/or vertically to match it with A′
- Students can see that often Translations are comprised of a combination of movements

Students will naturally discover this purpose as they complete the activities.

Checklist:

The **Suggestion Checklist** should be posted on the whiteboard to serve as a written reminder. Such items for the checklist should include:

- Did you include key transformation vocabulary (Translation, vector) when and if it applies?
- Did the vertices move in the same parallel movement to one another?
- Did you include size and shape in your description of the journey?
- Did you include lengths of sides and angle measure in your description of the journey?
- Are your responses full complete sentences?

Students: Students may be seated in groups of 4, but for situations #1 – 4, it is preferable to work first with an elbow partner/dyad to form conjectures about dilated figures. Students should read the suggestion checklist to ensure thorough responses.

20 Minutes:

- **Independent Group Effort: Collaboration**
- **Mathematical Practice(s) Being Monitored:**
  3 Construct viable arguments and critique the reasoning of others

Teacher: Introduce question #5 with the following statements:

- "Each diagram in #1 – 3 are examples of Reflections or Reflected Figures. For #5 let's see if you can develop your own definition of what these terms mean."
- "This time, I want you to work independently. In a few minutes, you'll have a chance to share your responses with your partner."
- "Be sure to refer to the checklist posted on the whiteboard."

Students: Work independently on #5.

	Quick-write with a Three-Step Interview Activity to respond to question #5**:** **Teacher:** Introduce the Quick-write with a Three-Step Interview Activity directions with the following statements: • "Now that you have your definition, work with your elbow partner to see how your statements compare." • "This activity is called a **Three –Step Interview Activity** (directions should be posted on the whiteboard)" • Teacher reviews the directions to ensure complete understanding: • **Step 1 -** Student A asks Student B the question. Student B responds. Student A must listen carefully because s/he will have to repeat it to the table group. **Step 2** - Student B now asks Student A the question. Student A responds. Student B must listen carefully because s/he will have to repeat it to the table group. **Step 3** – Share, in a round robin format at the table group, the partners' response to the quick-write. **Students:** Follow as directed. **10 Minutes: Closure** • **Mathematical Practice(s) Being Monitored:** 3 Construct viable arguments and critique the reasoning of others 6 Attend to precision 8 Look for and express regularity in repeated reasoning **Teacher:** Reminds students to compare each student's responses with each other and against the posted checklist to finalize one group response. Next direct students to use a marker to write their formal definition on construction paper. **Students:** Compare the various responses (with each other and against the checklist) to decide if changes need to be made. If so, students should amend their personal responses. When all students have come to an agreement, a formal group definition should be written on the construction paper.	
Lesson Reflection		
Teacher Reflection Evidenced by Student Learning/ Outcomes		

SAUSD Common Core Lesson Planner Mathematics Teacher:_____

Unit: G1 **Lesson:** **G1-1-3B**	**Grade Level/Course:** Geometry	**Duration: Day 2 of 3 (50 min.) Lesson** **Date:**
Common Core and Content Standards	**Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure.** **Unpacked - Focus:** Use descriptions of Translations to predict the effects rigid motion has on figures in the coordinate plane	
Materials/ Resources/ Lesson Preparation	Patty Paper (Tracing Paper) Straightedge Student Handouts Text/Workbook Checklist and Reading Comprehension Directions	
Objectives	**Content:** Students will be able to develop their own understanding of Rotations as how: • It is one type of transformation • Has its own distinct characteristics • It impacts rigid figures	**Language:** Students will be able to justify their own understanding of Rotations as how: • It is one type of transformation • Has its own distinct characteristics • It impacts rigid figures
Depth of Knowledge Level	☐ **Level 1: Recall** ☒ **Level 2: Skill/Concept** ☒ **Level 3: Strategic Thinking** ☐ **Level 4: Extended Thinking**	
Standards for Mathematical Practice	☒ **1. Make sense of problems and persevere in solving them.** ☒ **2. Reason abstractly and quantitatively.** ☒ **3. Construct viable arguments and critique the reasoning of others.** ☒ **4. Model with mathematics.** ☐ **5. Use appropriate tools strategically** ☒ **6. Attend to precision.** ☒ **7. Look for and make use of structure.** ☒ **8. Look for and express regularity in repeated reasoning.**	
Common Core Instructional Shifts in Mathematics	☒ **Focus on the Standards** **Students create their** ☒ **Coherence within and across grade levels** ☒ **Rigor (Balance of conceptual understanding, procedural skill & fluency, and application of skills)**	
Academic Vocabulary (Tier II & Tier III) / **PROVIDES TEACHER SIMPLE EXPLANATION**	**KEY WORDS ESSENTIAL TO UNDERSTANDING**	**WORDS WORTH KNOWING**
	Transform New Image A prime A double-prime A triple-prime	Vector Horizontal and Vertical Movement Parallel

	STUDENTS FIGURE OUT THE MEANING	Translations	
Pre-teaching Considerations		This lesson requires students to be able to communicate their understanding and findings with peers.	

Lesson Delivery

Instructional Methods	**Check method(s) used in the lesson:** ☒ **Modeling** ☐ **Guided Practice** ☒ **Collaboration** ☐ **Independent Practice** ☐ **Guided Inquiry** ☒ **Reflection**
	Prior Knowledge, Context, and Motivation: **Prior Knowledge:** Students know how to name quadrilaterals, triangles, and polygons by their vertices **Context:** Students are to derive their own definition for Translations and to demonstrate its effect on rigid figures **Motivation:** Students are able to analyze that Translations: a) are one type of transformations, b) have distinct characteristics, and c) have no effect on the size and shape of rigid figures

Lesson Continuum

Body of the Lesson:
Activities/ Questioning/ Tasks/ Strategies/ Technology/ Engagement

Lesson Overview
All explorations are collaborative in nature:

Translations Student Handout

Teacher: While students are working in groups, teacher should serve as a facilitator, walking from group to group to provide clarification.
Student: Work in groups of 2 - 4 (see structure outlined below) to respond to the questions provided. The goal is for students to develop their own meaningful understanding s of the topic being explored.

Structure: **Option 1 – Assign Group Roles:**
Roles may be teacher-assigned, randomly assigned or self-selected and adjusted as necessary.

- **Recorder** – serves as the Secretary who records the thoughts and hypotheses of group members; ensures all members contribute to the discussion (including self)
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- **Sergeant of Arms** – Serves as norm monitor and quality control; keeps each team member on task; ensures task is completed on a timely manner; and monitors time to ensure the team has ample time to answer all assigned questions
- **Supply General** – Obtains supplies for each team member; leads the team to action; and empowers, monitors and maintains responsibilities of each member

Structure: **Option 2 – Pair-share/Dyad to Group of 4**

- **Students work as elbow partners** to ensure all members contribute to

Differentiated Instruction:

English Learners:

Students Who Need Additional Support:

Provide vocabulary cards with simple definitions for academic vocabulary and symbols or diagram if applicable.

For Gallery Walk, provide handout or project on board the prompts for student tasks.

For Decoding the Definition, display sentence frames or give handouts.

	the discussion; have ample time to develop meaningful conjectures, and can clarify key vocabulary for one another • Once each pair has come to an agreement on their findings**, they then share/compare their conjectures with other members in their group of 4 or more** • **If pairs disagree on their findings,** further discussion must take place to finalize all conjectures • **Provides ample validation of ideas** **Day 2:** **10 Minutes – Gallery Walk** • **Independent Group Effort: Collaboration** • **Mathematical Practice(s) Being Monitored:** 3 Construct viable arguments and critique the reasoning of others **Teacher:** Direct students to post group definition posters about the room in preparation for a Gallery Walk. (See the structure posted below). **Students:** Follow as directed to evaluate and develop the class definition of Reflections. **Gallery Walk Structure:** • Each group will display their poster • Each group selects a group member to be the docent to answer questions or provide clarifications/explanations • The other group members examines, explores, reviews the other groups' posters • There will be time for each group to re-assemble and discuss the information shared in the groups' posters • Please remind gallery walk norms and be respectful of the work and information shared. **Teacher:** Please assign tasks for the rest of the team to pay attention to while performing the walk. Assign a purpose for each observant. Prompts: Student 1: What is a method that is found common across teams? Student 2: What is a unique method that is very different from the rest of the team? Student 3: Pick one method/poster that gives a different answer from yours. Evaluate that method in comparison to yours. **10 Minutes – Textbook Definition Comparison** • **Independent Group Effort: Collaboration** • **Mathematical Practice(s) Being Monitored:** 6 Attend to Precision **Teacher:** Direct students to copy the textbook definition and mathematical formula in the space provided on handout. (see Holt text, page 832; Holt Review for Mastery Workbook, page 153) **Students:** Follow as directed (#6) to validate the class definition and to obtain an even more precise definition of Translations. **20 Minutes – Decoding the Definition** • **Independent Group Effort: Reading Comprehension and Collaboration** • **Mathematical Practice(s) Being Monitored:**	**Accelerated Learners:**

	1 Make sense of problems and persevere in solving them **Teacher:** Have students decipher the textbook definition of Translations using the process provided below. **Students:** In groups of 4, student 1 reads out loud while the rest of the team is following along. Student 2 is to state the key vocabulary of the definition. Student 3 is to draw meaning to the definition. Student 4 is to state the main idea. All students note their understanding of the main idea in Question #7. **Teacher:** Provide the following sentence frames to assist students: • I think this definition means _____. • A new vocabulary word _____was used. I think it means _____. • My definition was correct because _____. • This definition introduces new information _____. **Students:** May work first in dyads to share ideas, then to table groups to reinforce understandings. **Teacher:** Reinforce Translations by calling on group representatives to present one sentence frame. Record their ideas on the whiteboard. Repeat the process until all sentence frames are utilized. **Students:** Amend their personal responses to incorporate all understandings. **10 Minutes: Application Activity** • **Independent Group Effort: Collaboration** • **Mathematical Practice(s) Being Monitored:** 2 Reason Abstractly and Quantitatively 4 Modeling with Mathematics 7 Look for and make use of Structure **Teacher:** Have students solidify their understanding by completing #8. Remind students to **include the vector markings to show the movement is both parallel and equal** (to reinforce the formal definition). Students may also refer to the text or workbook for examples and/or similar models. **Students:** Create their own Translated Figures by naming and applying horizontal and/or vertical movement. Students may work in dyads to share and confirm ideas.	
Lesson Reflection		
Teacher Reflection Evidenced by Student Learning/ Outcomes		

SAUSD Common Core Lesson Planner Mathematics Teacher:_____

<table>
<tr><td>Unit: G1
Lesson:
G1-1-3C</td><td>Grade Level/Course:
Geometry</td><td colspan="2">Duration: <u>Day 3 of 3 (50 min.) Lesson</u>
Date:</td></tr>
<tr><td>Common Core and Content Standards</td><td colspan="3">Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure.
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Student Handouts
Text/Workbook as reference
Checklist as reference</td></tr>
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<tr><td>Transform
New Image
A prime
A double-prime
A triple-prime, etc.</td><td>Vector
Horizontal and Vertical Movement
Parallel Movement</td></tr>
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	STUDENTS FIGURE OUT THE MEANING	Translations Equal distance	
Pre-teaching Considerations		This lesson requires students to be able to communicate their understanding and findings with peers.	

Lesson Delivery

Instructional Methods

Check method(s) used in the lesson:

☒ **Modeling** ☐ **Guided Practice** ☒ **Collaboration**

☐ **Independent Practice** ☒ **Guided Inquiry** ☒ **Reflection**

Prior Knowledge, Context, and Motivation:

Prior Knowledge: Students know how to name quadrilaterals, triangles, and polygons by their vertices

Context: Students apply their own understanding of reflections to accurately create and define new reflected images.

Motivation: Students are able to analyze that translations: a) are one type of transformations, b) have distinct characteristics, and c) have no effect on the size and shape of rigid figures

Lesson Continuum

Body of the Lesson:
Activities/ Questioning/ Tasks/ Strategies/ Technology/ Engagement

Lesson Overview

All explorations are collaborative in nature:

Strengthening Translations Student Handout

Teacher: While students are working in groups, teacher should serve as a facilitator, walking from group to group to provide clarification.
Student: Work in groups of 2 - 4 (see structure outlined below) to respond to the questions provided. The goal is for students to develop their own meaningful understanding s of the topic being explored.

Structure: **Option 1 – Assign Group Roles:**
Roles may be teacher-assigned, randomly assigned or self-selected and adjusted as necessary.

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Structure: **Option 2 – Pair-share/Dyad to Group of 4**

- **Students work as elbow partners** to ensure all members contribute to

Differentiated Instruction:

English Learners:

Students Who Need Additional Support:

Provide vocabulary cards with simple definitions for academic vocabulary and symbols or diagram if applicable.

Accelerated Learners:

the discussion; have ample time to develop meaningful conjectures, and can clarify key vocabulary for one another

- Once each pair has come to an agreement on their findings**, they then share/compare their conjectures with other members in their group of 4 or more**
- **If pairs disagree on their findings,** further discussion must take place to finalize all conjectures
- **Provides ample validation of ideas**

Day 3:

40 Minutes – Collaborative Group Work

- **Independent Group Effort: Reading Comprehension and Collaboration**
- **Mathematical Practice(s) Being Monitored:**
  5 Use appropriate tools strategically
  6 Attend to precision

Teacher: Have students work in groups of 2-4 students (see Option 1 or 2). Direct students to use Patty Paper and Straightedge to complete the Translation Activity. Remind them to refer to the text/workbook definition and previous work. Teacher monitors and facilitates group activity.

To introduce the activity, teacher states:

- "We have spent the last two days exploring Translations or Translated Figures. Now, let's apply what we have learned with today's activity."
- "Let's take a look at #1 to make sure everyone has a clear understanding."

Guided Inquiry: Teacher provides verbal directions while students lead each other to solve each problem.

- "Using your Patty Paper and Straightedge, trace Figure ABC." [Pause for students to trace figure]
- "Translate your Patty Paper figure by first, drawing in **a vector line** to show the indicated movement." [Silently check to see if students are proceeding as directed. You may also direct students to separate horizontal from vertical movement into two separate steps]
- "Be sure to connect the vertices between the New Image and its Pre-Image to verify accuracy." [Silently check for accuracy – remind students that these corresponding vectors should all be drawn parallel to one another to ensure precise drawings]
- "Finally, name the coordinates of your New Image. How do we name these new vertices?" [Do a quick check or random call to obtain A prime notation]
- "In the spaces provided, name the coordinates of your New Image."[Select three groups to name one vertex to allow students to check their work]
- "Now let's proceed. For each problem, you need to re-create the New Image from the previous problem. For #2, first you need to draw A′ from #1, then you need to translate it."
- "Remember to use your **math tools** (hold up **Patty Paper** and **Straightedge**), **Checklist** (point to the Whiteboard) and **Text/Workbook** to provide hints and to draw your figures with precision."

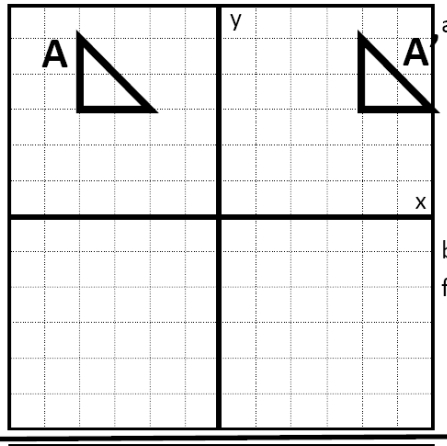
Assign problems #1 – 4 and direct students to do the student activity presented

	below. **Students:** Complete each problem, manipulating the Patty Paper to strategize with a partner/group the most appropriate placement and solution. • Work initially on problems #1 – 4 in dyads. • Next, have students share their responses with their entire table group • When consensus is formed, verify answers with another group to validate understanding. If differences result, students must convince the other group who is correct and amend all erroneous responses. • Next, complete #5 – 8. • Repeat student verification if time allows. **5 – 10 Minutes: Strengthening Translations/Frayer Model** • **Closure:** Essential Understanding of this Lesson. • **Mathematical Practice(s) Being Monitored:** 7 Look for and make use of structure 8 Look for and express regularity in repeated reasoning **Teacher:** Have students complete Quadrant II of the Frayer Model. Be sure to remind students to view the Checklist posted on the Whiteboard to derive thorough answers. If time allows, they may also do quadrant I. **Students:** Complete activity independently, making sure they have met all criteria of the Checklist. **Note: This activity may be used as an on-going Formative Assessment (each day completing the remaining quadrants) or reserved as a comparison (particularly Quadrant 4) following Reflections and Rotations.** **Extension: Now that all transformations are complete, students may complete all three Frayer Models as a Summative Assessment.**	
Lesson Reflection		
Teacher Reflection Evidenced by Student Learning/ Outcomes		

Exploration of Translations Name _____ Period

For each pairs of figures, compare the figures A and A', where A' is the new image of A.
Denote: A' is read as "A prime"; A'' is read as "A double-prime".

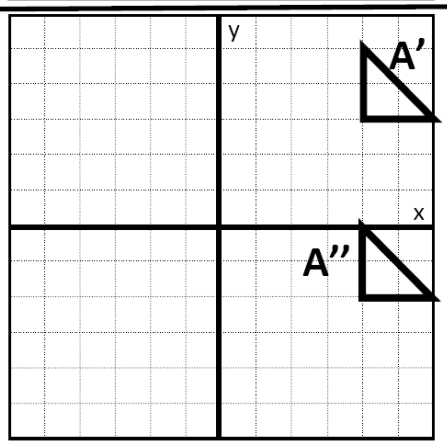
1



a) Describe how A is transformed to A'

b) How are the key features of the shape of figure A alike or different from figure A'?

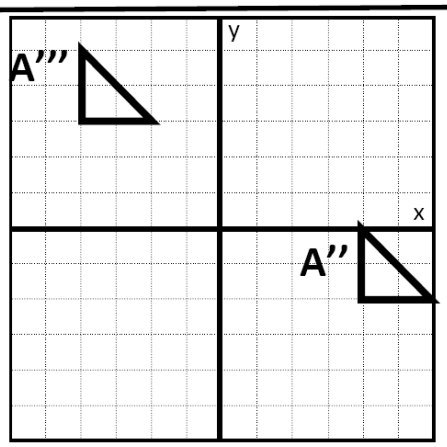
2



a) Describe how A' is transformed to A''

b) How are the key features of the shape of figure A alike or different from figure A'?

3



a) Describe how A'' is translated to A'''

b) How are the key features of the shapes of figure A, A', A'', and A''' all alike or different from each other?

4

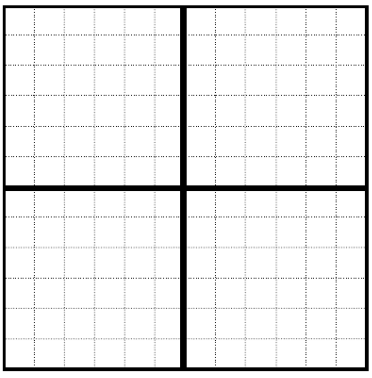
a) Describe the relationship between Figures A and A'''. Describe the journey of how Figure A is transformed into Figure A''' during the three steps above.

5 In your own words, define a translation:

6 Formal Definition:

7 Evaluate the differences and similarities of your definition and formal definition above.

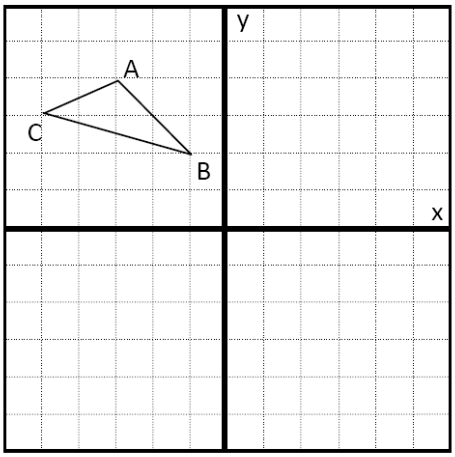
8 Draw your own figure and translate it. Describe its translation.



Translations Name _____ Period _____

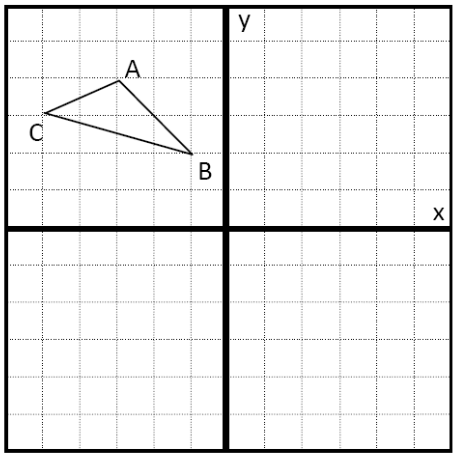
1) Translate triangle ABC using the following motion rule to create triangles DEF. State the coordinates.

(x, y) → (x + 5, y - 1)



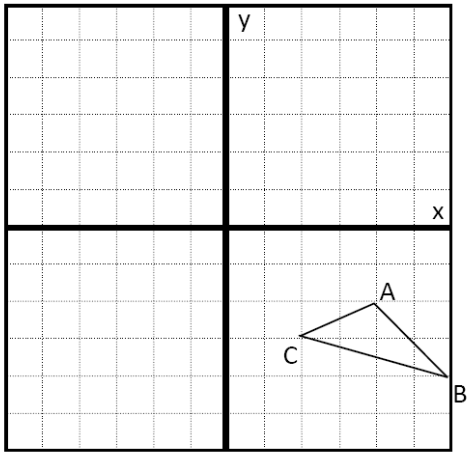
_____, _____, _____,

2) Translate triangle ABC 5 units left and 1 unit u to create triangle GHI. State the coordinates.



_____, _____, _____,

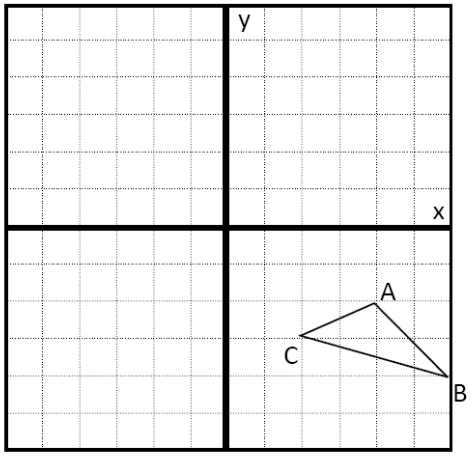
3) Translate triangle ABC 3 units left and 7 units up to create triangle JKL. State the coordinates.



_____, _____, _____,

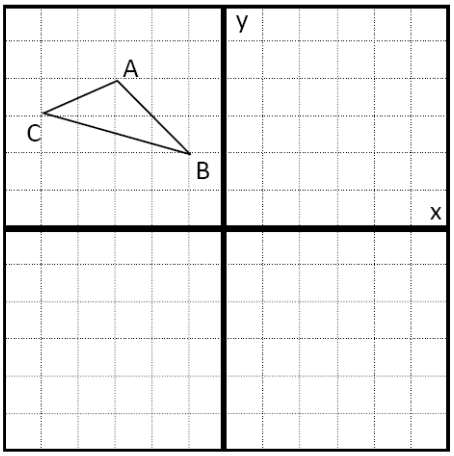
4) Translate triangle ABC using the following motion rule to create triangles MNO. State the coordinates.

(x, y) → (x - 3, y + 7)



_____, _____, _____,

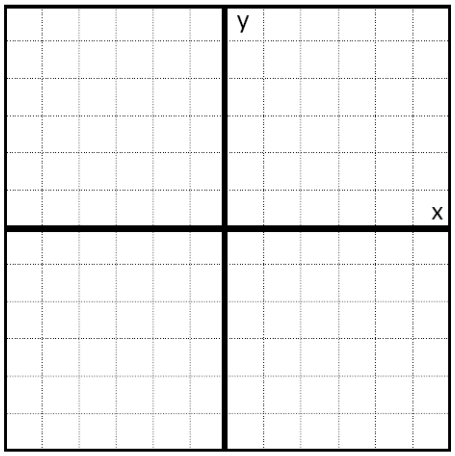
5) Translate triangle A 5 units right and 2 units up to create triangle A'. State the coordinates.



_____, _____, _____,

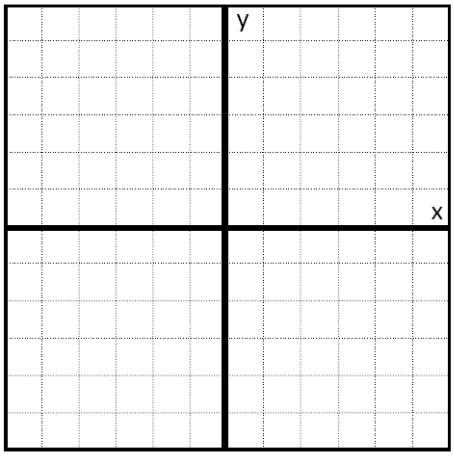
6) Translate triangle A' using the following motion rule to create triangles A''. State the coordinates.

(x, y) → (x, y - 1.5)



_____, _____, _____,

7) Translate triangle A'' 4 units left and 2 units down. Then translate it 5 units right and 2 units down to create triangle A''''. State the coordinates.

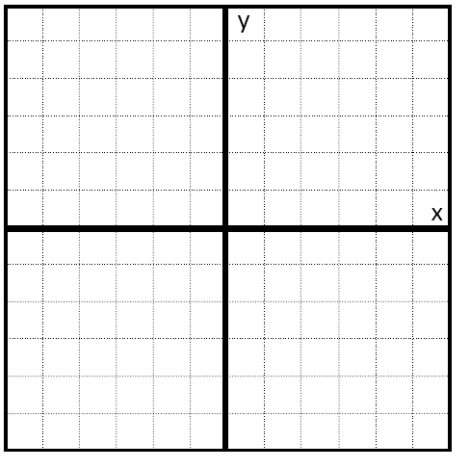


_____, _____, _____,

8) Translate triangle A'''' using the following motion rules to create triangles A''''''. State the coordinates.

(x, y) → (x - 6, y - 5)

(x, y) → (x - 5, y + 6)



_____, _____, _____,

Strengthening Translations Name _____Period _____

Definition in your own words

Facts/ Characteristics
(Symbols, representations, traits)

Translations

Examples
(What does it look like? – model, Illustration, diagram)

Non-Examples
(What does it look like?)

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SAUSD Common Core Lesson Planner Mathematics Teacher:_____

Unit: G1 **Lesson:** **G1-Ind-1**	**Grade Level/Course:** Geometry	**Duration: Day 1 & 2 of 2 (50 Min.) Lesson** **Date:**
Common Core and Content Standards	**Experiment with transformations in the plane** **G.CO.2 –** Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as function that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch). **G.CO.5 –** Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another. **G.CO.3 –** Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself. **G-CO 1 –** Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.	
Materials/ Resources/ Lesson Preparation	Paper (for foldables if needed) Poster (if needed) Computer/ppt (if needed)	
Objectives	**Content:** Students are to analyze and synthesize their discovery and understanding in order to inductively create a document that shows evidence of understanding.	**Language:** Students are to verbally communicate their reasoning with each other in groups and are expected to communicate their reasoning in writing.
Depth of Knowledge Level	☒**Level 1: Recall** ☒**Level 2: Skill/Concept** ☒ **Level 3: Strategic Thinking** ☒ **Level 4: Extended Thinking**	
Standards for Mathematical Practice	☐ **1. Make sense of problems and persevere in solving them.** ☐ **2. Reason abstractly and quantitatively.** ☒ **3. Construct viable arguments and critique the reasoning of others.** ☐ **4. Model with mathematics.** ☒ **5. Use appropriate tools strategically** ☒ **6. Attend to precision.** ☐ **7. Look for and make use of structure.** ☒ **8. Look for and express regularity in repeated reasoning.**	
Common Core Instructional Shifts in Mathematics	☒ **Focus on the Standards** ☒ **Coherence within and across grade levels** ☒ **Rigor (Balance of conceptual understanding, procedural skill & fluency, and application of skills)**	

Academic Vocabulary (Tier II & Tier III)	**PROVIDES TEACHER SIMPLE EXPLANATION**	**KEY WORDS ESSENTIAL TO UNDERSTANDING**	**WORDS WORTH KNOWING**
	STUDENTS FIGURE OUT THE MEANING		
Pre-teaching Considerations			

Lesson Delivery

Instructional Methods	**Check method(s) used in the lesson:** ☐ **Modeling** ☐ **Guided Practice** ☒ **Collaboration** ☒ **Independent Practice** ☐ **Guided Inquiry** ☒ **Reflection**
	Prior Knowledge, Context, and Motivation:

Lesson Continuum

Body of the Lesson:
Activities/ Questioning/ Tasks/ Strategies/ Technology/ Engagement

Lesson Overview

Day 1 of 2

- **Guided Inquiry to support Understanding & Mathematical Understanding: Communication, Collaboration, and Creativity**
- **Mathematical Practice(s) Being Monitored:**
  6 Attend to precision
- Objective: Students are to attend to the precision of vocabulary and fluency of each rigid motion in order to construct inductive and deductive reasoning on the final product.

Teacher: Be a facilitator to provide idea on the lesson.
Advice ☺:

- Choose a transformation type that you and your team feel either 1) comfortable presenting or 2) more learning and exploration need to take place in order to really grasp the rigid motion
- Show how and why this rigid motion is important
- Show different representations one motion can be communicated
- Provide precision in vocabulary, image, and characteristics of the motion
- Communicate properties experimentally and theoretically by observing, measuring, and drawing using both symbols and language
- Give informal arguments and new properties by deduction
- Follow and can supply parts of the inductive and deductive argument

Teacher: Holds a conversation with students, in well-known language symbols, in which the context he/she wants to use become clear.
Students: Under the guidance of the teacher, students share their opinions about the relationships and concepts they have discovered in the previous activities.

Differentiated Instruction:

English Learners:
-Think-Write-Pair-Share
-Multiple opportunities to speak
-Cooperative groups

Students Who Need Additional Support:
-Think-Write-Pair-Share
-Multiple opportunities to speak
-Cooperative groups

	Teacher: will take care that the correct technical language is developed and used. **Day 2 of 2** **Teacher:** have students perform the Gallery Walk to share their findings and reasoning. **Teacher:** Reference Reflections/Rotations/Translations lessons for more detail on Gallery Walk structure.	
Lesson Reflection		
Teacher Reflection Evidenced by Student Learning/ Outcomes		

Synthesis/Inductive/Deductive Task **Name _____**

One of your best friends, Jairique, was in a car accident and has been in the hospital for the last few days. As a top student at his school, Jairique is concerned about his recovery, but he also cares about what he is missing in his Geometry class. He has asked you to take notes and tutor him.

This particular lesson is focused on a geometric _____(transformation type). As a good friend, you understand his strengths and weaknesses and want to help him understand this concept to the best of his abilities. There is one catch, however. Jairique hates memorizing math concepts. He does much better if he can see things visually.

You convince some other friends to help you create a lesson summary for Jairique. The lesson can be presented, using PowerPoint, Foldable, Thinking Map, or poster. Remember, Jairique's greatest strength is his creativity, so keep that in your mind as you create your summary.

You also convince your teacher to give you extra credit points for making this lesson. She agrees, but she has certain criteria to earn these points.

The lesson needs to be:

- A stand-alone lesson/poster/work so that is self-explanatory
- Organized, with accurate and concise information that is easily understood
- A visual summary of your findings about _____ (transformation type). This means you will need to include diagrams and a brief explanation.

SAUSD Common Core Lesson Planner Mathematics **Teacher:_____**

Unit: G1 **Lesson:** **G1-SA-1**	**Grade Level/Course:** Geometry	**Duration: Day 1 of 1 (50 Min.) Lesson** **Date:**

Common Core and Content Standards

Concept 1:

Experiment with transformations in the plane

G.CO.2 – Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as function that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).

G.CO.5 – Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.

G.CO.3 – Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.

G-CO 1 – Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.

CCSS Reading Standard: Student read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

CCSS Writing Standard: Students provide a concluding statement that supports the argument presented.

CCSS Speaking and Listening Standard: Students initiate and participate effectively in a range of collaborative discussions with diverse partners, texts, and issues building on other's ideas and expressing their own clearly and persuasively.

Materials/ Resources/ Lesson Preparation

Summative Assessment

Objectives

Content:	**Language:**
Students are able to inductively and deductively apply their understanding in solving problems.	Students are to verbally communicate their reasoning with each other in groups and are expected to communicate their reasoning in writing.

Depth of Knowledge Level

☒**Level 1: Recall** ☒**Level 2: Skill/Concept**

☒ **Level 3: Strategic Thinking** ☒ **Level 4: Extended Thinking**

Standards for Mathematical Practice

☐ **1. Make sense of problems and persevere in solving them.**

☐ **2. Reason abstractly and quantitatively.**

☒ **3. Construct viable arguments and critique the reasoning of others.**

☐ **4. Model with mathematics.**

☒ **5. Use appropriate tools strategically**

☒ **6. Attend to precision.**

		☐ **7. Look for and make use of structure.** ☒ **8. Look for and express regularity in repeated reasoning.**
Common Core Instructional Shifts in Mathematics		☒ **Focus on the Standards** ☒ **Coherence within and across grade levels** ☒ **Rigor (Balance of conceptual understanding, procedural skill & fluency, and application of skills)**
Academic Vocabulary (Tier II & Tier III)	**PROVIDES TEACHER SIMPLE EXPLANATION**	**KEY WORDS ESSENTIAL TO UNDERSTANDING** / **WORDS WORTH KNOWING**
	STUDENTS FIGURE OUT THE MEANING	
Pre-teaching Considerations		

Lesson Delivery

Instructional Methods	**Check method(s) used in the lesson:** ☐ **Modeling** ☐ **Guided Practice** ☒ **Collaboration** ☒ **Independent Practice** ☐ **Guided Inquiry** ☒ **Reflection**	
	Prior Knowledge, Context, and Motivation:	
Body of the Lesson: Activities/ Questioning/ Tasks/ Strategies/ Technology/ Engagement	**Lesson Overview** **Teacher:** May have students work collaboratively in pairs or groups of 4. Students: Each student is expected to contribute and provide reasoning on written form. **Feedback:** This feedback session may take an additional 30 minutes. **Option 1:** Students may share their answers in a Gallery Walk structure. See the structure in the previous lessons. **Option 2:** Students will perform the I-Spy strategy to gather feedback and improve their work.	**Differentiated Instruction:** **English Learners:** -Think-Write-Pair-Share -Multiple opportunities to speak -cooperative groups **Students Who Need Additional Support:** -Think-Write-Pair-Share -Multiple opportunities to speak -cooperative groups **Accelerated Learners:**

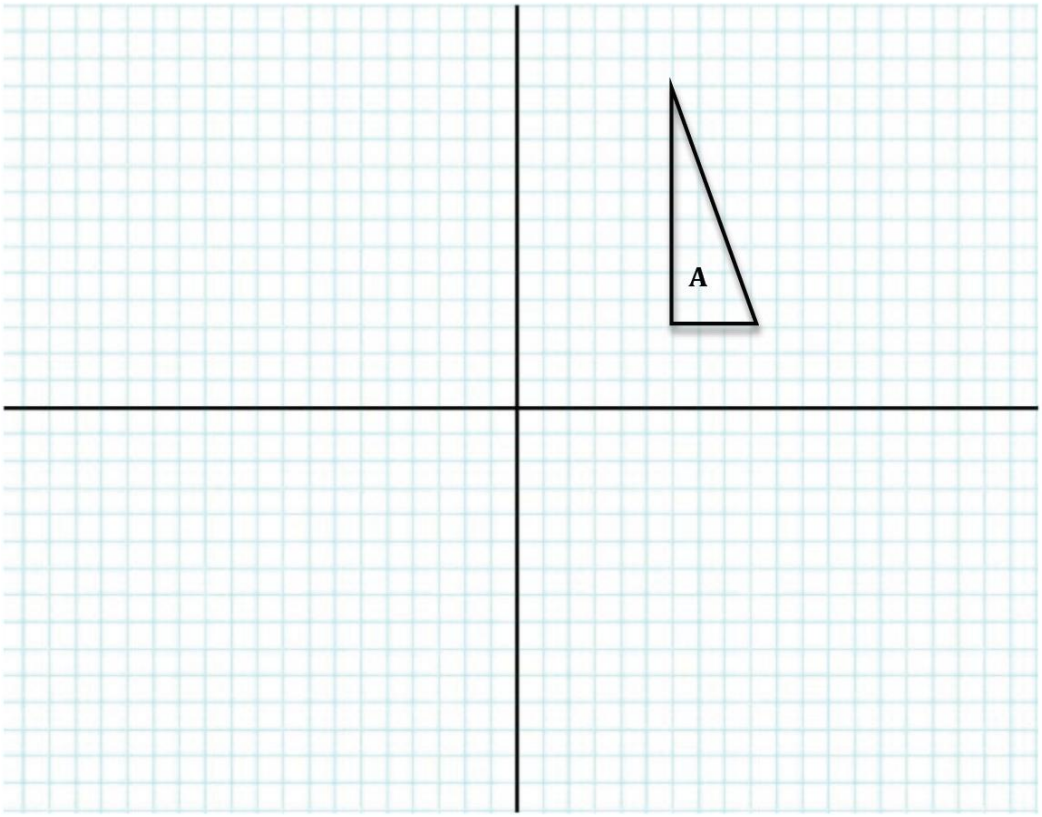
Lesson Reflection

Teacher Reflection Evidenced by Student Learning/ Outcomes	

Lesson Continuum

Flip Sliding Away
Assessment Task

Wendy drew a right triangle on the coordinate gird and labeled it Triangle A.



1. What are the coordinates of the three vertices of the triangle?

   _____ _____ _____

2. Wendy reflected Triangle **A** about the x- axis. Draw the reflected figure on the coordinate axis above. Label that figure **B.**

   What are the coordinates of the reflected figure **B**?

   _____ _____ _____

   How has the size of the triangle changed? Explain.

Flip Sliding Away
Assessment Task

3. Wendy translated the original figure **A** so that the vertex of the new figure's right angle is at (-3, -5). Draw the new figure and label it **C.**

   Write the translation from figure **A** to figure **C**

   _____

4. Wendy rotated the original triangle **A** counterclockwise 180º about the origin. Draw the rotated triangle **D** on the coordinate axis. Label the figure **D**.

   List the coordinate points of figure **D.**

   _____ _____ _____

5. Determine a one step transformation that will map triangle **D** to triangle **B.**

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