



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

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Santa Ana Unified School District Common Core Unit Planner-Mathematics

Unit Title:	G1-Basic Defin	itions and Rigid M	otions				
Grade	Geometry			Time Frame: Entire Unit might be about 4 weeks. This Unit of			
Level/Course:	Study segment requires 10 days						
Big Idea	Rigid motions	transform figures.					
(Enduring							
Understandings):	How do nicid n	ations offerstimes					
Essential	0	notions affect imag esign a process to		t of a given rigid	motion on a	ivon figuro')
Questions:	How call you u	0 1		0 0		, iven figure :	
		Instru	ctional Activit	ies: Activities/T	asks		
Units have	many typ	es of lesso	ons that l	have diffe	erent pu	irpose	S
Level 1: Visual/Preparing the Learner: -G1-H: Face It (1 day)	G1-FA-1 -What will it be? (1 day)	C1: Levels 1 & 2: Visual & Descriptive -Three-Moment of Definitions: Reflection, Rotation, Translation: -G1-1-1 (3 days) -G1-1-2 (3 days) -G1-1-3 (3 days)	C1: Levels 1 & 2: Visual & Descriptive -Inferences of C1 with Non- examples: Dilation	C3: Levels 3 & 4: Relational & Deductive -Congruency	Level 4: Inductive/De ductive -Task	Level5: Rigor	ROBUST AND DIFFERENTIATION LESSONS G1-SA-1 -Flip Sliding Away (1 day)
Unit of S Segme	ent	or Mathematical Pract	tice happen at the	Unit Level			

21 st Century	Learning and Innovation:			
Skills:				
	\square Critical Thinking & Problem Solving \square Co	nmunication & Collaboration 🛛 Creativity & In	nnovation	
	Information, Media and Technology:			
	Online Tools Sof	ware Hardware		
Essential	Tier II:	Tier III:		
Academic				
Language:	Describe	Reflection		
	Explain	Rotation		
	Analyze	Translation		
Formative Assess	nent will be given?	How will pre-assessment guide instruction? Formative Assessment		
-What will it be?	sment	-to determine prior knowledge and to address t	the grap of	
		weakness in order to differentiate.	life afea of	
Summative Asses	semont	Summative Assessment		
-Flip Sliding Awa		-MARS task to demonstrate learned knowledge and modeling		
The shalls rive	y	with mathematics.		
	Standards	Assessment of Standards (include formative	e and summative)	
	earning Standards Taught and Assessed (include one		What does the	
	s for one or more of the areas below. Please write out		assessment tell us?	
the complete text f	for the standard(s) you include.)	formative assessments (\mathbf{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.)		
Common Core M	Iathematics Content Standard(s):			
Concept 1:				
Experiment with	transformations in the plane			
G.CO.2 – Represe	nt transformations in the plane using, e.g.,			
-	d 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 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.

	listening, speaking, reading, writing, and thinking dards (as applicable):		
speaking, reading, o 6. Acquire and use domain-specific wo addition, and other	of language and its conventions when writing,		
 Engage effective in groups, and teach texts, building on o a. Come to discussi explicitly draw on to topic to explore ide b. Follow agreed-up c. Pose and respond contribute to the dia d. Review the key in information and kn Report on a topic 	and Listening Standards: ly in a range of collaborative discussions (one-on-one, her-led) with diverse partners on grade 6 topics and thers' ideas and expressing their own clearly. ons prepared having read or studied required material; that preparation and other information known about the as under discussion. pon rules for discussions and carry out assigned roles. I to specific questions by making comments that scussion and elaborate on the remarks of others. deas expressed and draw conclusions in light of owledge gained from the discussions.		
	appropriate facts and relevant, descriptive details to or themes; speak clearly at an understandable pace.		
Standards of Mathematical Practice:	(<i>Check all that apply</i>) 1. Make sense of problems and persevere in solving them.		Opportunities for Observable Data (How will students demonstrate these Mathematical Practices?)
	 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 		 Students will make sense of given direction to perform a task. Students will describe a relationship between the figure and its images. 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 connection studies, art, etc.)	ns made in this unit of study (i.e. literature, science, social
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

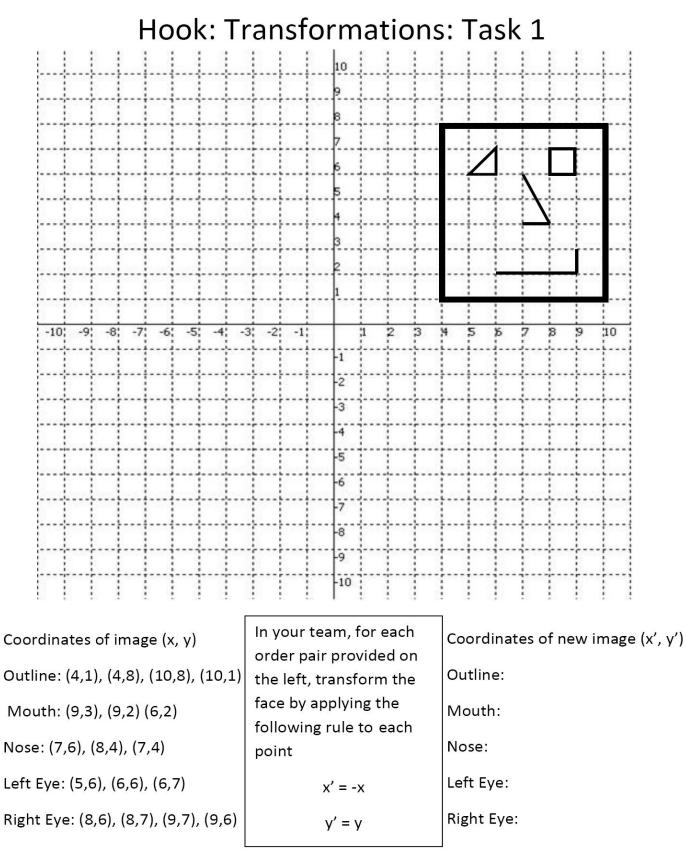
Unit: G1 Lesson: G1-H	Grade Level/Course: Geometry	Duration: <u>Day 1</u> Date:	of 1 Period of 50 Minutes		
Common Core and Content Standards	Focus at the Cluster level: Experiment with transformations in the plane G.CO.5 Given a geometric figure and a rotation, reflection, or translation, draw the transformed 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 - Hook: Transformations - Hook: Transformations -	:: Transformations – Task 1 Handout :: Transformations – Task 2 Handout :: Transformations – Task 3 Handout :: Transformations – Task 4 Handout :: Transformations – Base Group – Part 2 Handout			
	Content:		Language:		
Objectives	Students are introduced to ex different transformations in the students may know of one typ transformation better than the student is expected to be an e transformation).	he plane. Some pe of other. (Each	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 ing □ Level 4: Ext	-		
Standards for Mathematic al 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	 ☑ Focus on the Standards ☑ Coherence within and a 	cross grade levels			
Shifts in Mathematics		-	, procedural skill & fluency, and application of skills)		
ca bul ary (Ti TEAC HER E E E	KEY WORDS ESSEN UNDERSTANI		WORDS WORTH KNOWING		

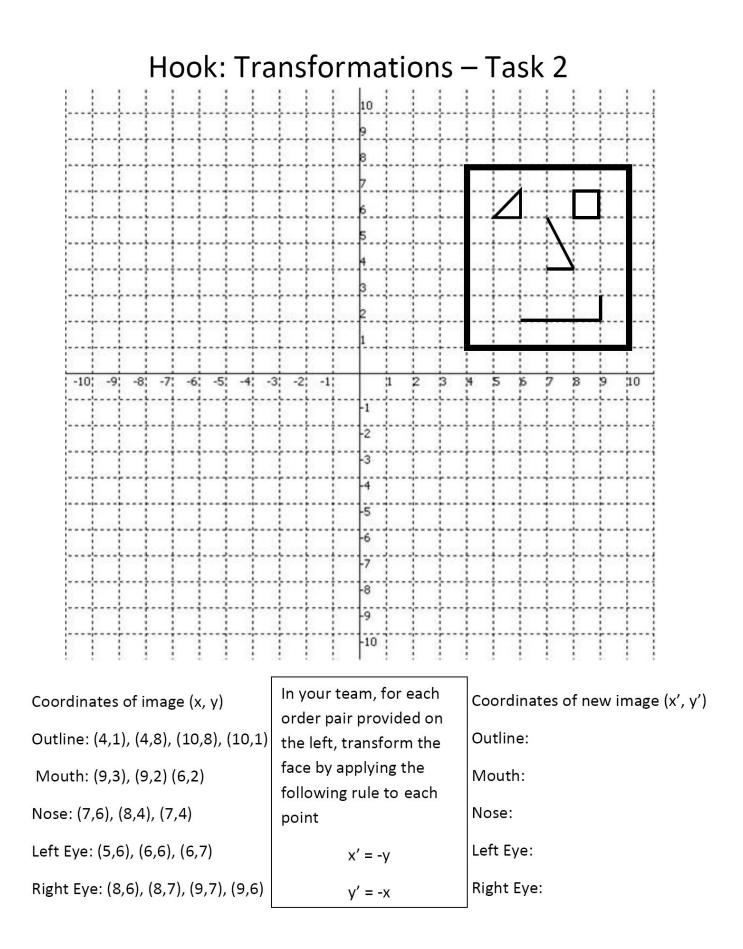
		Observe Describe Explain		
	STUDENTS FIGURE OUT THE MEANING	Reflect Rotate Translate	Flip Turn Move Slide	
Pre-tea Conside	ching	First introduction to rigid transformation. Collaboration.	ative group work experience is	essential in learning this
		Lesson Deliv	very	
		Check method(s) used in the lesson:		
Instru		⊠ Modeling □ Guided Prac	ctice 🛛 Collaboration	
al Met	hods	Independent Practice 🛛 Guided Inqu		
		Prior Knowledge, Context, and Motivation	on:	
		Collaborative Conversations and group wor		
		Lesson Overview		Differentiated
Body of the Lesson: Activities/ Questioning/ Tasks/ Strategies/ Technology/ Engagement		 Day 1 of 1 Hook Lesson/Preparing the Learner Lesson Preparations: Students are divided in groups of 4 to transformation task via the Jigsaw activity. They are match the action with the mathematical terminology structure of the Jigsaw Activity. Structure of Jigsaw Activity. Students are in groups of four. This group is Each student in this Base/Expert group is p become an expert later on in this activity. Students move to Experts group. Members together to become experts in the task give Once each student in the group has learned task that they were given in their Expert G the Base Group what they learned and mak "experts" just like themselves. 	to perform the task and Perform the task and Perform the task and Perform the task and Perform the Base Group. Perform the Base Group. Perform the task to In the Expert Group work In hand. Perform the task to Perform task to P	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
		 Hook: Transformation – Tasks 1 – 4 handouts DOK Level 3 – Strategic Thinking Independent Group Effort: Collaboration an Mathematical Practice(s) Being Monitored: 3 Construct viable arguments and critique the reformer 1 Make sense of problem and persevere in solvi Objective: Students are to make sense of the prostrategy on how to perform the task and teach each be done. 	easoning of others ng them oblem and figure out a	Teacher, paraprofessional of student study buddy read aloud the question if needed. Write or project all sentence frames

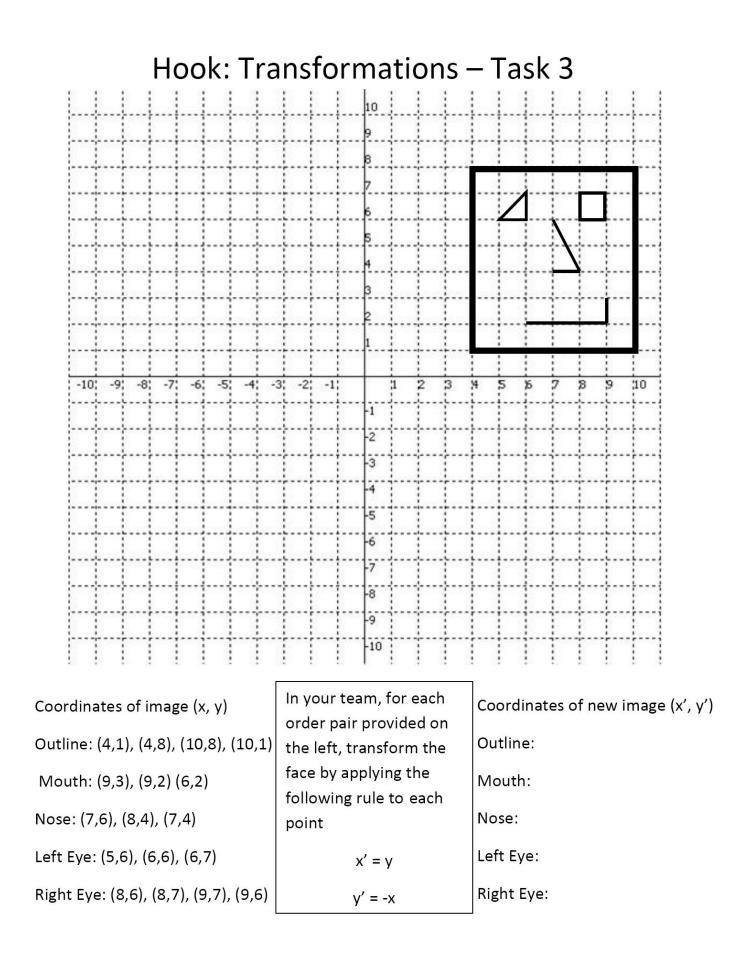
Teacher: Have students form Base Groups of 4 each. Each student is to choose a	
task from:	
• Hook: Transformation – Task 1 (Reflection)	
• Hook: Transformation – Task 2 (Rotation 180^{\cup})	Accelerated Learners:
• Hook: Transformation – Task 3 (Translation)	
Hook: Transformation – Task 4 (Rotation 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.	
once mey return to men base oroup.	
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 ¹ 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.	

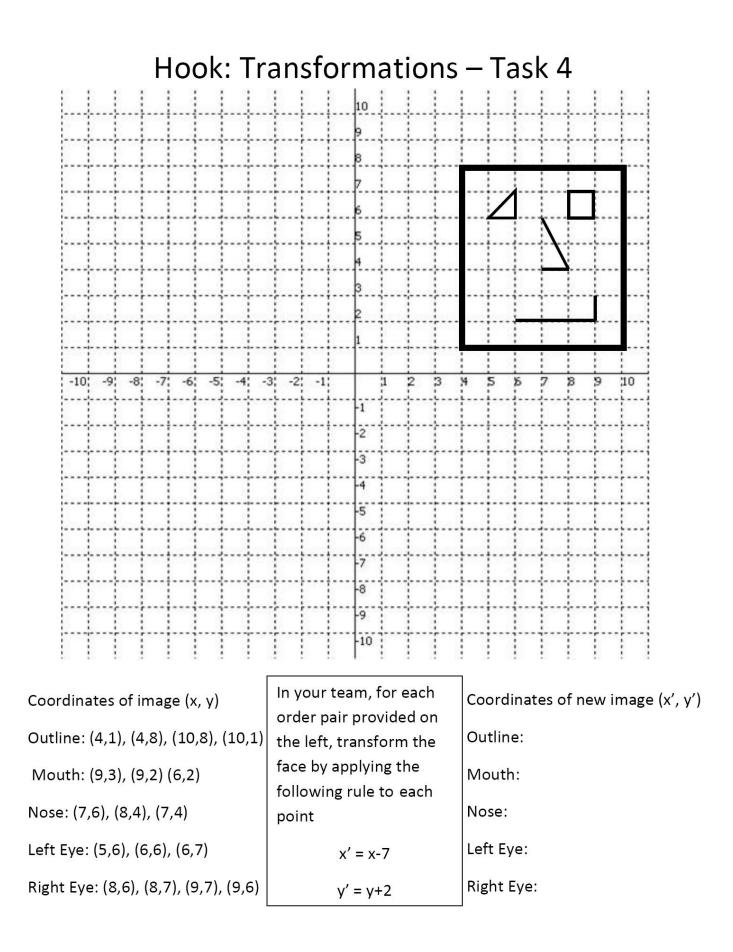
	Teacher: May provide the following sentence frames to help students organize their responses:
	• Task 1: The rule was written as in order to communicate that
	the image is a flip of
	• Task 2: The rule as written as in order to communicate that the image is a of
	 Task 3: The rule was written as in order 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
	 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
	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	
Outcomes	

Names _









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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Unit: G1	Grade Level/Course:	Duration: Day 1 of 1 (50 Min.) Lesson				
Lesson:	Geometry	Date:				
G1-FA						
Common Core and Content Standards	G.CO.2 – Represent transoftware; describe trans give other points as out to those that do not (e.g. G.CO.5 – Given a geome transformed figure using sequence of transforma G.CO.3 – Given a rectan rotations and reflection G-CO 1 – Know precise of	nsformations in the plane transformations in the plane using, e.g., transparencies and geometry ansformations as function that take points in the plane as inputs and butputs. Compare transformations that preserve distance and angle (e.g., translation versus horizontal stretch). ometric figure and a rotation, reflection, or translation, draw the sing, e.g., graph paper, tracing paper, or geometry software. Specify a mations that will carry a given figure onto another. tangle, parallelogram, trapezoid, or regular polygon, describe the ions that carry it onto itself. se definitions of angle, circle, perpendicular line, parallel line, and line he undefined notions of point, line, distance along a line, and distance				
Materials/ Resources/ Lesson Preparation	Formative Assessment					
L	Content:		Language:			
Objectives	Students are provided the opp and be an expert in Reflection Translation of Rigid Motions	he opportunity to learn lection, Rotation, and Students are to communicate orally and in written for to learn, explain, and become an expert.				
Depth of	Level 1: Recall	⊠Level 2: Skill	/Concept			
Knowledge	Level 3: Strategic Think		-			
Level)		-			
	□ 1. Make sense of pro	oblems and perse	vere in solving them.			
	2. Reason abstractly	y and quantitativ	ely.			
	3. Construct viable	arguments and c	ritique the reasoning of others.			
Standards for	4. Model with math	-	• 0			
Mathematic						
al Practice	⊠ 5. Use appropriate t	ools strategically				
	\boxtimes 6. Attend to precision	o n.				
	7. Look for and ma	ke use of structm	·e.			
			repeated reasoning.			
Common Core	S. LOOK for and exp	ress regularity II	i repeateu reasoning.			
Instructional	\boxtimes Focus on the Standards	oross grada lavala				
Shifts in Mathematics		-				
manemanes	Rigor (Balance of conceptual understanding, procedural skill & fluency, and application of skills)					

HER TION		KEY WORDS ESSENTIAL TO UNDERSTANDING	WORDS WOR	TH KNOWING
Academic Vocabulary (Tier II & Tier III)	HE PROVIDES TEACHER SIMPLE EXPLANATION		Flip Turn Move Slide	
Acad	STUDENTS FIGURE OUT THE MEANING			
Pre-tea Conside				
Conside				
		Lesson Deli	very	
		Check method(s) used in the lesson:	•	
Instru		Modeling Guided Practice	ctice 🛛 Collaboration	
al Met	hods	⊠ Independent Practice □ Guided Inq	uiry 🛛 Reflection	
		Prior Knowledge, Context, and Motivati	on:	
Body o Lesse Activit Question Tasks/ Stra Technol Engagen	ning/ ategies/ logy/	Lesson Overview Teacher: May have students work either individual Formative Assessment. The assessment will help tea the area of weakness and to pick the correct lesson to Saw activity below to help students become experts Students will be differentiated in different groups to Rotation, or Translation. Once students are assigned perform the appropriate lessons provided (G1-1-1 R and/or G1-1-3 Translation).	acher and students identify to differentiate. Use the Jig in all Rigid Motions. I learn either Reflection, to the appropriate group, teflection, G1-1-2 Rotation,	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:
TT -		Lesson Refle	ction	
Teac Reflec Evider by Stu Learn Outco	etion nced dent ing/			

Lesson Continuum

What will it be?

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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

Unit: (G1	Grade Level/Course:	Duration: Day	of 3 of (50 min.) Lesson				
Lesson		Geometry	Date:					
G1-1-1								
Com		8	-	igid motions to transform figures and to				
Core		predict the effect of a given rigid motion on a given figure.						
Cont		Unpacked - Focus: Use descriptions of Reflections to predict the effects rigid motion has						
Stand		on figures in the coordin	1					
Mate		Patty Paper (Tracing Paper)	per)					
Resou		Straightedge						
Less		Markers and Constructi	on Paper					
Prepa	ration	Student Handouts						
			p Interview Activi	y directions posted on the Whiteboard				
Objec	ctives	Content: Students will be able to deve understanding of Reflections It is one type of tran Has its own distinc It impacts rigid figure	as how: asformation t characteristics	 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 				
Dept Know Lev	ledge	□Level 1: Recall □Level 2: Skill/Concept □Level 3: Strategic Thinking □ Level 4: Extended Thinking						
		☑ 1. Make sense of problems and persevere in solving them.						
		igtimes 2. Reason abstractly and quantitatively.						
Stand	lards	\boxtimes 3. Construct viable arguments and critique the reasoning of others.						
fo		4. Model with mathematics.						
Mathe al Pra		□ 5. Use appropriate tools strategically						
al Pra	ictice	\boxtimes 6. Attend to precision.						
		7. Look for and make use of structure.						
		\boxtimes 8. Look for and express regularity in repeated reasoning.						
Commo		S Focus on the Standards						
Instruc		Coherence within and across grade levels						
Shift Mather		\boxtimes Rigor (Balance of conceptual understanding, procedural skill & fluency, and application of skills)						
	a N	KEY WORDS ESSE	- *					
	CHE	UNDERSTAN	DING	WORDS WORTH KNOWING				
~	PROVIDES TEACHER SIMPLE EXPLANATION	Transform		Symmetry (Fold line)				
III) ullar	DES	New Image A prime		Coordinates				
ocab	OVI	A double-prime						
nic V 11 & '		A triple-prime						
Academic Vocabulary (Tier II & Tier III)	STUDENTS FIGURE OUT THE MEANING	Reflections						
Ac	DUT							
	STUDENTS URE OUT 7 MEANING							
	HGU							

Pre-teaching	This lesson requires students to be able to communicate their understanding and fi	indings with peers.
Considerations		
	Lesson Delivery	
	Check method(s) used in the lesson:	
Instruction	⊠ Modeling □ Guided Practice ⊠ Collaboration	
al Methods	☐ Independent Practice ☐ Guided Inquiry ☐ Reflection	
	Prior Knowledge, Context, and Motivation:	
	r nor Knowledge, Context, and Wottvation:	
	Prior Knowledge: Students know how to name quadrilaterals, triangles, and polyg	gons by their vertices
	Context: Students are to derive their own definition for reflections and to demonstr	rate its effect on rigid figures
	Motivation: Students are able to analyze that reflections: a) are one type of transfor characteristics, and c) have no effect on the size and shape of rigid figures	rmations, b) have distinct
	Lesson Overview	Differentiated
	All explorations are collaborative in nature:	Instruction:
	Evaluation of Deflection Student Handout	
	Exploration of Reflection Student Handout	English Learners:
	Teacher: While students are working in groups, teacher should serve as a	English Leathers.
	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.	Students Who Need
	Structure: Option 1 – Assign Group Roles:	Additional Support:
	Roles may be teacher-assigned, randomly assigned or self-selected and adjusted	Provide vocabulary cards
Body of the	as necessary.	with simple definitions for
Lesson: Activities/	• Recorder – serves as the Secretary who records the thoughts and hypotheses of group members; ensures all members contribute to the	academic vocabulary.
Questioning/ Tasks/ Strategies/	discussion (including self)	Project or provide handout
Technology/ Engagement	• Reader/Interpreter – Reads the question and interprets what the group is asked to do for each question; determines and defines key vocabulary	to group of role names and
Engagement	for all members; and ensures every team member has the same	descriptions for Option 1.
	understanding	Teacher, paraprofessional
	• Sergeant of Arms – Serves as norm monitor and quality control; keeps each team member on task; ensures task is completed on a timely	or student study buddy read aloud the questions on
	manner; and monitors time to ensure the team has ample time to answer	Exploration of Reflections
	all assigned questions	handout as needed.
	• 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	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 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:	
	Quick-write with a finree-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	
	Tanahary Domindo students to compare each student's responses with each other	
	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		

Unit: C Lesson G1-1-1	:	Grade Level/Course: GeometryDurati Date:					
Com Core Cont Stand	and tent	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					
Mater Resou Less Prepar	rces/ son	Patty Paper (Tracing Paper) Straightedge Student Handouts Text/Workbook Checklist and Reading Comprehension Directions					
Objec	tives	Content: Students will be able to develop their of understanding of Reflections as how: It is one type of transformatio Has its own distinct character It impacts rigid figures	own on	 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 			
Dept Know Lev	ledge	□Level 1: Recall □Level 2: Skill/Concept □ Level 3: Strategic Thinking □ Level 4: Extended Thinking					
Stand fo Mathe al Pra	r matic actice	 1. Make sense of problems a 2. Reason abstractly and question 3. Construct viable argume 4. Model with mathematics 5. Use appropriate tools strated 6. Attend to precision. 7. Look for and make use of 8. Look for and express region 	uantitativ ents and c s. ategically of structur	ely. ritique the reasoning of others. re.			
Commo Instruc Shift Mather	tional s in	 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 T UNDERSTANDING Transform New Image A prime A double-prime A triple-prime	-	WORDS WORTH KNOWING Symmetry (Fold line) Coordinates Vertices			

	Deflections Demonstration Disector	
STUDENTS EIGURE OUT THE MEANING	Reflections Perpendicular Bisector	
Pre-teaching Considerations	This lesson requires students to be able to communicate their understanding and f	indings with peers.
	Lesson Delivery	
	Check method(s) used in the lesson:	
Instruction	⊠ Modeling □ Guided Practice ⊠ Collaboration	
al Methods	☐ Independent Practice ☐ Guided Inquiry ☐ Reflection	
	Prior Knowledge, Context, and Motivation:	
	Prior Knowledge: Students know how to name quadrilaterals, triangles, and poly	gons by their vertices
	Context: Students are to derive their own definition for reflections and to demonst	rate its effect on rigid figures
	Motivation: Students are able to analyze that reflections: a) are one type of transfo	
	characteristics, and c) have no effect on the size and shape of rigid figures	initiations, b) have distinct
	Lesson Overview	Differentiated
	All explorations are collaborative in nature:	Instruction:
	Reflection Student Handout	
	Teacher: While students are working in groups, teacher should serve as a	English Learners:
	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	
Body of the	understanding s of the topic being explored.	Students Who Need Additional Support:
Lesson:	Structure: <u>Option 1 – Assign Group Roles:</u> Roles may be teacher-assigned, randomly assigned or self-selected and adjusted	
Activities/ Questioning/	as necessary.	Provide vocabulary cards with simple definitions for
Tasks/ Strategies/ Technology/	• Recorder – serves as the Secretary who records the thoughts and hypotheses of group members; ensures all members contribute to the	academic vocabulary.
Engagement	discussion (including self)	For Gallery Walk, provide
	• Reader/Interpreter – Reads the question and interprets what the group is asked to do for each question; determines and defines key vocabulary	handout or project on board the prompts for
	for all members; and ensures every team member has the same	student tasks.
	 Sergeant of Arms – Serves as norm monitor and quality control; keeps 	For Decoding the
	each team member on task; ensures task is completed on a timely	Definition, display
	manner; and monitors time to ensure the team has ample time to answer all assigned questions	sentence frames or give handouts.
	• Supply General – Obtains supplies for each team member; leads the	
	team to action; and empowers, monitors and maintains responsibilities of each member	
	Structures Ontion 2 Dain share Decides Groups of 4	Accelerated Learners:
	 Structure: <u>Option 2 – Pair-share/Dyad to Group of 4</u> Students work as elbow partners to ensure all members contribute to 	
	the discussion; have ample time to develop meaningful conjectures, and	

	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 wordwas 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.	
	Statents, Finient tien personal responses to meorporate an anaersanteings.	
	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	
	/ 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		
	1	

Unit: G	1	Grade		8 of 3 (50 min.) Lesson				
Lesson: G1-1-10	r	Level/Course:	Date:					
G1-1-10	<i>,</i>	Geometry Use geometric descrip	tions of rigid mo	tions to transform figures and to predict the				
Com Core Cont Stand	and tent	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						
Mater Resou Less Prepar	rces/ son	Patty Paper (Tracing Paper) Straightedge Student Handouts Text/Workbook as reference Checklist as reference						
Objectives		Content: Students will be able to devu understanding of Reflection • It is one type of tra • Has its own disting • It impacts rigid fig	s as how: nsformation ct characteristics	 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 				
Dept Knowled		□Level 1: Recall □Level 2: Skill/Concept □ Level 3: Strategic Thinking □ Level 4: Extended Thinking						
		⊠ 1. Make sense of p	oblems and pers	evere in solving them.				
		\boxtimes 2. Reason abstractly and quantitatively.						
		\boxtimes 3. Construct viable arguments and critique the reasoning of others.						
Standa		\boxtimes 4. Model with mathematics.						
Mathen Prac		\boxtimes 5. Use appropriate tools strategically						
Tac	ucc	\boxtimes 6. Attend to precision.						
		☑ 0. Attend to precision.☑ 7. Look for and make use of structure.						
Commo	n Core	 ☑ 8. Look for and express regularity in repeated reasoning. ☑ Focus on the Standards 						
Instruc Shift		Coherence within and across grade levels						
Mather		☐ Concernce within and across grade levels ☐ Rigor (Balance of conceptual understanding, procedural skill & fluency, and application of skills)						
	3R ION	KEY WORDS ESSE	NTIAL TO	WORDS WORTH KNOWING				
ic ry r III)	ACHI NATI	UNDERSTAN Transform	DING	Symmetry (Fold line)				
Academic Vocabulary (Tier II & Tier III)	S TE.	New Image		Coordinates				
Aca Voca sr II d	TDE! E EX	A prime		Vertices				
, (Tic	PROVIDES TEACHER SIMPLE EXPLANATION	A double-prime A triple-prime, etc.						

	۲	Reflections Peterson	erpendicular Bisector	
	SE .	Line of Reflection	apendicular Disector	
		Line of Kenection		
	UDE EAN			
	ST SUS			
	STUDENTS FIGURE OUT THE MEANING			
Pre-teac	hing	This lesson requires students to be able to communic	ate their understanding and	findings with peers.
Considera	ations			
		Lesson Deliver	X 7	
		Check method(s) used in the lesson:	y	
Instructi		⊠ Modeling □ Guided Practic	ce 🖂 Collaboration	
l Metho	ods	☐ Independent Practice ⊠ Guided Inquir	<u> </u>	
		Prior Knowledge, Context, and Motivation		
		Prior Knowledge: Students know how to name quadr	ilaterals, triangles, and poly	gons by their vertices
		Context: Students apply their own understanding of re images.	flections to accurately creat	e and define new reflected
		Mativation. Students are able to analyze that reflection	a a) and and type of the set	amotions h) have distinct
		Motivation: Students are able to analyze that reflection characteristics, and c) have no effect on the size and sh		ormations, b) have distinct
		characteristics, and c) have no effect on the size and sh	ape of fight figures	
		Lesson Overview		Differentiated
		All explorations are collaborative in nature	:	Instruction:
		Strengthening Reflections		
			English Learners:	
		Teacher: While students are working in groups, teacher	0	
		facilitator, walking from group to group to provide clar		
		Student: Work in groups of 2 - 4 (see structure outline		
		questions provided. The goal is for students to develop		
		understanding s of the topic being explored.		Students Who Need
Body of t				Additional Support:
Lesson		Structure: Option 1 – Assign Group Roles:		
Activities Questioning/		Roles may be teacher-assigned, randomly assigned or s	elf-selected and adjusted	Provide vocabulary cards
Strategies		as necessary.		with simple definitions for
Technolog		• Recorder – serves as the Secretary who recor		academic vocabulary and
Engageme	ent	hypotheses of group members; ensures all mer	mbers contribute to the	symbols if applicable.
		discussion (including self)	1	
		• Reader/Interpreter – Reads the question and		For # 7-8, scaffolding
		is asked to do for each question; determines an		questions might include:
		for all members; and ensures every team mem	ber has the same	"When you are reflecting
		understanding	and quality controly been	over y=x, what do you
		• Sergeant of Arms – Serves as norm monitor a		think you should do first?"
		each team member on task; ensures task is con		or "Do you remember what
		manner; and monitors time to ensure the team all assigned questions	has ample unle to answer	y=x looks like and how to put that on the graph?"
			aam mambar: laads tha	"How about y=-x? What
		• Supply General – Obtains supplies for each t team to action; and empowers, monitors and m		can you do to help yourself
		of each member	aunums responsionnues	remember what that looks
				like?" (possible response:
		Structure: Ontion 2 - Pair share/Dyad to Crown of A		make a t-chart and graph
		Structure: Option 2 – Pair-share/Dyad to Group of 4		the points)
		• Students work as elbow partners to ensure a	in memoers contribute to	Poince)

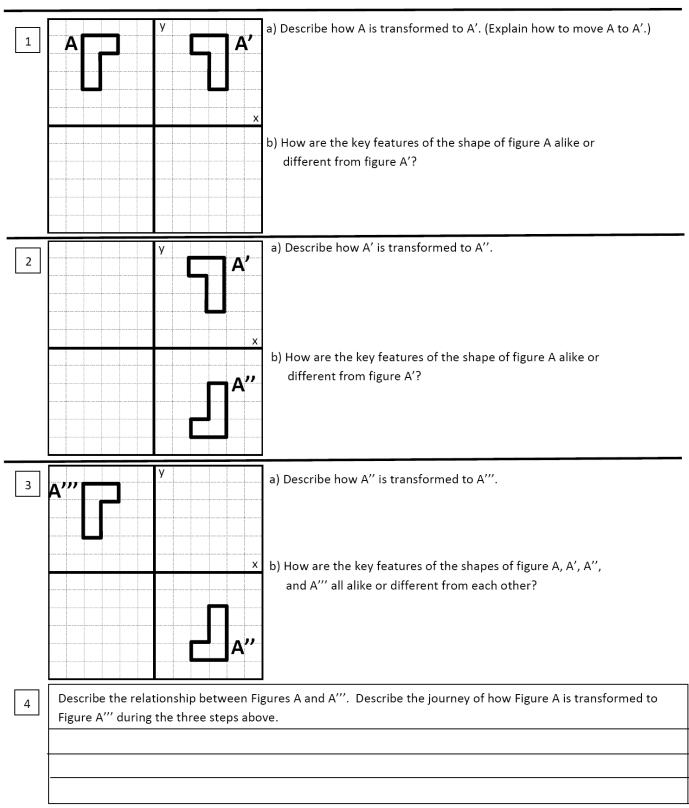
	 the discussion; have ample time to develop meaningful conjectures, and can clarify key vocabulary for one another Once each pair has come to an agreement on their findings, they then share/compare their conjectures with other members in their group of 4 or more If pairs disagree on their findings, further discussion must take place to finalize all conjectures Provides ample validation of ideas 	Accelerated Learners:
	ay 3:	
40) Minutes – Collaborative Group Work	
40	Independent Group Effort: Reading Comprehension and Collaboration	
	 Mathematical Practice(s) Being Monitored: 5 Use appropriate tools strategically 6 Attend to precision 	
Dir	acher: Have students work in groups of 2-4 students (see Option 1 or 2). rect students to use Patty Paper and Straightedge to complete the Reflection tivity. Remind them to refer to the text/workbook definition and previous ork. Teacher monitors and facilitates group activity.	
То	 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." 	
Gi	uided Inquiry: Teacher provides verbal directions while	
stu	udents 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 <u>math tools</u> (hold up Patty Paper and Straightedge), <u>Checklist</u> (point to the Whiteboard) and <u>Text/Workbook</u> to provide hints and to draw your figures with precision." 	
	sign problems $\#1 - 4$ and direct students to do the student activity presented low.	

	 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	
	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".



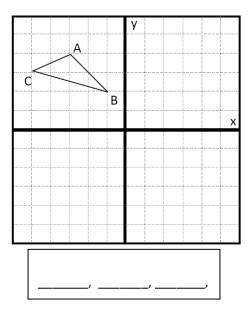
In your own words, describe your understanding of reflection or reflected figures.
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Formal Definition:

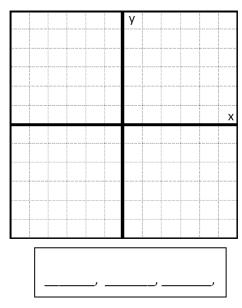
7	Evaluate your definition above in 5 in comparison to the formal definition in 6 differences between the two definitions?	. What are the similarities and
_		
-		
8	Draw your own figure and reflect it. Describe the reflection.	

Reflections

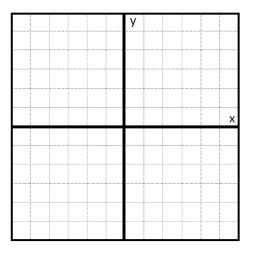
1) Reflect triangle A about the y-axis to create triangle A'. What are the coordinates of A'?

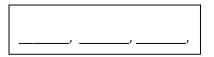


- Name _____
- 2) Draw A' (from #1) on the grid below and then reflect it about the x-axis to create triangle A". What are the coordinates of A"?

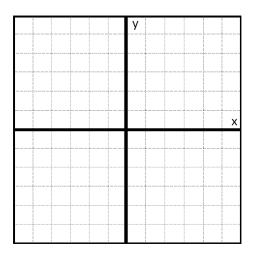


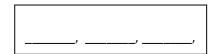
3) Reflect A" about x = 1 to create triangle A"".What are the coordinates of A""?



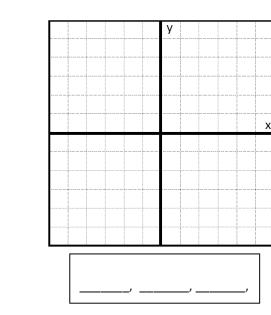


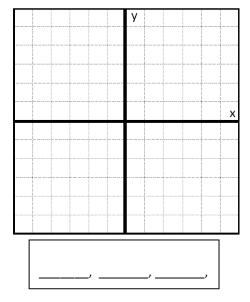
4) Reflect A''' about y = 1 to create triangle A''''. What are the coordinates of A''''?





- 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'''''?

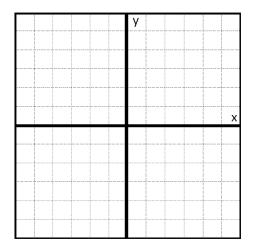




7) Reflect A''''' about y = x to create triangle A'''''' 8) Reflect A'''''' about y = -x to create triangle What are the coordinates of A"""?

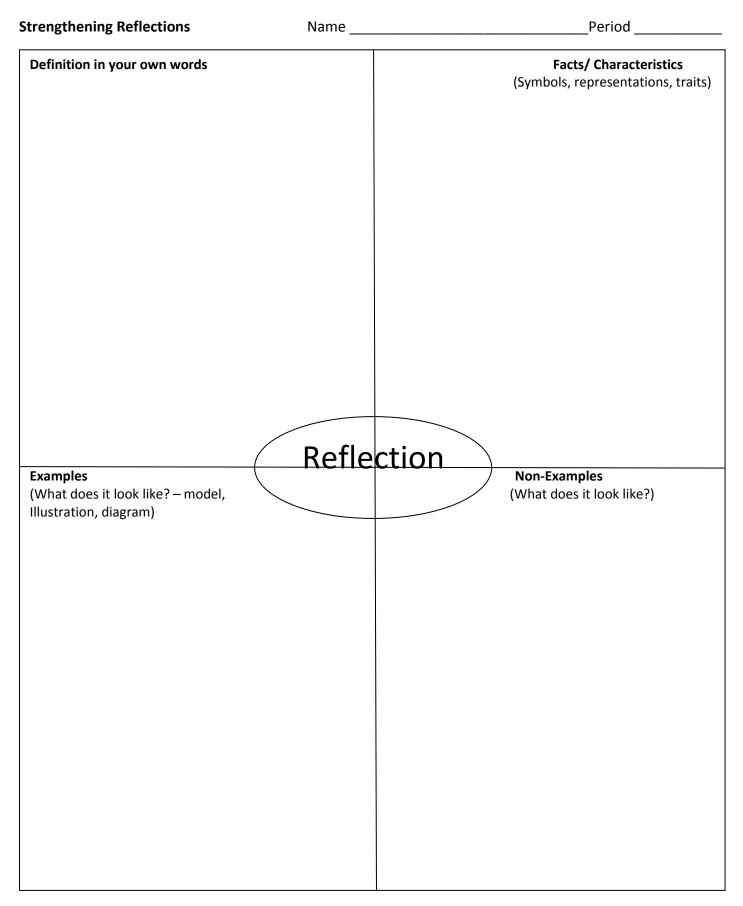
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A""". What are the coordinates of A"""?









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SAUSD Common Core Lesson Planner Mathematics

Unit: C	51	Grade Level/Course: Duration: Day 1 of 3 (50 min.) Lesson			
Lesson	:	Geometry	Date:		
G1-1-2	Α				
Com	mon	Use geometric descript	ions of rigid moti	ons to transform figures and to predict the	
Core	and	effect of a given rigid r	notion on a given	figure.	
Cont	tent	Unpacked - Focus: Use	e descriptions of Re	otations to predict the effects rigid motion has on	
Stand	ards	figures in the coordinate	plane.		
Mater	rials/	Patty Paper (Tracing Pa	per)		
Resou	rces/	Straightedge	,		
Less	son	Markers and Constructi	on Paper		
Prepar	ation	Student Handouts			
-		Checklist and Three Step Interview Activity directions posted on the Whiteboard			
		Content:		Language:	
		Students will be able to deve	lop their own	Students will be able to justify their own understanding of	
		understanding of Rotations as how:		Rotations as how:	
Objec	tives	• It is one type of tran		• It is one type of transformation	
Objec	11103	• Has its own distinc		• Has its own distinct characteristics	
		It impacts rigid figures It impacts rigid figures		• It impacts rigid figures	
Dept	h of				
Know		Level 1: Recall Evel 2: Skill/Concept			
Lev	vel	Level 3: Strategic Think	ting 📋 Level 4: Exte	ended Thinking	
		☐ 1. Make sense of pro	oblems and persev	vere in solving them.	
		\boxtimes 2. Reason abstractly and quantitatively.			
Stand	landa	\boxtimes 3. Construct viable arguments and critique the reasoning of others.			
Stand fo		\boxtimes 4. Model with mathematics.			
Mathe		□ 5. Use appropriate tools strategically			
al Pra	ctice	✓ 6. Attend to precision.			
		☐ 0. Attend to precision. 7. Look for and make use of structure.			
Commo	n Core	 ✓ 8. Look for and express regularity in repeated reasoning. ✓ Focus on the Standards 			
Instruc	tional	\boxtimes Focus on the Standards \boxtimes Coherence within and a	arass arada lavals		
Shift Mather			0	procedural skill & fluency, and application of skills)	
		KEY WORDS ESSE			
	TIO	UNDERSTAN		WORDS WORTH KNOWING	
	EAC ANA	Transform		Point of Reference	
lary I)	ES T XPL	New Image		Coordinates	
abu er II	VID LE E	A prime A double-prime		Degrees Origin	
& Ti	PROVIDES TEACHER SIMPLE EXPLANATION	A double-prime A triple-prime		Ungin	
Academic Vocabulary (Tier II & Tier III)		Rotations			
cade (Tie	T TS T TH IG	Clockwise			
A	STUDENTS FIGURE OUT THE MEANING	Counter Clockwise			
	STU URE ME/				
	EIG				

Pre-teaching	This lesson requires students to be able to communicate their understanding and findings with peers.						
Considerations							
	Lesson Delivery						
	Check method(s) used in the lesson:						
Instruction al Methods	⊠ Modeling □ Guided Practice ⊠ Collaboration						
ai methous	☐ 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 Overview	Differentiated					
	All explorations are collaborative in nature:	Instruction:					
	Exploration of Rotations Student Handout						
	Exploration of Kotations Student Handout	English Learners:					
	Teacher: While students are working in groups, teacher should serve as a	English Learners.					
	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.	Students Who Need					
	Structure: Option 1 – Assign Group Roles:	Additional Support:					
	Roles may be teacher-assigned, randomly assigned or self-selected and adjusted	Provide vocabulary cards					
Body of the	as necessary.	with simple definitions for					
Lesson: Activities/	• Recorder – serves as the Secretary who records the thoughts and hypotheses of group members; ensures all members contribute to the	academic vocabulary and symbols or diagram if					
Questioning/ Tasks/ Strategies/	discussion (including self)	applicable.					
Technology/	• Reader/Interpreter – Reads the question and interprets what the group						
Engagement	is asked to do for each question; determines and defines key vocabulary for all members; and ensures every team member has the same	Project or provide handout to group of role names and					
	understanding	descriptions for Option 1.					
	• 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	Teacher, paraprofessional or student study buddy					
	all assigned questions	read aloud the questions on					
	• Supply General – Obtains supplies for each team member; leads the	Exploration of Rotations					
	team to action; and empowers, monitors and maintains responsibilities of each member	handout as needed.					
	Structure: Option 2 – Pair-share/Dyad to Group of 4						
	• Students work as elbow partners to ensure all members contribute to	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 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 	
	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		

Unit: G		Grade Level/Course: Duration: Day 2 of 3 (50 min.) Lesson				
Lesson		Geometry	Date:			
G1-1-2	B		• • • • • • • • • • • • • • • • • • • •			
Com Core Cont Stand	and tent	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				
Mater Resou Less Prepar	rces/ son	Patty Paper (Tracing Pap Straightedge Student Handouts Text/Workbook Checklist and Reading Co		ections		
Objectives Students will be able to develop their own understanding of Rotations as how: It is one type of transformationHas its own distinct characteristicsIt impacts rigid figures Students will be able to justify their of Rotations as how: It is one type of transformation It impacts rigid figures				It is one type of transformationHas its own distinct characteristics		
Dept Knowl Lev	ledge	Level 1: Recall Image: Level 2: Skill/Concept Level 3: Strategic Thinking Level 4: Extended Thinking				
		⊠ 1. Make sense of pro	blems and perse	vere in solving them.		
		\boxtimes 2. Reason abstractly and quantitatively.				
		☑ 3. Construct viable arguments and critique the reasoning of others.				
Stand						
fo: Mathe		✓ 4. Model with mathematics.				
al Pra		☐ 5. Use appropriate tools strategically				
urru	ietiee	☑ 6. Attend to precision.				
		☑ 7. Look for and make use of structure.				
		\boxtimes 8. Look for and express regularity in repeated reasoning.				
Commo	n Core	Focus on the Standards		repeated reasoning.		
Instruc		\boxtimes Coherence within and ac	eross grade levels			
Shift Mather			-	, procedural skill & fluency, and application of skills)		
		KEY WORDS ESSEN		, procedural skill & fidency, and application of skills)		
, Î	CHER ATIO	UNDERSTAND		WORDS WORTH KNOWING		
Academic Vocabulary Tier II & Tier III)	TEAC LAN2	Transform		Point of Reference		
Academic ⁄ocabular r II & Tier	ES 1	New Image		Coordinates		
A(Vo lier I	JVID LE F	A prime A double-prime		Degrees		
Ę	SIMPLE EXPLANATION	A triple-prime				

HE	Rotations	Center of Rotation				
ST 1	2 Clockwise A	angle of Rotation				
OO	Counter-clockwise 9	0 degrees				
STUDENTS	1	80 degrees				
STUDENTS FIGURE OUT THE	2	70 degrees				
		-				
Pre-teaching	This lesson requires students to be able to communic	ate their understanding and f	indings with peers.			
Consideration	5					
	Lesson Delive	WX 7				
		<u>1 y</u>				
- , ,.	Check method(s) used in the lesson:					
Instruction	☐ Modeling ☐ Guided Pract	ice 🛛 Collaboration				
al Methods	Independent Prestice Cuided Inqui	ry 🛛 Reflection				
	Independent Practice Guided Inqui					
	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 rotation	s: a) are one type of transfor	mations b) have distinct			
	characteristics, and c) have no effect on the size and sl		nations, b) have distinct			
	Lesson Overview		Differentiated			
	All explorations are collaborative in natur	e:	Instruction:			
	Rotations Student Handout					
			English Learners:			
	Teacher: While students are working in groups, teach		_			
	facilitator, walking from group to group to provide cla					
	Student: Work in groups of 2 - 4 (see structure outline					
	questions provided. The goal is for students to develop	their own meaningful				
	understanding s of the topic being explored.		Students Who Need			
Body of the		Additional Support:				
Lesson:	Structure: Option 1 – Assign Group Roles:					
Activities/	Roles may be teacher-assigned, randomly assigned or	self-selected and adjusted	Provide vocabulary cards			
Questioning/	as necessary.		with simple definitions for			
Tasks/ Strategies/	• Recorder – serves as the Secretary who reco	rds the thoughts and	academic vocabulary and			
Technology/	hypotheses of group members; ensures all me	mbers contribute to the	symbols or diagram if			
Engagement	discussion (including self)		applicable.			
	• Reader/Interpreter – Reads the question and	1 interprets what the group				
	is asked to do for each question; determines a	nd defines key vocabulary	For Gallery Walk, provide			
	for all members; and ensures every team mer	aber has the same	handout or project on			
	understanding		board the prompts for			
	Sergeant of Arms – Serves as norm monitor	and quality control; keeps	student tasks.			
	each team member on task; ensures task is co	mpleted on a timely				
	manner; and monitors time to ensure the team	has ample time to answer	For Decoding the			
	all assigned questions		Definition, display			
	• Supply General – Obtains supplies for each		sentence frames or give			
	team to action; and empowers, monitors and	maintains responsibilities	handouts.			
	of each member					
	Structures Option 2 Dair shows Dred to Cream of	1				
	 Structure: Option 2 – Pair-share/Dyad to Group of a Students work as elbow partners to ensure 					
	• Students work as endow partners to ensure the discussion; have ample time to develop m					

 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 	Accelerated Learners:
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.	
Kencetons.	
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	
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:	

Teacher Reflection	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	
	students to <u>include the Center and Angle of Rotation</u> (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.	
	students to <u>include the Center and Angle of Rotation</u> (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	
	 sentence frame. Record their ideas on the winteboard. 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 	
	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	

Unit: G		Grade Duration: <u>Day 3 of 3 (50 min.) Lesson</u>			
Lesson: G1-1-20		Level/Course: Geometry	Date:		
Com Core Core Stand	mon and tent	Use geometric descrip effect of a given rigid	motion on a given e descriptions of l	tions to transform figures and to predict the n figure. Rotations to predict the effects rigid motion has on	
Mater Resou Less Prepar	rces/ son	Patty Paper (Tracing Pa Straightedge and Protr Student Handouts Text/Workbook as refe Checklist as reference	actor		
Objectives		Content: Students will be able to devunderstanding of Rotations It is one type of tra Has its own distinct It impacts rigid fight	s as how:Rotations as how:ransformationIt is one type of transformationnct characteristicsHas its own distinct characteristics		
Dept Knowled		□Level 1: Recall ⊠Level 2: Skill/Concept ⊠ Level 3: Strategic Thinking □ Level 4: Extended Thinking			
		⊠ 1. Make sense of problems and persevere in solving them.			
		\boxtimes 2. Reason abstractly and quantitatively.			
		\boxtimes 3. Construct viable arguments and critique the reasoning of others.			
Standa		\boxtimes 4. Model with mathematics.			
Mathen Prac		\boxtimes 5. Use appropriate tools strategically			
		✓ 6. Attend to precision.			
		☑ 7. Look for and make use of structure.			
		\boxtimes 8. Look for and express regularity in repeated reasoning.			
Commo		Secus on the Standard			
Instruc Shift		Coherence within and	across grade levels		
Mather	matics	Rigor (Balance of conc	eptual understandin	g, procedural skill & fluency, and application of skills)	
Œ	HER TION	KEY WORDS ESSE UNDERSTAN		WORDS WORTH KNOWING	
Academic Vocabulary (Tier II & Tier III)	PROVIDES TEACHER SIMPLE EXPLANATION	Transform New Image A prime A double-prime A triple-prime, etc.		Point of Reference Coordinates Degrees	

	1						
	HE	Rotations	Center of Rotation				
	E T S	Clockwise	Angle of Rotation				
	NIOEN	Counter Clockwise	90 degrees				
	ICI IEA		180 degrees				
	STUDENTS FIGURE OUT THE MEANING		270 degrees				
	E		•	a			
Pre-tea		This lesson requires students to be able to commun	nicate their understanding and	findings with peers.			
Conside	erations						
		Lesson Deliv	erv				
		Check method(s) used in the lesson:	- 0				
Instruct		⊠ Modeling □ Guided Prac	tice 🛛 Collaboration				
l Meth	nods	☐ Independent Practice ⊠ Guided Inquiry ⊠ Reflection					
		Prior Knowledge, Context, and Motivatio	on:				
Prior Knowledge: Students know how to name quadrilaterals, triangles, and polyg				gons by their vertices			
		e and define new reflected					
		Motivation: Students are able to analyze that reflections: a) are one type of transformations, b) have distinct					
				rmations, b) have distinct			
		characteristics, and c) have no effect on the size and	shape of rigid figures				
		Lesson Overview		Differentiated			
		All explorations are collaborative in natu	re:	Instruction:			
		Strengthening Rotations Student Handout					
		0 0		English Learners:			
		Teacher: While students are working in groups, teac	cher should serve as a	English Learners.			
		facilitator, walking from group to group to provide c					
		Student: Work in groups of 2 - 4 (see structure outli					
		questions provided. The goal is for students to develo					
		understanding s of the topic being explored.		Students Who Need			
Body of	f the		Additional Support:				
Lesso		Structure: Option 1 – Assign Group Roles:					
Activiti	ies/	Roles may be teacher-assigned, randomly assigned o	Provide vocabulary cards				
Questioning		as necessary.	with simple definitions for				
Strategi Technolo		• Recorder – serves as the Secretary who rec	cords the thoughts and	academic vocabulary and			
Engagen		hypotheses of group members; ensures all n	nembers contribute to the	symbols or diagram if			
		discussion (including self)		applicable.			
		• Reader/Interpreter – Reads the question a	and interprets what the group				
			and defines key vocabulary				
		is asked to do for each question; determines	for all members; and ensures every team member has the same				
				Accelerated Learners:			
		for all members; and ensures every team me	ember has the same	Accelerated Learners:			
		 for all members; and ensures every team me understanding Sergeant of Arms – Serves as norm monito each team member on task; ensures task is of 	ember has the same or and quality control; keeps completed on a timely	Accelerated Learners:			
		 for all members; and ensures every team me understanding Sergeant of Arms – Serves as norm monito each team member on task; ensures task is o manner; and monitors time to ensure the team 	ember has the same or and quality control; keeps completed on a timely	Accelerated Learners:			
		 for all members; and ensures every team me understanding Sergeant of Arms – Serves as norm monito each team member on task; ensures task is o manner; and monitors time to ensure the tea all assigned questions 	ember has the same or and quality control; keeps completed on a timely am has ample time to answer	Accelerated Learners:			
		 for all members; and ensures every team me understanding Sergeant of Arms – Serves as norm monito each team member on task; ensures task is o manner; and monitors time to ensure the tea all assigned questions Supply General – Obtains supplies for each 	ember has the same or and quality control; keeps completed on a timely am has ample time to answer h team member; leads the	Accelerated Learners:			
		 for all members; and ensures every team me understanding Sergeant of Arms – Serves as norm monito each team member on task; ensures task is o manner; and monitors time to ensure the tea all assigned questions Supply General – Obtains supplies for each team to action; and empowers, monitors and 	ember has the same or and quality control; keeps completed on a timely am has ample time to answer h team member; leads the	Accelerated Learners:			
		 for all members; and ensures every team me understanding Sergeant of Arms – Serves as norm monito each team member on task; ensures task is o manner; and monitors time to ensure the tea all assigned questions Supply General – Obtains supplies for each 	ember has the same or and quality control; keeps completed on a timely am has ample time to answer h team member; leads the	Accelerated Learners:			
		 for all members; and ensures every team me understanding Sergeant of Arms – Serves as norm monito each team member on task; ensures task is o manner; and monitors time to ensure the tea all assigned questions Supply General – Obtains supplies for each team to action; and empowers, monitors and of each member 	ember has the same or and quality control; keeps completed on a timely am has ample time to answer h team member; leads the d maintains responsibilities	Accelerated Learners:			
		 for all members; and ensures every team me understanding Sergeant of Arms – Serves as norm monito each team member on task; ensures task is o manner; and monitors time to ensure the tea all assigned questions Supply General – Obtains supplies for each team to action; and empowers, monitors and 	ember has the same or and quality control; keeps completed on a timely am has ample time to answer h team member; leads the d maintains responsibilities	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 	
<u>Day 3:</u>	
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 <u>math tools</u> (hold up Patty Paper, Straightedge and Protractor), <u>Checklist</u> (point to the Whiteboard) and <u>Text/Workbook</u> to provide hints and to draw your figures with precision." 	
Assign problems $#1 - 4$ and direct students to do the student activity presented below.	

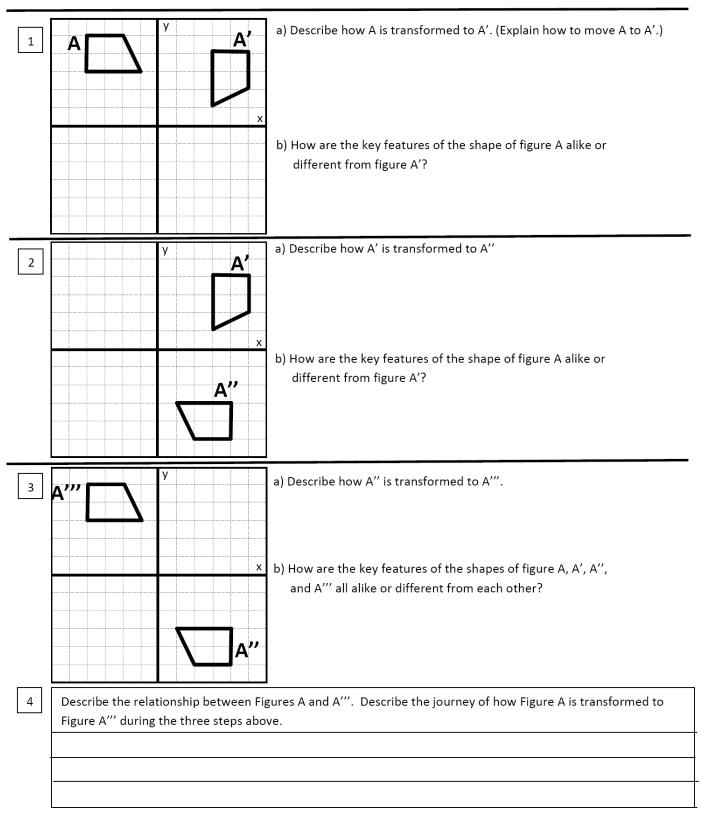
	1	
	 Students: Complete each problem, manipulating the Patty Paper to strategize with a partner/group the most appropriate placement and solution. Work initially on problems #1 – 4 in dyads. Next, have students share their responses with their entire table group When consensus is formed, verify answers 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		
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".



5	In your own words, define a rotation:
_	

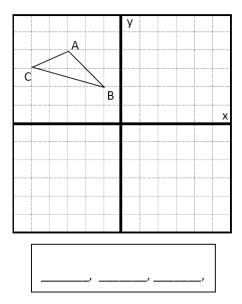
6

Formal Definition:

7	Evaluate the differences and similarities in your definition and the formal definitio	on a	bove	9.			
8	Draw your own figure and rotate it. Describe its rotation.				 		

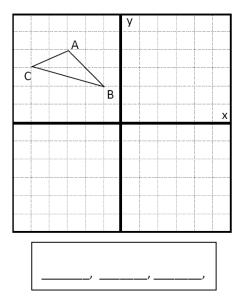
Rotations

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

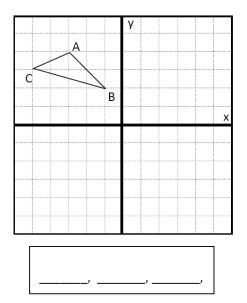


Name _____ Period _____

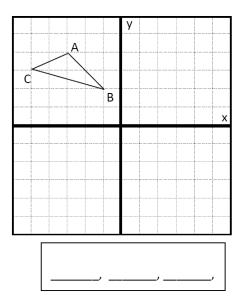
2) Rotate triangle ABC 90 degrees counterclockwise to create triangle GHI. State the coordinates.



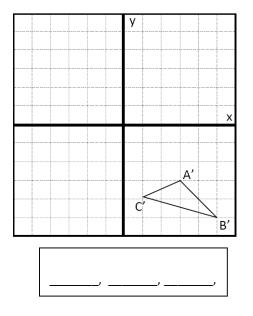
3) Rotate triangle ABC 180 degrees about the origin to create triangle JKL. State the coordinates.



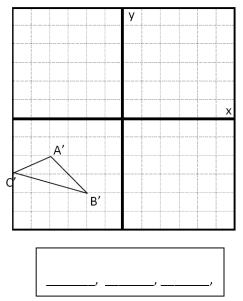
4) Rotate triangle ABC 270 degrees counterclockwise to create triangle MNO. State the coordinates.



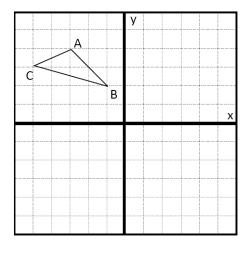
 If the below triangle A'B'C' is the result of a triangle that was rotated 180 degrees about the origin, state the coordinates of the original triangle ABC.



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.

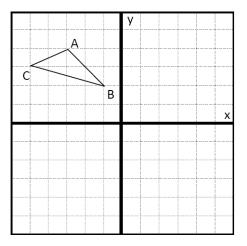


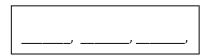
7) Rotate triangle ABC 45 degrees clockwise to create triangle XYZ. State the coordinates.

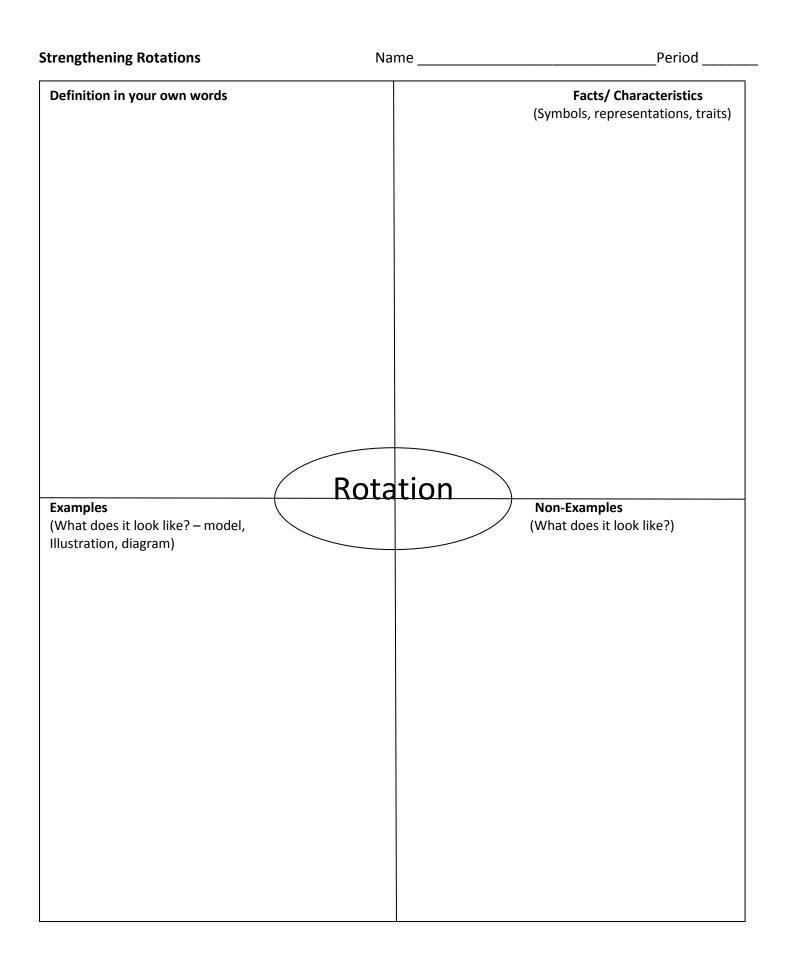




8) Rotate triangle ABC 45 degrees counterclockwise to create triangle XYZ. State the coordinates.







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SAUSD Common Core Lesson Planner Mathematics

Unit: C	51	Grade Level/Course:	Duration: Day 1	of 3 (50 min.) Lesson	
Lesson	:	Geometry	Date:		
G1-1-3	Α				
Com	mon	Use geometric descript	tions of rigid mot	ions to transform figures and to predict the	
Core	and	effect of a given rigid r	notion on a given	figure.	
Cont	tent	Unpacked - Focus: Use	e descriptions of T	ranslations to predict the effects rigid motion has	
Stand	ards	on figures in the coordir	nate plane.		
Mater	rials/	Patty Paper (Tracing Pa	per)		
Resou	rces/	Straightedge	-		
Less	son	Markers and Constructi	on Paper		
Preparation		Student Handouts			
•			o Interview Activit	v directions posted on the Whiteboard	
Objectives		Content: Students will be able to deve understanding of Translation It is one type of tran Has its own distinc It impacts rigid figu	on as how:Translations as how:ansformationIt is one type of transformationnet characteristicsHas its own distinct characteristics		
Know	pth of □Level 1: Recall □Level 2: Skill/Concept wledge □Level 3: Strategic Thinking □Level 4: Extended Thinking				
		☐ 1. Make sense of pro	oblems and perse	vere in solving them.	
		≥ 2. Reason abstractly and quantitatively.			
Stand	lards	\boxtimes 3. Construct viable arguments and critique the reasoning of others.			
fo		\boxtimes 4. Model with mathematics.			
Mathe					
al Pra		5. Use appropriate t	□ 5. Use appropriate tools strategically		
		⊠ 6. Attend to precision.			
		1 7. Look for and make use of structure.			
C	C		oress regularity in	repeated reasoning.	
Commo Instruc		\boxtimes Focus on the Standards			
Shift		ig Coherence within and a	cross grade levels		
Mather	natics	Rigor (Balance of conce	ptual understanding	, procedural skill & fluency, and application of skills)	
	a N	KEY WORDS ESSE	- *		
	CHE	UNDERSTAN	DING	WORDS WORTH KNOWING	
y	IEA(LAN	Transform		Vector	
ular, II)	DES '	New Image A prime		Horizontal and Vertical Movement	
ocab Fier I	PROVIDES TEACHER SIMPLE EXPLANATION	A double-prime			
ic V(I & J	PR	A triple-prime			
Academic Vocabulary (Tier II & Tier III) 	HE.	Translations			
	STUDENTS URE OUT 7 MEANING				
	JRE JRE VEA				
	FIGU				

Pre-teaching Considerations	This lesson requires students to be able to communicate their understanding and fi	indings with peers.		
Considerations				
	Lesson Delivery			
Instruction Modeling Cuided Practice Modeling				
al Methods	☑ Modeling □ Guided Practice ☑ Collaboration			
	☐ Independent Practice ☐ Guided Inquiry ☐ Reflection			
	Prior Knowledge, Context, and Motivation:			
	Prior Knowledge: Students know how to name quadrilaterals, triangles, and poly	gons by their vertices		
	Context: Students are to derive their own definition for translations and to demons figures	trate its effect on rigid		
	Motivation: Students are able to analyze that translations: a) are one type of transfer characteristics, and c) have no effect on the size and shape of rigid figures	ormations, b) have distinct		
	Lesson Overview	Differentiated		
	All explorations are collaborative in nature:	Instruction:		
	Exploration of Translations Student Handout			
	Teacher: While students are working in groups, teacher should serve as a	English Learners:		
	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.	Students Who Need		
	Structure: Option 1 – Assign Group Roles:	Additional Support:		
Body of the	Roles may be teacher-assigned, randomly assigned or self-selected and adjusted as necessary.	Provide vocabulary cards with simple definitions for		
Lesson: Activities/	• Recorder – serves as the Secretary who records the thoughts and hypotheses of group members; ensures all members contribute to the	academic vocabulary and		
Questioning/ Tasks/ Strategies/	discussion (including self)	symbols or diagram if applicable.		
Technology/ Engagement	• Reader/Interpreter – Reads the question and interprets what the group is asked to do for each question; determines and defines key vocabulary	Project or provide handout		
	for all members; and ensures every team member has the same understanding	to group of role names and		
	• Sergeant of Arms – Serves as norm monitor and quality control; keeps	descriptions for Option 1.		
	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	Teacher, paraprofessional or student study buddy		
	all assigned questions	read aloud the questions on		
	• Supply General – Obtains supplies for each team member; leads the team to action; and empowers, monitors and maintains responsibilities of each member	Exploration of Translations handout as needed.		
	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	Accelerated Learners:		
	• 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 discussio	on must take place
to finalize all conjecturesProvides ample validation of ideas	
• Frovides ample valuation of ideas	
Day 1:	
20 Minutes:	
Independent Group Effort: Collaboration	
Mathematical Practice(s) Being Monitored:	
3 Construct viable arguments and critique the reasoni	ng of others
5 Use appropriate tools strategically	
Teacher: Have students form collaborative groups (Option 1 of	
Patty Paper (tracing paper) and Straightedge to trace the figure the figure of the state of the	
the journey from Figure A to Figure A triple-prime (situation # respond to the questions provided. Teacher should also clarify	
responses must incorporate key transformation vocabulary (Re	
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 hori vertically to match it with A' 	zontally and/or
• Students can see that often Translations are comprise	d 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	l to serve as a
written reminder. Such items for the checklist should include:	
 Did you include key transformation vocabulary (Tran when and if it applies? 	islation, vector)
 Did the vertices move in the same parallel movement 	to one another?
• Did you include size and shape in your description of	
• Did you include lengths of sides and angle measure in	n your description
of the journey?Are your responses full complete sentences?	
	tions #1 4 it is
Students: Students may be seated in groups of 4, but for situat preferable to work first with an elbow partner/dyad to form con	
dilated figures. Students should read the suggestion checklist to	
responses.	
20 Minutes:	
Independent Group Effort: Collaboration	
Mathematical Practice(s) Being Monitored:	
3 Construct viable arguments and critique the reasoni	ng of others
Teacher: Introduce question #5 with the following statements	
• "Each diagram in $\#1 - 3$ are examples of Reflections	
Figures. For #5 let's see if you can develop your own these terms mean "	definition of what
these terms mean.""This time, I want you to work independently. In a fe	w minutes, you'll
 This time, I want you to work independently. In a re have a chance to share your responses with your partr 	
 "Be sure to refer to the checklist posted on the whiteb 	
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, 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		

Unit: G	51	Grade Level/Course:	Duration: Day 2	c of 3 (50 min.) Lesson	
Lesson	:	Geometry	Date:		
G1-1-3	B				
Com Core Cont Stand	and tent	effect of a given rigid n	notion on a given e descriptions of T	ions to transform figures and to predict the figure. ranslations to predict the effects rigid motion has	
Mater Resou Less Prepar	rces/ son	Patty Paper (Tracing Paper) Straightedge Student Handouts Text/Workbook Checklist and Reading Comprehension Directions			
Objec	tives	Content: Students will be able to devel understanding of Rotations as It is one type of tran Has its own distinct It impacts rigid figur	lop their own s how: sformation t characteristics	 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 	
Deptl Knowl Lev	ledge	□Level 1: Recall □Level 2: Skill/Concept □ Level 3: Strategic Thinking □ Level 4: Extended Thinking			
		☑ 1. Make sense of problems and persevere in solving them.			
		\boxtimes 2. Reason abstractly and quantitatively.			
Stand	lards	\boxtimes 3. Construct viable arguments and critique the reasoning of others.			
fo	r	🖂 4. Model with mathematics.			
Mathe	matic	☐ 5. Use appropriate tools strategically			
al Pra	ctice				
		☑ 6. Attend to precision	on.		
		\boxtimes 7. Look for and make use of structure.			
		🛛 8. Look for and exp	ress regularity ir	repeated reasoning.	
Commo	n Cono	Focus on the Standards			
Instruc		Students create their			
Shift		☐ Coherence within and across grade levels			
Mather	natics		-	, procedural skill & fluency, and application of skills)	
~ ^Z		KEY WORDS ESSEN			
, Î	CHEI	UNDERSTANI		WORDS WORTH KNOWING	
emic ılary Tier	IEA(LAN	Transform		Vector	
Academic Vocabulary Tier II & Tier III)	ES 1 3XPI	New Image		Horizontal and Vertical Movement	
	UID LE E	A prime A double-prime		Parallel	
Ð	PROVIDES TEACHER SIMPLE EXPLANATION	A triple-prime			

	۲	Tanalations	
	STUDENTS FIGURE OUT THE MEANING	Translations	
Due 4ee		This larger requires students to be ship to communicate their and entered in and fi	a dia an anish a cara
Pre-teaching This lesson requires students to be able to communicate their understanding and the Considerations			indings with peers.
Consider	anons		
		Lesson Delivery	
		Check method(s) used in the lesson:	
Instruc		⊠ Modeling □ Guided Practice ⊠ Collaboration	
al Metł	hods	☐ Independent Practice ☐ Guided Inquiry ☐ Reflection	
		Prior Knowledge, Context, and Motivation:	
		Prior Knowledge: Students know how to name quadrilaterals, triangles, and polyg	gons by their vertices
		Context: Students are to derive their own definition for Translations and to demons figures	strate its effect on rigid
		Motivation: Students are able to analyze that Translations: a) are one type of transl	formations, b) have distinct
		characteristics, and c) have no effect on the size and shape of rigid figures	
		Lesson Overview	Differentiated
		All explorations are collaborative in nature:	Instruction:
Body of Lesso Activiti Question Tasks/ Stra Technolo Engagen	f the on: ies/ iing/ itegies/ ogy/	 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 	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.
		 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 	For Decoding the Definition, display sentence frames or give handouts.
		• 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	Accelerated Learners:
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 Beflections	
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.	
even more precise definition of Translations.	
20 Minutes – Decoding the Definition	
 Independent Group Effort: Reading Comprehension and 	
Independent Group Enort: Reading Comprehension and Collaboration	
 Mathematical Practice(s) Being Monitored: 	
- Mamemancar Fractice(s) Deing Monitoreu.	

	1 Make cause of problems and personers in solving them	
	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 wordwas 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		

Unit: G1		Grade	Duration: Day 3 of 3 (50 min.) Lesson			
Lesson:		Level/Course:	Date:			
G1-1-3C Common Core and Content Standards		GeometryUse 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 as reference Checklist as reference				
Objectives		 Content: Students will be able to develop their own understanding of Translations 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 Translations 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) 				
	-	KIGOT (Balance of Con KEY WORDS ESSE UNDERSTAN	ENTIAL TO	WORDS WORTH KNOWING		
Academic Vocabulary (Tier II & Tier III)	PROVIDES TEACHER SIMPLE EXPLANATION	Transform New Image A prime A double-prime A triple-prime, etc.	1071/0	Vector Horizontal and Vertical Movement Parallel Movement		

	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					
T		Check method(s) used in the lesson:					
Instrue al Met		☑ Modeling ☐ Guided Practice ☐ Collaboration					
ai methous		☐ Independent Practice ⊠ Guided Inquiry ⊠ Reflection					
		Prior Knowledge, Context, and Motivation:					
		Prior Knowledge: Students know how to name quadrilaterals, triangles, and polyg	gons by their vertices				
		Context: Students apply their own understanding of reflections to accurately create images.	e and define new reflected				
		Motivation: Students are able to analyze that translations: a) are one type of transfer characteristics, and c) have no effect on the size and shape of rigid figures	ormations, b) have distinct				
		<u>Lesson Overview</u> All explorations are collaborative in nature:	Differentiated Instruction:				
Body o Lesso Activit Question Tasks/ Stra Technol Engager	Dn: ties/ ning/ ategies/ logy/	 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. 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 	English Learners: Students Who Need Additional Support: Provide vocabulary cards with simple definitions for academic vocabulary and symbols or diagram if applicable. Accelerated Learners:				
		 Structure: Option 2 – Pair-snare/Dyad to Group of 4 Students work as elbow partners to ensure all members contribute to 					

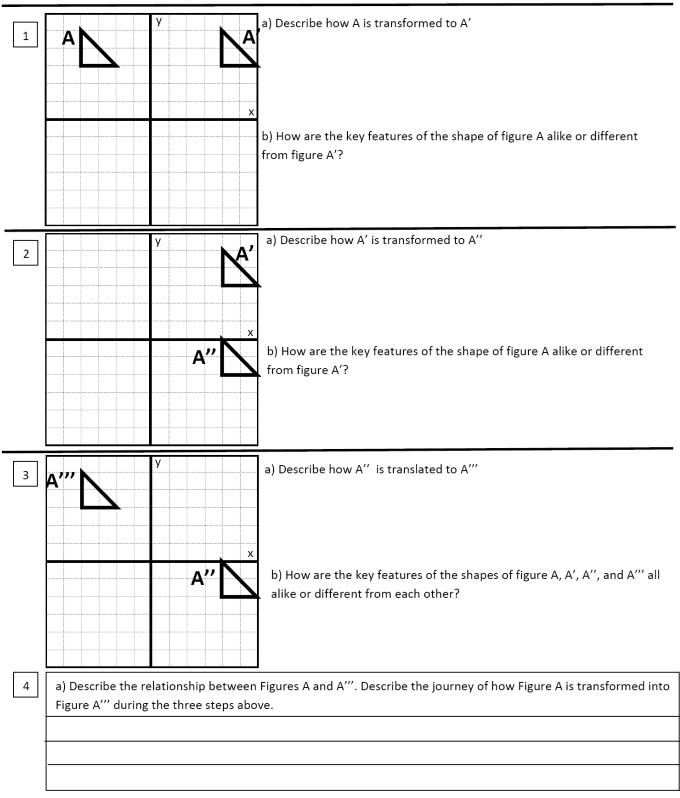
 the discussion; have ample time to develop meaningful conjectures, and can clarify key vocabulary for one another Once each pair has come to an agreement on their findings, they then share/compare their conjectures with other members in their group of 4 or more If pairs disagree on their findings, further discussion must take place to finalize all conjectures Provides ample validation of ideas
<u>Day 3:</u>
40 Minutes Collaborative Crown Work
 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
• 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 <u>math tools</u> (hold up Patty Paper and
Straightedge), Checklist (point to the Whiteboard) and
<u>Text/Workbook</u> to provide hints and to draw your figures with precision."
Assign problems $\#1 - 4$ and direct students to do the student activity presented

 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 the remover a feature allow a many students to view the Checklist posted on the Whiteboart to derive 	
Students: Complete activity independently, making sure they have met all	
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	
	 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: 1 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.

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".



_	
5	In your own words, define a translation:

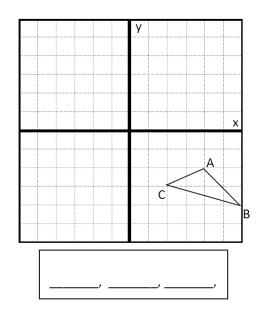
6

Formal Definition:

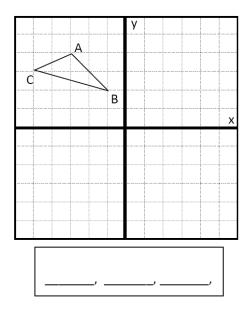
7	Evaluate the differences and similarities of your definition and formal definition above.					
-						
-						
8	Draw your own figure and translate it. Describe its translation.					

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

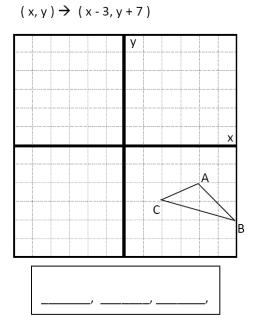
3) Translate triangle ABC 3 units left and 7 units up to create triangle JKL. State the coordinates.



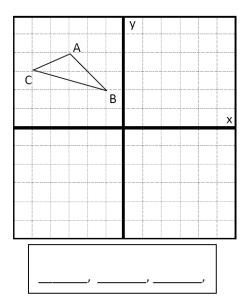
2) Translate triangle ABC 5 units left and 1 unit u to create triangle GHI. State the coordinates.



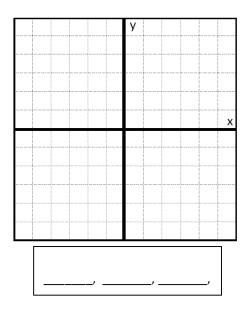
4) Translate triangle ABC using the following motion rule to create triangles MNO. State the coordinates.



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

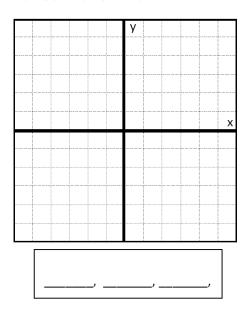


 Translate triangle A" 4 units left and 2 units down. Then translate it 5 units right and 2 units down to create triangle A"". State the coordinates.



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

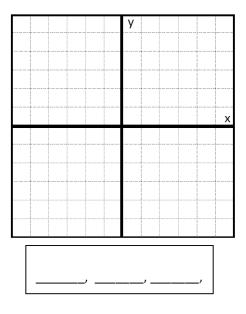
 $(x, y) \rightarrow (x, y - 1.5)$

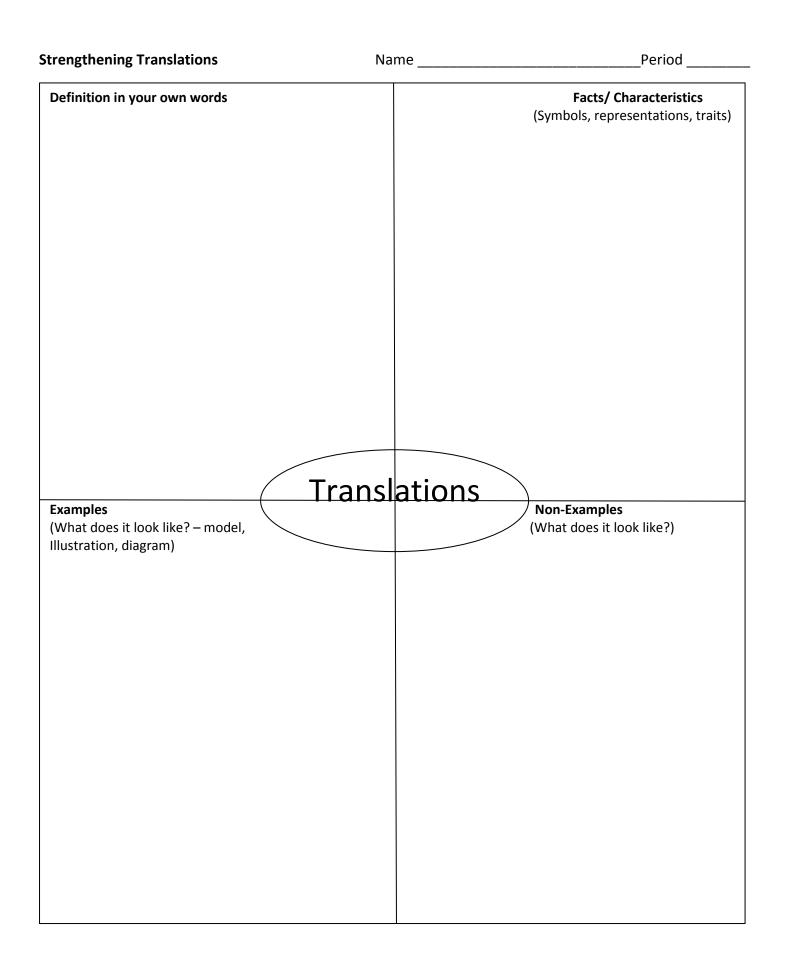


 Translate triangle A^{''''} using the following motion rules to create triangles A^{''''''}. State the coordinates.

 $(x, y) \rightarrow (x - 6, y - 5)$

(x,y) → (x-5,y+6)





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SAUSD Comm	on Core Lesso	n Planner	Mathematics

Г

Teacher:_____

Unit: G1	Grade Level/Course:	Duration: <u>Day 1 & 2 of 2 (50 Min.) Lesson</u>				
Lesson:	Geometry	Date:				
G1-Ind-1						
	Experiment with transf	alane				
		=				
	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					
	-		ansformations that preserve distance and angle			
	to those that do not (e.g., translation versus horizontal stretch).					
Common			otation, reflection, or translation, draw the			
Core and	•	-	er, tracing paper, or geometry software. Specify a			
Content	-		ry a given figure onto another.			
Standards	•		, trapezoid, or regular polygon, describe the			
	rotations and reflection					
		•	e, 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/	Paper (for foldables if no	eeded)				
Resources/	Poster (if needed)					
Lesson Preparation	Computer/ppt (if neede	d)				
Treparation	Content:		Language			
	Content:		Language:			
	Students are to analyze and s		Students are to verbally communicate their reasoning with			
Objectives	discovery and understanding inductively create a document		each other in groups and are expected to communicate their reasoning in writing.			
	evidence of understanding.	it that bild wis	then reasoning in writing.			
Depth of Knowledge	Image: Skill/Concept					
Level	Level 3: Strategic Think	ting 🛛 Level 4: Ext	ended Thinking			
	□ 1. Make sense of problems and persevere in solving them.					
	2. Reason abstractly and quantitatively.					
Standards	\boxtimes 3. Construct viable arguments and critique the reasoning of others.					
for	🗌 4. Model with math	ematics.				
Mathematic	\square 3. Use appropriate tools strategically					
al Practice	⊠ 6. Attend to precision.					
	7. Look for and make use of structure.					
	🔀 8. Look for and exp	oress regularity in	repeated reasoning.			
Common Core	Secus on the Standards					
Instructional Shifts in	Coherence within and across grade levels					
Mathematics	Rigor (Balance of conce	ptual understanding	, procedural skill & fluency, and application of skills)			

	HER	KEY WORDS ESSENTIAL TO UNDERSTANDING	WORDS WORTH KNOWING				
Academic Vocabulary (Tier II & Tier III)	PROVIDES TEACHER SIMPLE EXPLANATION						
	STUDENTS FIGURE OUT THE MEANING						
Pre-teaching Considerations							
		Lesson Delive	ery				
		Check method(s) used in the lesson:					
Instructiona		□ Modeling □ Guided Practice ⊠ Collaboration					
l Met	hods	☐ Independent Practice ☐ Guided Inquiry ☐ Reflection					
		Prior Knowledge, Context, and Motivation	•				
		The Moviege, Context, and Motivate					
		Lesson Overview		Differentiated Instruction:			
Body of the Lesson: Activities/ Questioning/ Tasks/ Strategies/ Technology/ Engagement		 Day 1 of 2 Guided Inquiry to support Understanding & Understanding: Communication, Collaborati Mathematical Practice(s) Being Monitored: 6 Attend to precision Objective: Students are to attend to the precision of each rigid motion in order to construct induct on the final product. Teacher: Be a facilitator to provide idea on the lesse Advice ©: Choose a transformation type that you and provide idea in order to really grasp the rigid if a show how and why this rigid motion is implied. Show how and why this rigid motion is implied. Show different representations one motion Provide precision in vocabulary, image, and motion Communicate properties experimentally an observing, measuring, and drawing using be Give informal arguments and new propertied. Follow and can supply parts of the inductive Teacher: Holds a conversation with students, in well in which the context he/she wants to use become cle Students: Under the guidance of the teacher, studen about the relationships and concepts they have disco activities. 	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.

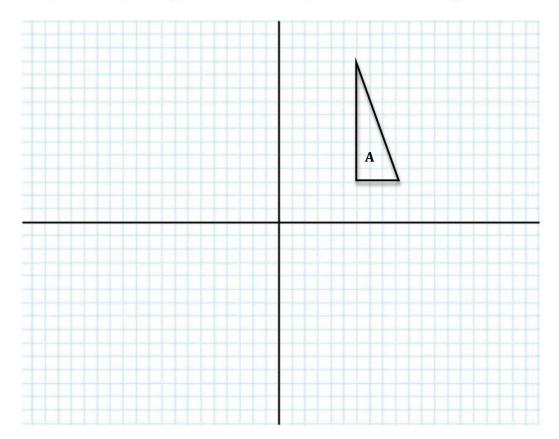
Teacher:_____

Unit: G1	Grade Level/Course: Duration: Day 1 of 1 (50 Min.) Lesson					
Lesson:	Geometry	cometry Date:				
G1-SA-1						
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 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					
	Content:		Language:			
apply their understanding in solving problems. each other in groups and are			Students are to verbally communicate their reasoning with each other in groups and are expected to communicate their reasoning in writing.			
Depth of	Level 1: Recall	⊠Level 2: Skill	/Concept			
Knowledge Level	Level 3: Strategic Think		-			
	☐ 1. Make sense of pro	oblems and perse	vere in solving them.			
	2. Reason abstractly and quantitatively.					
Standards						
for	⊠ 3. Construct viable arguments and critique the reasoning of others.					
Mathematic al Practice	4. Model with mathematics.					
airractice	🖂 5. Use appropriate t	ools strategically				

		7. Look for and make use of structure.				
		⊠ 8. Look for and express regularity in repeated reasoning.				
Common Core Instructional Shifts in Mathematics		Secus on the Standards				
		\boxtimes Coherence within and across grade levels				
		⊠ Rigor (Balance of conceptual understanding, procedural skill &	fluency, an	nd application of skills)		
	ER	KEY WORDS ESSENTIAL TO WORI	DS WORTI	H KNOWING		
Academic Vocabulary (Tier II & Tier III)	PROVIDES TEA CHER SIMPLE EXPLANATION	UNDERSTANDING				
	ES TE XPLA					
	VIDI					
ic Vo II & T	PRC					
adem (Tier]	THE					
Ac	STUDENTS URE OUT 7 MEANING					
	STUDENTS FIGURE OUT THE MEANING					
Dro to						
Pre-teaching Considerations						
		Lesson Delivery				
		Check method(s) used in the lesson:				
Instru	iction					
al Me						
		Independent Practice Guided Inquiry Reflection				
		Lesson Overview		Differentiated Instruction:		
		Teacher: May have students work collaboratively in pairs or groups of 4	4.			
Body	of the	Students: Each student is expected to contribute and provide reasoning o form.	English Learners: -Think-Write-Pair-Share			
Less Activ		Iorni.		-Multiple opportunities to		
Questi	oning/	Feedback: This feedback session may take an additional 30 minutes. Option 1:		speak -cooperative groups		
Tasks/ Strategies/ Technology/ Engagement		Students may share their answers in a Gallery Walk structure. See the str	ructure in			
		the previous lessons.		Students Who Need Additional Support:		
		Option 2:		-Think-Write-Pair-Share		
		Students will perform the I-Spy strategy to gather feedback and improve		-Multiple opportunities to speak		
		work.		-cooperative groups		
				Accelerated Learners:		
				Accelerated Learners.		
Ter	aher P	Lesson Reflection				
		eflection				
Evid	lenced b					

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.

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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 180° 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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