Rigorous Curriculum Design

Unit Planning Organizer

Subject:	Integrated Math 1			Grade:	9
Unit Number:	5	Unit Name:	Translations		
Unit Length	Days: 30 days		Mins / Day: 50-55		
Unit Synopsis	Rigid Motion and Function Translations				

	Math CCSS
Priority Standards	**M1.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.** **M1.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.** **M1.F.IF.4** **For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: *intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*** **M1.F.IF.7** **Graph functions expressed symbolically and show key features of the graph by hand in simple cases and using technology for more complicated cases.**
SMP	Standards for Mathematical Practice
	☐Make sense of problems and persevere in solving them ☐Reason abstractly and quantitatively ☐Construct viable arguments and critique the reasoning of others ☐Model with mathematics ☐Use appropriate tools strategically ☐Attend to precision ☐Look for and make use of structure ☐Look for and express regularity in repeated reasoning
Supp	Math CCSS

M1.NQ.1 - Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

M1.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.
M1.G.CO.2 – Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions 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).
M1.G.CO.3 – Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.
M1.G.CO.4 – Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.
M1.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.
M1.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.
M1.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.
M1.G.CO.13 – Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.

M1.F.IF.5 – Relate the domain of a function to its graph and where applicable, to the quantitative relationship it describes. *For example, if the function h gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.*
M1.F.IF.6 – Calculate and interpret the average rate of change of a function (represented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
M1.F.IF.7a – Graph linear and quadratic functions and show intercepts, maxima and minima.
M1.F.IF.7e – Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.
M1.F.IF.9 – Compare properties of two functions each represented in a different way (algebraically, numerically in tables, or by verbal descriptions).

M1.F.BF.2 – Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.
M1.F.BF.3 – Identify the effect on the graph of replacing f(x) by f(x) + k, kf(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions of them.

M1.A.CED.2 – Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

Interdisciplinary Connections

Literacy/Science/ History/Other	NG ELD Standards
	ELD.9.1.B.6 Reading closely literary and informational texts and viewing multimedia to determine how meaning is conveyed explicitly and implicitly through language. ELD.9.1.B.8 Analyzing how writers and speakers use vocabulary and other language resources for specific purposes (to explain, persuade, entertain, etc.) depending on modality, text type, purpose, audience, topic, and content area. ELD.9.1.C.10 Writing literary and informational texts to present, describe, and explain ideas and information, using appropriate technology. ELD.9.1.C.12 Selecting and applying varied and precise vocabulary and other language resources to effectively convey ideas.

Unwrapped Priority Standards

Standard:	M1.G.CO.6			
Skills	Concepts	Bloom's	DOK	Language Demand
Use Transform Predict	Geometric descriptions of rigid motions Figures The effect of a given rigid motion on a given figure	Understand Apply Evaluate	3 2 3	Interpretive And Productive
Use Decide	Definition of congruence in terms of rigid motions given two figures If they are congruent	Understand Evaluate	3 3	
Essential Question(s)		**Big Idea(s)**		
How can you predict the effect of a combination of transformations?		Performing a series of transformations (excluding dilations) preserves congruency.		

Standard:	M1.G.CO.8			
Skills	Concepts	Bloom's	DOK	Language Demand
Explain	how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions	Understanding	2	Interpretive
Essential Question(s)		**Big Idea(s)**		
How are transformations related to the ASA, SAS, and SSS triangle congruence theorems?		Performing a translation, rotation, or reflection on a triangle preserves congruency, such that it does not change the angle measures or side lengths of the triangle.		

Standard:	M1.F.IF.4			
Skills	Concepts	Bloom's	DOK	Language Demand
Interpret Sketch	Key features of graphs and tables in terms of quantities Graphs showing key features given a verbal description of the relationship	Analyze Apply	3 2	Interpretive And Productive
Essential Question(s)		**Big Idea(s)**		
How can graphs be used in real life applications to predict outcomes? What similarities and differences exist between the graphs of linear, quadratic and exponential functions?		Graphs provide visual representations of two quantities establishing a pattern that can be used to predict future outcomes.		

Standard:	M1.F.IF.7			
Skills	Concepts	Bloom's	DOK	Language Demand
Graph Show	Functions expressed symbolically Key features of the graph by hand in simple cases and using technology for more complicated cases	Apply Analyze	2 3	Productive
Essential Question(s)		**Big Idea(s)**		
How are graphs and equations related in a real life context? How does technology play a role in		Graphs are the visual representation of equations.		

communicating the relationship between graphs and equations?	

Learning Progressions

Standard:	M1.G.CO.6				
Previous Grade		Current Grade		Next Grade	
Skills	Concepts	Skills	Concepts	Skills	Concepts
Understand	That a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations (8.G.2)	Use	Geometric descriptions of rigid motions	Prove	Geometric theorems. (Focus on validity of underlying reasoning)
Describe	A sequence that exhibits the congruence between them, given two congruent figures (8.G.2)	Transform	Figures		
		Predict	The effect of a given rigid motion on a given figure		
		Use	Definition of congruence in terms of rigid motions given two figures		
		Decide	If they are congruent		

Standard:	M1.G.CO.8				
Previous Grade		Current Grade		Next Grade	
Skills	Concepts	Skills	Concepts	Skills	Concepts
Understand	Congruence and similarity using physical models, transparencies, or geometry software. (8.G)	Explain	how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions	Prove	Theorems about triangles (G.CO.10)

Standard:	M1.F.IF.4				
Previous Grade		Current Grade		Next Grade	
Skills	Concepts	Skills	Concepts	Skills	Concepts
Describe	Qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). (8.F.5)	Interpret	Key features of graphs and tables in terms of quantities (linear and exponential)	Interpret	Functions that arise in applications in terms of a context (quadratic)
Sketch	A graph that exhibits the qualitative features of a function that has been described verbally (8.F.5)	Sketch	Graphs showing key features given a verbal description of the relationship (linear and exponential)	Sketch	Graphs showing key features given a verbal description of the relationship (quadratic)

Standard:	M1.F.IF.7				
Previous Grade		Current Grade		Next Grade	
Skills	Concepts	Skills	Concepts	Skills	Concepts
Sketch	A graph that exhibits the qualitative features of a function that has Been described verbally. (8.F.5)	Graph	Functions expressed symbolically	Analyze	Functions using different representations
		Show	Key features of the graph by hand in simple cases and using technology for more complicated cases	Include	Rational and radical; focus on
				Using	Key features to guide selection of appropriate type of model function

Unit Vocabulary Words	
Academic Cross-Curricular Vocabulary (Tier 2)	Content/Domain Specific Vocabulary (Tier 3)
Isometry, translation, reflection, rotation, coordinates, vertices, polygon, transformation	Translation, rotation, reflection, transformation, congruent, quantity, intercepts, intervals, increasing function, decreasing function, positive function, negative function, relative maximum, relative minimum, symmetry, end behavior, periodicity, rigid motion, ASA, SAS, SSS, triangle, linear function, quadratic function, exponential function, visual representation, isometry, vertices, polygon, origin, quadrilateral, asymptote, seque nce, coordinates
Resources for Vocabulary Development (Strategies, Routines and Activities Unit Graphic Organizers, Word Walls, Vocabulary Quizzes, Crosswords, foldables, Cornell Notes, Flashcards, Quizlet.	

21st Century Skills	
☐Creativity and Innovation	☐Initiative and Self-Direction
☐Critical Thinking and Problem Solving	☐Social and Cross-Cultural Skills
☐Communication and Collaboration	☐Productivity and Accountability
☐Flexibility and Adaptability	☐Leadership and Responsibility
☐Globally and Financially Literate	☐_____
☐Communicating and Collaborating	☐_____
Connections between 21st Century Skills, CCCSS, and Unit Overview:	

Costa & Kallick, 2008

Unit Assessments	
Pre-Assessment	Post-Assessment
Please go to: http://www.alvordschools.org/Page/2700	Please go to: http://www.alvordschools.org/Page/2700
Scoring Guides and Answer Keys	
Please go to: http://www.alvordschools.org/Page/2700	Please go to: http://www.alvordschools.org/Page/2700

Assessment Differentiation			
Students with Disabilities	***Accommodations*** Reference IEP to ensure appropriate testing environment ***Modifications***	English Language Learners	Emerging Expanding

Engaging Scenario Overview (Situation, challenge, role, audience, product or performance)	
S: current situation: You are a mechanical engineer (this is a person who applies what they have learned in engineering, physics and material design to enable them to design, analyze, manufacture and maintain mechanical systems). In this job, you need to understand isometry. Your company has decided to offer summer internships with the local high school. You have been told that you will have an intern and you need to select a student to work with. . C: student challenge: Through a wide variety of tasks, students will identify, construct and describe various types and combinations of transformations. R: student role: Students will act as interns applying for a position with an engineer. A: intended audience: Graphic artists, computer game designers, architects, mechanical engineers. P: product or performance: Students will be able to identify translations, rotations and reflections. Students will produce two stained glass samples using three translations. The student is required to write a reflection on why he created his design, why it is the best, what isometries did they use in their design and why, and describe three isometries that can be observed outside the classroom.	Suggested Length of Time Days: 4 Mins/Day: 50

Engaging Learning Experiences Synopsis of Authentic Performance Tasks		
Authentic Performance Tasks	Description	Suggested Length of Time
Task 1: Your company has decided to offer summer internships with the local high school. You have been told that you will have an intern and you need to select a student to work with. So, you have decided to have each of the applicants take a test to see what their level of understanding of isometry is.	Students will learn how to identify the correct isometry (translation, reflection or rotation) in graphic form. Pre-instruction: Students will learn the difference between translation, reflection and rotation of a geometric shape. Students will be able to describe the vertices of the given and transformed shape using coordinates. Instruction will focus on identifying the characteristics of each type of transformation and having students graph each transformation. Task 1 will involve students looking at given graphs, identifying the correct isometry (translation, reflection, and rotation), and plotting the appropriate points for each transformation.	Days: Mins/Day:
Task 2: Your company has decided to move equipment from one place in the warehouse to another. But, before they do that, they want to know if it would fit in the area they want to move it to. So, have your intern show where the equipment will eventually be located.	Moving equipment Students will learn how to perform double isometries to simulate moving equipment in a warehouse. Students will be able to identify vertices of the figure from the original to the image. Students will be able to interpret writing instructions and translate them to properly plotting and transforming a figure on a coordinate plane.	Days: Mins/Day:

Task 3:	Design	Days: Mins/Day:
Task 4:	Reproduce	Days: Mins/Day:

Engaging Scenario

Detailed Description (situation, challenge, role, audience, product or performance)
S: current situation: You are a mechanical engineer (this is a person who applies what they have learned in engineering, physics and material design to enable them to design, analyze, manufacture and maintain mechanical systems). In this job, you need to understand isometry. Your company has decided to offer summer internships with the local high school. You have been told that you will have an intern and you need to select a student to work with. . C: student challenge: Through a wide variety of tasks, students will identify, construct and describe various types and combinations of transformations. R: student role: Students will act as interns applying for a position with an engineer. A: intended audience: Graphic artists, computer game designers, architects, mechanical engineers. P: product or performance: Students will be able to identify translations, rotations and reflections. Students will produce two stained glass samples using three translations. The student is required to write a reflection on why he created his design, why it is the best, what isometries did they use in their design and why, and describe three isometries that can be observed outside the classroom.

Instructional Strategies			
All Students	SWD	ELs	Enrichment
	Accommodations	Emerging	
		Expanding	
	Modifications	Bridging	