Robotics – Quadrilaterals Length: 4 Weeks

STEM SCIENCE TECHNOLOGY ENGINEERING MATH	**Mathematics Unit Plan**	
Teacher: Williamson	Grade: 9	Course: Geometry
Unit Title: Robotics – Quadrilaterals		

LEARNING TARGETS

LT1: I can use coordinates to prove simple geometric theorems. (CC.GPE.12)
LT5: I can apply geometric concepts in modeling situations. (CC.GMG.1)

UNIT OVERVIEW — **Overall summary of the unit, activities, tasks, and/or content.**

In this unit, students will develop an understanding of the properties of quadrilaterals and their use in the study of motion and mechanics. Students will also apply the mathematical habits of interaction as they work collaboratively to research, design and construct a kite using the engineering design process. Students will also examine the use of artificial intelligence in applications other than robotics, and will evaluate if it's possible to replace a math teacher with programs that employ artificial intelligence.

MOTIVATORS — **Hooks for the unit and supplemental activities. (PBL scenarios, video clips, websites, literature)**

~Video clip from Overview of Kart Racing from PBS POV
- http://www.pbs.org/pov/racingdreams/additional-voideo-1.php#.VSvbr8a9Y6o

~Video Clip " Teaching Kite Flying " from The Kite Runner
- https://www.youtube.com/watch?v=ypf6WHYpeRU&safe=active

~Video Clip of Artificial Intelligence
http://marvel.com/videos/watch/4983

Week	Learning Targets	Materials & Resources	Instructional Procedures	Differentiated Instruction	Assessment
1	I can use coordinates to prove simple geometric theorems. (CC.GPE.12)	Curricular: • Holt Fuse App Chapter 6 Lessons 1, 2 and 3. • Holt Online Geometry Lab Chapter 6 lesson 2. • http://tweentribune.com/tween56/japanese-	Essential Questions: How can I use coordinates to prove and apply simple geometric theorems about parallelograms? How can I use properties of parallelograms to solve problems? How can I synthesize information from articles regarding the use of artificial intelligence in various real world	Remediation Ready To Go On Practice Problems and Leveled Practice worksheets A- C. My.hrw.com	Formative: Ready to Go On Quiz from Holt Fuse App Chapter 6 lessons 1,2 and 3.

		robot-get-artificial-intelligence • http://www.futuregov.asia/articles/artificial-intelligence-tools-to-be-used-in-singapore-schools • http://chinmayxdas.hubpages.com/hub/Artificial-Intelligence-Applications-in-Everyday-Life Materials: • Graph paper • Ruler (or straight edge) • iPad • Calculator • Patty Paper	applications? Set: Using a circle map graphic organizers students, working in small groups will brainstorm what they know about quadrilaterals. Each group will then share their graphic organizer and ideas with each other, and then will share as a whole group attributes of quadrilaterals. Teaching Strategies • Students will complete a Freyer model graphic organizer defining polygons. They will share in a whole group discussion with class and teacher. • Students will complete lesson 6.1 in Holt Fuse App. Practice and Problem Solving questions # 16-44. • Those that finish early will complete challenge and extend problems # 56-59. • Students will complete geometry lab 6.1 from Holt Online My.hrw.com. where they will explore and practice constructing regular polygons. Partners will then compare answers with one other pair of students • Students will work with a partner to complete Geometry Lab 6.2 from Holt Online, My.hrw.com. Using patty paper, students will investigate the relationships among angles and sides of a parallelogram. • Students will complete lessons 6.2 Practice and Problem Solving # 15-25, 27-43, 49-50. • Students will complete Lesson 6.3 Practice and Problem Solving # 9-24. • Student will break into groups of three. Groups will then redivide into three expert groups. Each expert group will read an article about artificial intelligence; take notes and re deliver information to home group. Summarizing Strategy Students will complete Lesson 6.3 Think and Discuss activity comparing and contrasting conditions for parallelograms, then sketching a parallelogram on a coordinate plane and labeling it to show how it meets the conditions. Homework Students will complete Holt practice worksheet B for lessons 6.1, 6.2 and 6.3.	Enrichment Create a lesson that can be taught to other students proving properties of parallelograms. Learning Styles Visual, Auditory and Kinesthetic Flexible Grouping	
2	I can use coordinates to	Curricular: • "Who Am I" Special	Essential Question: How can I use coordinates to prove and apply simple	Remediation Intervention activity	Formative: Floor Patterns

	prove simple geometric theorems. (CC.GPE.12)	Quadrilateral activity • Constructing with Diagonals Task from Georgia Math Frameworks. • https://www.georgiastandards.org/Common-Core/Common%20Core%20Frameworks/CCGPS_Math_9-12_AnalyticGeo_Unit1.pdf • MDC Lesson "Describing Quadrilaterals. • http://map.mathshell.org/lessons.php?unit=7325&collection=8 Materials: • Graph paper • iPad	geometric theorems of rhombuses, squares, trapezoids and kites? How can I research and evaluate an article about the use of artificial intelligence? Set: Working in small groups, students will brainstorm and research properties of quadrilaterals to solve the puzzle and determine the type of quadrilateral being described in the "Who Am I " Special Quadrilateral Worksheet Teaching Strategies • Working in pairs, students will complete Constructing Diagonals task from GA DOE Math Frameworks. https://www.georgiastandards.org/Common-Core/Common%20Core%20Frameworks/CCGPS_Math_9-12_AccelCoorAlgebraAnalyticGeom_Unit7.pdf • Working in pairs, students will complete the Math Design Collaborative (MDC) lesson 'Describing and Defining Quadrilaterals http://map.mathshell.org/lessons.php?unit=7325&collection=8 • Students will use Holt Fuse App Chapter 6 lessons 4 and 5 as a resource in completing the Quadrilateral task. • Students will research an article about the use of artificial intelligence, will write an abstract about the article and be prepared to share the article in class. Summarizing Strategy Students will complete a fast write summarizing the conditions for a rectangle, rhombus and square and will sketch and label each figure on a coordinate plane. Homework Students will complete a raft (role, audience, format, topic) writing assignment " personal ad: quadrilateral searching for another quadrilateral. Within the creative ad, students must include characteristics of at least two different quadrilaterals.	embedded in task. Enrichment Extension activity embedded in task. Learning Styles: Auditory, Visual, and Kinesthetic.	http://www.map.mathshell.org/materials/download.php?fileid=768 Summative: Chapter 6 Performance Task-Holt Online. My.hrw.com
3	I can apply geometric concepts in modeling situations. (CC.G.MG.1)	Materials: • Graph paper or geometric software • iPad	Essential Question: How can I use the properties of quadrilaterals to design a racecar? How can I evaluate the use of artificial intelligence in a math classroom?	Remediation Students will use rectangles or squares in design. Enrichment	Formative: Teacher created rubric will be used to assess the properties of quadrilaterals used in the design of a racecar.

			Set: Working in pairs, students will examine a hot wheels car, evaluating the design and construction and will discuss which ones most appeal to them and why. Teaching Strategies: • Working in pairs, students will research and design a racecar, using two different non-rectangle or square quadrilaterals in the design. They will prepare a 3 -5 minute presentation, defending their design choice in terms of attractiveness and durability and drivability. • Students will evaluate the Holt Ready to Go On quiz feature and discuss its applicability as a form of artificial intelligence Summarizing Strategy: Students will evaluate two different quadrilaterals, drawing them on a coordinate plane, labeling them. and justifying why they would be a good race car design choice. Homework: Students will complete The Real World Connection- Millennium Force Roller Coaster from Holt Online- my.hrw.com- page 461.	Students will research aerodynamics of a racecar and will incorporate three additional design elements to the car using geometric figures. Students will justify their choices within their presentation.	
4	I can apply geometric concepts in modeling situations. (CC.G.MG.1)	Curricular: • Kite Building Task and Rubric which can be accessed at http://williamsongeometry9.blogspot.com	Essential Questions: How can I apply geometric concepts in modeling situations? How can I use the properties of quadrilaterals to design and build a kite that will fly? How can I evaluate and defend the use of artificial intelligence in a math classroom? Set: After watching video clip from The Kite Runner, students and teacher will engage in a whole group discussion of kite flying, to include what would make a kite fun and where you could fly a kite in Chattanooga. Teaching Strategies: • Working in groups of two or three, students will research, design, construct and fly a kite using an engineering design process. They will also prepare a one page written design report including works cited in MLA format. • Students will engage in classroom debate about the use of artificial intelligence in a math class. They will use the articles previously read and evaluation of Ready to Go On feature of Holt Fuse app as resources to draw upon for the debate.	Remediation Students will construct a newspaper kite from a set of given instructions. Enrichment: Students will build a three dimensional kite that will fly. Learning Styles: Auditory, visual and kinesthetic.	Formative: Kite Engineering Design Report completed per project requirements. Summative: Teacher created assessment covering the properties and conditions of parallelograms , trapezoids and kites.

			<u>Summarizing Strategy:</u> Write two conditions for parallelograms. Sketch and label your kite to show how it meets those conditions. <u>Homework:</u> Multi step test prep chapter 6 Holt online at my.hrw.com		