Unit Title	3 Rights Don't Make A….		**Length of Unit**	4 weeks
Focusing Lens(es)	Relationships	**Standards and Grade Level Expectations Addressed in this Unit**	MA10-GR.HS-S.4-GLE.2	
Inquiry Questions (Engaging-Debatable):	• How can you determine the measure of something that you cannot measure physically? (MA10-GR.HS-S.4-GLE.2-IQ.1)			
Unit Strands	Geometry: Similarity, Right Triangles, and Trigonometry			
Concepts	sides ratios, angles, right triangle, trigonometric functions, similar triangles			

Generalizations **My students will Understand that…**	**Guiding Questions** **Factual**	**Conceptual**
The relationship between the side ratios and angles of a right triangle define the trigonometric functions. (MA10-GR.HS-S.4-GLE.2-EO.c)	What are trigonometric ratios? What is the relationship of the sine and cosine of complementary angles?	How does similarity explain that the side ratios in right triangles are a function of the angles of the triangle? How do we know that the sine of all 30 degree angles is the same?
Mathematicians use similar triangles to prove generalizable relationships. (MA10-GR.HS-S.4-GLE.2-EO.b.i)	How can you use right triangle similarity to prove the Pythagorean Theorem? How can similar triangle be used to prove that a line parallel to one side of a triangle divides the other two proportionally?	Why are similar triangles the foundation for mathematical proofs about side lengths of triangles?

Key Knowledge and Skills: **My students will…**	*What students will know and be able to do are so closely linked in the concept-based discipline of mathematics. Therefore, in the mathematics samples what students should know and do are combined.*

- Prove theorems about similar triangles. (MA10-GR.HS-S.4-GLE.2-EO.b.i) (CCSS: G-SRT.4)
  - Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity
- Understand through similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles. (MA10-GR.HS-S.4-GLE.2-EO.c.i) (CCSS: G-SRT.6) PARCC Calculator neutral
  - ✓ Trigonometric ratios include sine, cosine, and tangent only.
- Explain and use the relationship between the sine and cosine of complementary angles. (MA10-GR.HS-S.4-GLE.2-EO.c.ii) (CCSS: G-SRT.6)

✓ Use the relationship between the sine and cosine of complementary angles. (CCSS: G-SRT.7-2) PARCC Calculator neutral

- The "explain" part of standard G-SRT.7 is not assessed here; See Subclaim C for this aspect of the standard.

- Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. (MA10-GR.HS-S.4-GLE.2-EO.c.iii) (CCSS: G-SRT.8) PARCC Calculator
  - ✓ The task may have a real world or mathematical context. For rational solutions, exact values are required. For irrational solutions, exact or decimal approximations may be required. Simplifying or rewriting radicals is not required; however, students will not be penalized if they simplify the radicals correctly.

✓ Construct, autonomously, chains of reasoning that will justify or refute geometric propositions or conjectures. (HS.C.14.5 & 6) PARCC Calculator

✓ Present solutions to multi-step problems in the form of valid chains of reasoning, using symbols such as equals signs appropriately (for example, rubrics award less than full credit for the presence of nonsense statements such as 1 + 4 = 5 + 7 = 12, even if the final answer is correct), or identify or describe errors in solutions to multi-step problems and present corrected solutions. . (HS.C.15.14) PARCC Calculator

✓ Use a combination of algebraic and geometric reasoning to construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures about geometric figures. (HS.C.18.2) PARCC Calculator

- For the Geometry course, we are reaching back to Algebra 1 to help students synthesize across the two subjects.

✓ Solve multi-step contextual problems with degree of difficulty appropriate to the course, requiring application of knowledge and skills articulated in 6.G, 7.G, and/or 8.G. (HS.D. 1-2) PARCC Calculator

✓ Solve multi-step contextual problems with degree of difficulty appropriate to the course involving perimeter, area, or volume that require solving a quadratic equation. (HS.D. 2-1) PARCC Calculator

- Tasks do not cue students to the type of equation or specific solution method involved in the task.
  For example:
  An artist wants to build a right-triangular frame in which one of the legs exceeds the other in length by 1 unit, and in which the hypotenuse exceeds the longer leg in length by 1 unit. Use algebra to show that there is one and only one such right triangle, and determine its side lengths.

- ✓ Solve multi-step contextual problems with degree of difficulty appropriate to the course involving perimeter, area, or volume that require finding an approximate solution to a polynomial equation using numerical/graphical means. (HS.D.2-2) PARCC Calculator
  - Tasks may have a real world or mathematical context.
  - Tasks may involve coordinates (G-GPE.7).
  - Refer to A-REI.11 for some of the content knowledge from the previous course relevant to these tasks.
  - Cubic polynomials are limited to polynomials in which linear and quadratic factors are available
  - To make the tasks involve strategic use of tools (MP.5), calculation and graphing aids are available but tasks do not prompt the student to use them.
- ✓ Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in G-SRT.8, involving right triangles in an applied setting. . (HS.D.2-11) PARCC Calculator
  - Tasks may, or may not, require the student to autonomously make an assumption or simplification in order to apply techniques of right triangles. For example, a configuration of three buildings might form a triangle that is nearly, but not quite, a right triangle; then, a good approximate result can be obtained if the student autonomously approximates the triangle as a right triangle.
- ✓ Micro-models: Autonomously apply a technique from pure mathematics to a real-world situation in which the technique yields valuable results even though it is obviously not applicable in a strict mathematical sense (e.g., profitably applying proportional relationships to a phenomenon that is obviously nonlinear or statistical in nature). (HS.D.3-2a) PARCC Calculator
- ✓ Reasoned estimates: Use reasonable estimates of known quantities in a chain of reasoning that yields an estimate of an unknown quantity. (HS.D.3-4a) PARCC Calculator

Critical Language: includes the Academic and Technical vocabulary, semantics, and discourse which are particular to and necessary for accessing a given discipline. EXAMPLE: A student in Language Arts can demonstrate the ability to apply and comprehend critical language through the following statement: *"Mark Twain exposes the hypocrisy of slavery through the use of satire."*	
A student in _____ can demonstrate the ability to apply and comprehend critical language through the following statement(s):	*I know the sine and cosine of the acute angles in a isosceles right triangle are the same.*
Academic Vocabulary:	prove, explain, right triangles,
Technical Vocabulary:	similar triangles, sine, cosine, tangent, trigonometric ratios, Pythagorean Theorem, complementary angles, parallel lines