Washington Applied Math Council - Geometry	
Course: Name of Course: Applied Math Geometry	**Total Framework Hours up to: 180**
CIP Code: 270301 ☒ **Exploratory** ☐ **Preparatory**	**Date Last Modified: May 23, 2016**
Career Cluster: Science, Technology, Engineering and Math	**Cluster Pathway: Science and Math**

Unit	***Hours***
Unit 1: Measuring in US Standard and Metric/Precision Measurement	10
Unit 2: Lines, Angles, and Triangles	20
Unit 3: Two Dimensional Figures	30
Unit 4: Three Dimensional Figures	20
Unit 5: Transformations, Similarity, and Congruence	35
Unit 6: Right Triangle Relationships/Trigonometry	30
Unit 7: Coordinate Geometry/Proof	20
Unit 8: Geometry Applications	15
	180

Unit 1: Measuring In US Standard and Metric/Precision Measurement

Performance Assessments: Students will be able to synthesize information from a variety of instructional and technological experiences. These will include (but are not limited to) labs, experiments, skill-drills, hands-on practice with calculators and other tools of mathematics, diagnostic (written) testing, group projects, problem-solving techniques, unit quizzes, as well as formative and summative assessments.

Leadership Alignment: **21st Century Skills (*indentify leadership component being utilized within this space; for example FFA, DECA, TSA, etc.)***
Note: All skills can be applied to CTSO Program and Equivalent Activities at the High School Level

1B.4 View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes
2C.5 Reflect critically on learning experiences and processes
2D.2 Identify and ask significant questions that clarify various points of view and lead to better solutions
3B.3 Assume shared responsibility for collaborative work, and value the individual contributions made by each team member
7A.1 Adapt to varied roles, jobs responsibilities, schedules and contexts

Standards and Competencies

Standard/Unit: Measuring in US Standard and Metric/Precision Measurement

Competencies	**Total Learning Hours for Unit: 10**

- Use the common measurement units for length, area, volume, capacity, and weight in US Standard units.
- Use the common measurement units for length, area, volume, capacity, and weight in Metric units.
- Convert measurement units from one form to another and carry out calculations that involve a variety of units.
- Use appropriate tools to accurately measure objects and to solve problems that involve these measurements.
- Distinguish between counting and measuring; precision and accuracy.
- Read and write measurements to show precision and tolerance. Use significant digits to indicate the accuracy of a measurement.
- Use precision tools to take accurate measurements.
- Calculate with measurements and round the results.
- Explore careers where conversion and precision measurement are crucial skills
- Demonstrate 21st Century Skills

Alignment to Washington State Standards

Educational Technology	1.2.1 Communicate and collaborate to learn with others. 1.3.2 Locate and organize information from a variety of sources and media. 2.2.1 Develop skills to use technology effectively. 2.4.1 Formulate and synthesize new knowledge.

Alignment to Common Core State Standards

CCSS - Reading	RST.9-10.1 Cite specific textual evidence to support analysis of technical texts, attending to the precise details of explanations or descriptions. RST.9-10.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. RST.9-10.4 Determine meaning of symbols, key terms, or other domain specific words and phrases as they are used in specific technical context RST.9-10.7 Translate quantitative or technical information expressed in words in a text into visual form and translate information expressed verbally or mathematically into words.

CCSS - Writing	W.9-10.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
CCSS - Speaking and Listening	SL.9-10.1 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher led) with diverse partners building on others' ideas and expressing their own clearly and persuasively. SL.9-10.4 Present information, findings, and supportive evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
CCSS - Language	L 9-10.6 Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.
CCSS - Mathematics	N-Q.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. N-Q.2 Define appropriate quantities for the purpose of descriptive modeling. N-Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. **Mathematical Practices** ☒ MP.1 Makes sense of problems and persevere in solving them ☒ MP.2 Reason abstractly and quantitatively ☒ MP.3 Construct viable arguments and critique reasoning of others ☒ MP.5 Use appropriate tools strategically ☒ MP.6 Attend to precision

Unit 2: Lines, Angles, and Triangles

Performance Assessments: Students will be able to synthesize information from a variety of instructional and technological experiences. These will include (but are not limited to) labs, experiments, skill-drills, hands-on practice with calculators and other tools of mathematics, diagnostic (written) testing, group projects, problem-solving techniques, unit quizzes, as well as formative and summative assessments.

Leadership Alignment: **21st Century Skills (*identify leadership component being utilized within this space; for example FFA, DECA, TSA, etc.)***
Note: All skills can be applied to CTSO Program and Equivalent Activities at the High School Level

- 2A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation
- 2C.3 Synthesize and make connections between information and arguments
- 2D.2 Identify and ask significant questions that clarify various points of view and lead to better solutions
- 3A.5 Communicate effectively in diverse environments (including multi-lingual)
- 7B.1 Incorporate feedback effectively
- 8A.3 Utilize time and manage workload efficiently

Standards and Competencies

Standard/Unit: Lines, Angles and Triangles

Competencies	**Total Learning Hours for Unit: 20**

- Demonstrate knowledge of the undefined terms of geometry.
- Name the different parts of lines and angles.
- Recognize parallel and perpendicular lines.
- Construct lines, angles, and triangles using the tools of geometry.
- Construct lines, angles, and triangles using a variety of tools and techniques.
- Measure line segments and angles.
- Construct lines and angles to produce parallel and perpendicular lines.
- Prove geometric theorems involving lines, angles, and triangles.
- Explore careers where the understanding and application of properties of lines and angles are crucial.
- Demonstrate 21st Century Skills.

Alignment to Washington State Standards	
Educational Technology	1.2.1 Communicate and collaborate to learn with others. 1.3.2 Locate and organize information from a variety of sources and media. 2.2.1 Develop skills to use technology effectively. 2.4.1 Formulate and synthesize new knowledge.
Alignment to Common Core State Standards	
CCSS - Reading	RST.9-10.1 Cite specific textual evidence to support analysis of technical texts, attending to the precise details of explanations or descriptions. RST.9-10.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. RST.9-10.4 Determine meaning of symbols, key terms, or other domain specific words and phrases as they are used in specific technical context RST.9-10.7 Translate quantitative or technical information expressed in words in a text into visual form and translate information expressed verbally or mathematically into words.

CCSS - Writing	W.9-10.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
CCSS - Speaking and Listening	SL.9-10.1 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher led) with diverse partners building on others' ideas and expressing their own clearly and persuasively. SL.9-10.4 Present information, findings, and supportive evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
CCSS - Language	L 9-10.6 Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.
CCSS - Mathematics	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.9 Prove theorems about lines and angles. *Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.* G-CO.10 Prove theorems about triangles. *Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.* G-CO.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). *Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.* **Mathematical Practices** ☒ MP.1 Makes sense of problems and persevere in solving them ☒ MP.2 Reason abstractly and quantitatively ☒ MP.3 Construct viable arguments and critique reasoning of others ☒ MP.4 Model with mathematics ☒ MP.6 Attend to precision ☒ MP.8 Look for and express regularity in repeated reasoning

Unit 3: Two Dimensional Figures

Performance Assessments: Students will be able to synthesize information from a variety of instructional and technological experiences. These will include (but are not limited to) labs, experiments, skill-drills, hands-on practice with calculators and other tools of mathematics, diagnostic (written) testing, group projects, problem-solving techniques, unit quizzes, as well as formative and summative assessments.

Leadership Alignment: **21st Century Skills (*indentify leadership component being utilized within this space; for example FFA, DECA, TSA, etc.)***

Note: All skills can be applied to CTSO Program and Equivalent Activities at the High School Level

2B.1 Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems
4A.2 Evaluate information critically and competently
4B.1 Use information accurately and creatively for the issue or problem at hand
6A.1 Use technology as a tool to research, organize, evaluate and communicate information
8B.1 Monitor, define, prioritize and complete tasks without direct oversight
8C.4 Reflect critically on past experiences in order to inform future progress

Standards and Competencies

Standard/Unit: Two Dimensional Figures

Competencies | **Total Learning Hours for Unit: 30**

- Identify common figures (such as rectangles, squares, triangles, parallelograms, trapezoids, circles, and polygons) within objects.
- Construct circles, quadrilaterals, and polygons using the tools of geometry
- Calculate the perimeter and the area of common figures.
- Calculate the circumference and area of circles.
- Understand and apply theorems about circles to solve real-world problems.
- Determine the relationship between the measure of a central angle and the measure of its intercepted arc.
- Use properties of chords to solve problems.
- Find the length of an arc given the central angle and the radius.
- Classify quadrilaterals
- Use the sum of the measures of a quadrilateral's interior angles to solve problems
- Use properties of parallelograms to solve problems
- Use the properties of trapezoids to solve problems
- Use the mid-segment theorems for trapezoids and triangles to solve problems
- Classify polygons by the number of sides and vertices
- Classify polygons as concave, convex, regular, and not regular.
- Name and draw diagonals of a polygon.
- Find perimeter of a polygon.
- Find the sum of the measures of the interior angles of a convex polygon.
- Find the measure of each interior and exterior angle of a regular polygon.
- Use the sum of the measures of a convex polygon's exterior angles to solve problems.
- Explore careers where the understanding and application of properties of two dimensional figures are crucial.
- Demonstrate 21st Century Skills

Alignment to Washington State Standards	
Educational Technology	1.2.1 Communicate and collaborate to learn with others. 1.3.2 Locate and organize information from a variety of sources and media. 2.2.1 Develop skills to use technology effectively. 2.4.1 Formulate and synthesize new knowledge.
Alignment to Common Core State Standards	
CCSS - Reading	RST.9-10.1 Cite specific textual evidence to support analysis of technical texts, attending to the precise details of explanations or descriptions. RST.9-10.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. RST.9-10.4 Determine meaning of symbols, key terms, or other domain specific words and phrases as they are used in specific technical context RST.9-10.7 Translate quantitative or technical information expressed in words in a text into visual form and translate information expressed verbally or mathematically into words.
CCSS - Writing	W.9-10.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
CCSS - Speaking and Listening	SL.9-10.1 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher led) with diverse partners building on others' ideas and expressing their own clearly and persuasively. SL.9-10.4 Present information, findings, and supportive evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
CCSS - Language	L 9-10.6 Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.
CCSS - Mathematics	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.11 Prove theorems about parallelograms. *Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.* G-CO.13 Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle. G-SRT.4 Prove theorems about triangles. *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*. G-C.1 Prove that all circles are similar. G-C.2 Identify and describe relationships among inscribed angles, radii, and chords. *Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.* G-C.3 Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle. G-C.4 (+) Construct a tangent line from a point outside a given circle to the circle. G-C.5 Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector. G-MG.1 Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).* Mathematical Practices ☒ MP.1 Makes sense of problems and persevere in solving them ☒ MP.2 Reason abstractly and quantitatively ☒ MP.3 Construct viable arguments and critique reasoning of others ☒ MP.4 Model with mathematics ☒ MP.5 Use appropriate tools strategically ☒ MP.6 Attend to precision ☒ MP.7 Look for and make use of structure

Unit 4: Three Dimensional Figures

Performance Assessments: Students will be able to synthesize information from a variety of instructional and technological experiences. These will include (but are not limited to) labs, experiments, skill-drills, hands-on practice with calculators and other tools of mathematics, diagnostic (written) testing, group projects, problem-solving techniques, unit quizzes, as well as formative and summative assessments.

Leadership Alignment: 21st Century Skills (*indentify leadership component being utilized within this space; for example FFA, DECA, TSA, etc.)*
Note: All skills can be applied to CTSO Program and Equivalent Activities at the High School Level

2A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation
2C.3 Synthesize and make connections between information and arguments
3A.1 Articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts
7A.1 Adapt to varied roles, jobs responsibilities, schedules and contexts
9A.1 Know when it is appropriate to listen and when to speak
9B.2 Respond open-mindedly to different ideas and values

Standards and Competencies

Standard/Unit: Three Dimensional Figures

Competencies	**Total Learning Hours for Unit: 20**

- Identify cylinders, rectangular solids, cones, and spheres.
- Understand and apply theorems about cylinders, rectangular solids, cones, and spheres to solve real-world problems.
- Calculate surface area and volume for cylinders, rectangular solids, cones and spheres.
- Explain volume formulas and use them to solve problems.
- Articulate the relation between two-dimensional and three-dimensional objects.
- Explore careers where the understanding and application of properties of three dimensional figures are crucial.
- Demonstrate 21st Century Skills

Alignment to Washington State Standards	
Educational Technology	1.2.1 Communicate and collaborate to learn with others. 1.3.2 Locate and organize information from a variety of sources and media. 2.2.1 Develop skills to use technology effectively. 2.4.1 Formulate and synthesize new knowledge.
Alignment to Common Core State Standards	
CCSS - Reading	RST.9-10.1 Cite specific textual evidence to support analysis of technical texts, attending to the precise details of explanations or descriptions. RST.9-10.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. RST.9-10.4 Determine meaning of symbols, key terms, or other domain specific words and phrases as they are used in specific technical context RST.9-10.7 Translate quantitative or technical information expressed in words in a text into visual form and translate information expressed verbally or mathematically into words.
CCSS - Writing	W.9-10.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

CCSS - Speaking and Listening	SL.9-10.1 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher led) with diverse partners building on others' ideas and expressing their own clearly and persuasively. SL.9-10.4 Present information, findings, and supportive evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
CCSS - Language	L 9-10.6 Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.
CCSS - Mathematics	G-GMD.1 Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. *Use dissection arguments, Cavalieri's principle, and informal limit arguments.* G-GMD.2 (+) Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures. G-GMD.3 Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.★ G-GMD.4 Identify the shapes of two-dimensional and cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects. G-MG.1 Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).* **Mathematical Practices** ☒ MP.1 Makes sense of problems and persevere in solving them ☒ MP.2 Reason abstractly and quantitatively ☒ MP.3 Construct viable arguments and critique reasoning of others ☒ MP.4 Model with mathematics ☒ MP.5 Use appropriate tools strategically ☒ MP.6 Attend to precision ☒ MP.7 Look for and make use of structure ☒ MP.8 Look for and express regularity in repeated reasoning

Unit 5: Transformations, Similarity, and Congruence

Performance Assessments: Students will be able to synthesize information from a variety of instructional and technological experiences. These will include (but are not limited to) labs, experiments, skill-drills, hands-on practice with calculators and other tools of mathematics, diagnostic (written) testing, group projects, problem-solving techniques, unit quizzes, as well as formative and summative assessments.

Leadership Alignment: **21st Century Skills (*indentify leadership component being utilized within this space; for example FFA, DECA, TSA, etc.)***
Note: All skills can be applied to CTSO Program and Equivalent Activities at the High School Level

1A.3 Elaborate, refine, analyze and evaluate their own ideas in order to improve and maximize creative efforts
1B.1 Develop, implement and communicate new ideas to others effectively
2C.5 Reflect critically on learning experiences and processes
3B.3 Assume shared responsibility for collaborative work, and value the individual contributions made by each team member
8A.3 Utilize time and manage workload efficiently
9A.2 Conduct themselves in a respectable, professional manner
10A.2 Prioritize, plan and manage work to achieve the intended result
11B.1 Act responsibly with the interests of the larger community in mind

Standards and Competencies

Standard/Unit: Transformations, Similarity, and Congruence

Competencies | **Total Learning Hours for Unit: 35**

- Explore and experiment with transformations, similarity, congruence, and rigid motion in the plane utilizing geometric software.
- Explore and experiment with rotations, reflections, and dilations in the plane utilizing geometric software.
- Explore and articulate the differences between rigid motions, transformation, rotations and other movement in a plane.
- Understand congruence in terms of rigid motions.
- Develop definitions for similarity and congruence using transformation, similarity, and rigid motions.
- Explore careers where the understanding and application of transformations, similarity, and congruence are crucial
- Demonstrate 21st Century Skills

Alignment to Washington State Standards

Educational Technology	1.2.1 Communicate and collaborate to learn with others. 1.3.2 Locate and organize information from a variety of sources and media. 2.2.1 Develop skills to use technology effectively. 2.4.1 Formulate and synthesize new knowledge.

Alignment to Common Core State Standards

CCSS - Reading	RST.9-10.1 Cite specific textual evidence to support analysis of technical texts, attending to the precise details of explanations or descriptions. RST.9-10.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. RST.9-10.4 Determine meaning of symbols, key terms, or other domain specific words and phrases as they are used in specific technical context RST.9-10.7 Translate quantitative or technical information expressed in words in a text into visual form and translate information expressed verbally or mathematically into words.
CCSS - Writing	W.9-10.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

CCSS - Speaking and Listening	SL.9-10.1 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher led) with diverse partners building on others' ideas and expressing their own clearly and persuasively. SL.9-10.4 Present information, findings, and supportive evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
CCSS - Language	L 9-10.6 Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.
CCSS - Mathematics	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). G-CO.3 Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself. G-CO.4 Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. 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.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.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.8 Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions. G-SRT.1 Verify experimentally the properties of dilations given by a center and a scale factor. G-SRT.2 Given two figures use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides. G-SRT.3 Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar. **Mathematical Practices** ☒ MP.1 Makes sense of problems and persevere in solving them ☒ MP.2 Reason abstractly and quantitatively ☒ MP.3 Construct viable arguments and critique reasoning of others ☒ MP.4 Model with mathematics ☒ MP.5 Use appropriate tools strategically ☒ MP.6 Attend to precision ☒ MP.7 Look for and make use of structure ☒ MP.8 Look for and express regularity in repeated reasoning

Unit 6: Right Triangle Relationships/Trigonometry

Performance Assessments: Students will be able to synthesize information from a variety of instructional and technological experiences. These will include (but are not limited to) labs, experiments, skill-drills, hands-on practice with calculators and other tools of mathematics, diagnostic (written) testing, group projects, problem-solving techniques, unit quizzes, as well as formative and summative assessments.

Leadership Alignment: 21st Century Skills (*indentify leadership component being utilized within this space; for example FFA, DECA, TSA, etc.)*
Note: All skills can be applied to CTSO Program and Equivalent Activities at the High School Level

1B.4 View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes
2A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation
2D.2 Identify and ask significant questions that clarify various points of view and lead to better solutions
3B.1 Demonstrate ability to work effectively and respectfully with diverse teams
4A.2 Evaluate information critically and competently
10A.1 Set and meet goals, even in the face of obstacles and competing pressures
11A.1 Use interpersonal and problem-solving skills to influence and guide others toward a goal

Standards and Competencies

Standard/Unit: Unit: Right Triangle Relationships/Trigonometry

Competencies	**Total Learning Hours for Unit: 30**

- Use properties of sine, cosine, and tangents to solve real-world problems.
- Use the tangents segment theorem to solve problems.
- Explore and prove the law of sines
- Explore and prove the law of cosines
- Use the Pythagorean Theorem of solve applied problems involving right triangles.
- Define trigonometric ratios and solve problems involving right triangles.
- Explore careers where the understanding and application of right triangle relationships and trigonometry are crucial
- Demonstrate 21st Century Skills

Alignment to Washington State Standards	
Educational Technology	1.2.1 Communicate and collaborate to learn with others. 1.3.2 Locate and organize information from a variety of sources and media. 2.2.1 Develop skills to use technology effectively. 2.4.1 Formulate and synthesize new knowledge.
Alignment to Common Core State Standards	
CCSS - Reading	RST.9-10.1 Cite specific textual evidence to support analysis of technical texts, attending to the precise details of explanations or descriptions. RST.9-10.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. RST.9-10.4 Determine meaning of symbols, key terms, or other domain specific words and phrases as they are used in specific technical context RST.9-10.7 Translate quantitative or technical information expressed in words in a text into visual form and translate information expressed verbally or mathematically into words.
CCSS - Writing	W.9-10.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

CCSS - Speaking and Listening	SL.9-10.1 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher led) with diverse partners building on others' ideas and expressing their own clearly and persuasively. SL.9-10.4 Present information, findings, and supportive evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
CCSS - Language	L 9-10.6 Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.
CCSS - Mathematics	G-SRT.5 Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. G-SRT.6 Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles. G-SRT.7 Explain and use the relationship between the sine and cosine of complementary angles. G-SRT.8 Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.★ G-SRT.9 (+) Derive the formula $A = 1/2$ ab sin(C) for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side. G-SRT.10 (+) Prove the Laws of Sines and Cosines and use them to solve problems. G-SRT.11 (+) Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces). **Mathematical Practices** ☒ MP.1 Makes sense of problems and persevere in solving them ☒ MP.2 Reason abstractly and quantitatively ☒ MP.3 Construct viable arguments and critique reasoning of others ☒ MP.4 Model with mathematics ☒ MP.5 Use appropriate tools strategically ☒ MP.6 Attend to precision ☒ MP.7 Look for and make use of structure ☒ MP.8 Look for and express regularity in repeated reasoning

Unit 7: Coordinate Geometry/Proof

Performance Assessments: Students will be able to synthesize information from a variety of instructional and technological experiences. These will include (but are not limited to) labs, experiments, skill-drills, hands-on practice with calculators and other tools of mathematics, diagnostic (written) testing, group projects, problem-solving techniques, unit quizzes, as well as formative and summative assessments.

Leadership Alignment: 21st Century Skills (*indentify leadership component being utilized within this space; for example FFA, DECA, TSA, etc.)*
Note: All skills can be applied to CTSO Program and Equivalent Activities at the High School Level

1A.1 Use a wide range of idea creation techniques (such as brainstorming)
1B.3 Demonstrate originality and inventiveness in work and understand the real world limits to adopting new ideas
2B.1 Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems
3A.1 Articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts
3B.1 Demonstrate ability to work effectively and respectfully with diverse teams
9A.1 Know when it is appropriate to listen and when to speak
10B.1 Demonstrate additional attributes associated with producing high quality products

Standards and Competencies

Standard/Unit: Coordinate Geometry/Proof

Competencies	**Total Learning Hours for Unit: 20**

- Use coordinates to prove geometric theorems algebraically.
- Translate between the geometric description and the equation for a conic section.
- Prove properties of circles, quadrilaterals, and polygons
- Use the Pythagorean Theorem to find the equation of a circle
- Explore and define the slope relationships for a variety of lines (parallel, perpendicular, and intersecting) in terms of no, one, and many simultaneous solutions.
- Find the midpoint of a line segment using coordinates then generalize the process to find the formula
- Explore careers where the understanding and application of coordinate geometry and proof are crucial
- Demonstrate 21st Century Skills

Alignment to Washington State Standards

Educational Technology	1.2.1 Communicate and collaborate to learn with others. 1.3.2 Locate and organize information from a variety of sources and media. 2.2.1 Develop skills to use technology effectively. 2.4.1 Formulate and synthesize new knowledge.

Alignment to Common Core State Standards

CCSS - Reading	RST.9-10.1 Cite specific textual evidence to support analysis of technical texts, attending to the precise details of explanations or descriptions. RST.9-10.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. RST.9-10.4 Determine meaning of symbols, key terms, or other domain specific words and phrases as they are used in specific technical context RST.9-10.7 Translate quantitative or technical information expressed in words in a text into visual form and translate information expressed verbally or mathematically into words.
CCSS - Writing	W.9-10.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

CCSS - Speaking and Listening	SL.9-10.1 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher led) with diverse partners building on others' ideas and expressing their own clearly and persuasively. SL.9-10.4 Present information, findings, and supportive evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
CCSS - Language	L 9-10.6 Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.
CCSS - Mathematics	G-CO.9 Prove theorems about lines and angles. *Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.* G-CO.10 Prove theorems about triangles. *Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.* G-CO.11 Prove theorems about parallelograms. *Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.* 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-SRT.4 Prove theorems about triangles. *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*. G-GPE.1 Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation. G-GPE.2 Derive the equation of a parabola given a focus and directrix. G-GPE.4 Use coordinates to prove simple geometric theorems algebraically. *For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point (1, √3) lies on the circle centered at the origin and containing the point (0, 2).* G-GPE.5 Prove the slope criteria for parallel and perpendicular lines and uses them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point). G-GPE.6 Find the point on a directed line segment between two given points that partitions the segment in a given ratio. G-GPE.7 Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.★ **Mathematical Practices** ☒ MP.1 Makes sense of problems and persevere in solving them ☒ MP.2 Reason abstractly and quantitatively ☒ MP.3 Construct viable arguments and critique reasoning of others ☒ MP.4 Model with mathematics ☒ MP.5 Use appropriate tools strategically ☒ MP.6 Attend to precision ☒ MP.7 Look for and make use of structure ☒ MP.8 Look for and express regularity in repeated reasoning

Unit 8: Geometry Applications

Performance Assessments: Students will be able to synthesize information from a variety of instructional and technological experiences. These will include (but are not limited to) labs, experiments, skill-drills, hands-on practice with calculators and other tools of mathematics, diagnostic (written) testing, group projects, problem-solving techniques, unit quizzes, as well as formative and summative assessments.

Leadership Alignment: 21st Century Skills (*indentify leadership component being utilized within this space; for example FFA, DECA, TSA, etc.)*
Note: All skills can be applied to CTSO Program and Equivalent Activities at the High School Level

1A.3 Elaborate, refine, analyze and evaluate their own ideas in order to improve and maximize creative efforts
1B.3 Demonstrate originality and inventiveness in work and understand the real world limits to adopting new ideas
2C.3 Synthesize and make connections between information and arguments
3B.2 Exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal
5A.1 Understand both how and why media messages are constructed, and for what purposes
5B.1 Understand and utilize the most appropriate media creation tools, characteristics and conventions
7B.1 Incorporate feedback effectively
8C.1 Go beyond basic mastery of skills and/or curriculum to explore and expand one's own learning and opportunities to gain expertise

Standards and Competencies

Standard/Unit: Geometry Applications

Competencies	**Total Learning Hours for Unit: 15**

- Apply geometric concepts in modeling situations.
- Explore careers where the understanding and application of the principals of geometry are crucial
- Demonstrate 21st Century Skills

Alignment to Washington State Standards

Educational Technology	1.2.1 Communicate and collaborate to learn with others. 1.3.2 Locate and organize information from a variety of sources and media. 2.2.1 Develop skills to use technology effectively. 2.4.1 Formulate and synthesize new knowledge.

Alignment to Common Core State Standards

CCSS - Reading	RST.9-10.1 Cite specific textual evidence to support analysis of technical texts, attending to the precise details of explanations or descriptions. RST.9-10.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. RST.9-10.4 Determine meaning of symbols, key terms, or other domain specific words and phrases as they are used in specific technical context RST.9-10.7 Translate quantitative or technical information expressed in words in a text into visual form and translate information expressed verbally or mathematically into words.
CCSS - Writing	W.9-10.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
CCSS - Speaking and Listening	SL.9-10.1 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher led) with diverse partners building on others' ideas and expressing their own clearly and persuasively. SL.9-10.4 Present information, findings, and supportive evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.

CCSS - Language	L 9-10.6 Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.
CCSS - Mathematics	G-SRT.11 (+) Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces). G-MG.2 Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).* G-MG.3 Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).* **Mathematical Practices** ☒ MP.1 Makes sense of problems and persevere in solving them ☒ MP.2 Reason abstractly and quantitatively ☒ MP.3 Construct viable arguments and critique reasoning of others ☒ MP.4 Model with mathematics ☒ MP.5 Use appropriate tools strategically ☒ MP.6 Attend to precision ☒ MP.7 Look for and make use of structure ☒ MP.8 Look for and express regularity in repeated reasoning

21st Century Skills

Check those that students will demonstrate in this course:

LEARNING & INNOVATION

Creativity and Innovation
- ☒ Think Creatively
- ☒ Work Creatively with Others
- ☐ Implement Innovations

Critical Thinking and Problem Solving
- ☒ Reason Effectively
- ☒ **U**se Systems Thinking
- ☒ Make Judgments and Decisions
- ☒ Solve Problems

Communication and Collaboration
- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA & TECHNOLOGY SKILLS

Information Literacy
- ☒ Access and /evaluate Information
- ☒ Use and Manage Information

Media Literacy
- ☒ Analyze Media
- ☒ Create Media Products

Information, Communications and Technology (ICT Literacy)
- ☒ Apply Technology Effectively

LIFE & CAREER SKILLS

Flexibility and Adaptability
- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction
- ☒ Manage Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural
- ☒ Interact Effectively with Others
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability
- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility
- ☒ Guide and Lead Others
- ☒ Be Responsible to Others