

STRATFORD PUBLIC SCHOOLS

Stratford, Connecticut



“Tantum eruditi sunt liberi”
Only The Educated Are Free

Trigonometry

Adopted by the Board of Education on June 25, 2012

Irene Cornish
Superintendent

Elaine Watson
Assistant Superintendent

DISTRICT MISSION

The mission of the Stratford Public Schools is to develop a community of learners in which students acquire the knowledge, skills and confidence to meet the challenges of a changing and increasingly diverse 21st century society.

DISTRICT CORE VALUES

Students will acquire content knowledge, strengthen higher-order thinking, and develop character in order to address 21st century challenges.

BUNNELL HIGH SCHOOL BELIEFS

We believe teachers must work collaboratively in support of student learning and to model collaboration as a social skill with students. We believe that a rigorous curriculum for all students, an acceptance of diversity, and a culture that actively welcomes all learners will contribute to a more knowledgeable community and society. We believe in the value of a strong education as a means of preparing students for work and life in the remainder of the 21st century.

STRATFORD HIGH SCHOOL BELIEFS

- a safe, positive school climate that embraces diversity is essential to ensure respect and opportunity for each individual
- students should understand the world beyond their community in order to contribute to a global society
- parents and students must share responsibility and work in partnership with the school in order to improve academic performance and to develop lifelong learners
- students should use technology effectively to acquire, process, and deliver information

BUNNELL HIGH SCHOOL and STRATFORD HIGH SCHOOL

LEARNING EXPECTATIONS

All students will...

- use real-world digital and other research tools to access, evaluate and effectively apply information appropriate for authentic tasks. (Academic)
- work independently and collaboratively to solve problems and accomplish goals. (Civic-Social)
- communicate information clearly and effectively using a variety of tools/media in varied contexts for a variety of purposes. (Academic)
- demonstrate innovation, flexibility and adaptability in thinking patterns, work habits and working/learning conditions. (Academic)
- effectively apply the analysis, synthesis and evaluation processes that enable productive problem solving. (Academic)
- value and demonstrate personal responsibility, character, cultural understanding and ethical behavior. (Civic-Social)
- show competence in all core academic subjects and other fields of interest, including the ability to clearly and effectively communicate content information in multiple formats. (Academic)

TRIGONOMETRY UNIT PLANS #1 – 5
Stratford Public Schools
Trigonometry Unit #1

Unit Name: Right Triangle Trigonometry Est. # of Weeks: (3 weeks) Synopsis: This unit is an introduction to the trig ratios as defined in a right triangle, and how they may be used to solve triangles and applications of triangles.. It will also include a review of properties of radicals.	
STUDENT LEARNING GOALS	
Content-Specific Powered Standards Algebraic Reasoning: Patterns And Functions ➤ Patterns and functional relationships can be represented and analyzed using a variety of strategies, tools and technologies	Interdisciplinary Standards (Technology Integration) Standard 1: Information Strategies Students determine their need for information and apply strategies to select, locate, and access information resources. Standard 2: Information Use Students evaluate, analyze, and synthesize information and data to solve problems, conduct research, and pursue personal interests. Standard 3: Information and Technology Application Students use appropriate technologies to create written, visual, oral and multimedia products that communicate ideas and information. Standard 4: Literacy and Literary Appreciation Students extract meaning from fiction and non-fiction resources in a variety of formats. They demonstrate an enjoyment of reading, including an appreciation of literature and other creative expressions. Standard 5: Personal Management Students display evidence of ethical, legal, and social responsibility in regard to information resources and project and self-management
Key Vocabulary ➤ Square roots, simplified square root, rationalize, trigonometry, hypotenuse, opposite, adjacent, sine, cosine, tangent, cosecant, secant, cotangent, special triangles, trig identities, angle of elevation, angle of depression; inverse trig functions, solving right triangles, bearings, simple harmonic motion	
Enduring Understandings: Students should... 1.1 Understand and describe patterns and functional relationships a. Model real-world situations and make generalizations about mathematical relationships using a variety of patterns and functions. 1.2 Represent and analyze quantitative relationships in a variety of ways a. Relate the behavior of functions and relations to specific parameters and determine functions to model real-world situations. 1.3 Use operations, properties, and algebraic symbols to determine equivalence and solve problems a. Solve problems using a variety of algebraic methods. 4.1 Collect, organize and display data using appropriate statistical and graphical methods. a. Create the appropriate visual or graphical representation of real data.	Essential Questions ➤ How are the trigonometric ratios defined in a right triangle? ➤ How can trig ratios be used to solve real-life applications? ➤ How can angles of a right triangle be found given the sides?
21st Century Skills and Expectations Rubric: Critical Skills 1. Use real-world digital and other research tools to access, evaluate, and effectively apply information appropriate for authentic tasks. 2. Work independently and collaboratively to solve problems and accomplish goals.	4. Demonstrate innovation, flexibility, and adaptability in thinking patterns, work habits, and working/learning conditions. 5. Effectively apply the analysis, synthesis, and evaluative processes that enable productive problem solving.

3. Communicate information clearly and effectively using a variety of tools/media in varied contexts for a variety of purposes.

6. Value and demonstrate personal responsibility, character, cultural understanding and ethical behavior.

Learning Objectives: Students will:

- Evaluate square roots
- Simplify square roots using properties of radicals
- Rationalize denominators
- Define the trig ratios in a right triangle
- Evaluate trig ratios in a right triangle
- Use the special triangles to find exact values of the trig ratios
- Evaluate trig ratios on a calculator
- Use right triangle trig to solve applied problems

ASSESSMENT PLAN

Summative Assessment(s)/Performance Based Assessments including 21st Century Learning

Diagnostic Assessment to determine previous knowledge of the trig ratios

Formative and Diagnostic Assessment(s)

- **Formative and Diagnostic Assessment(s)**
- CFA
- Verbal assessments
- Informal assessments of class work
- Weekly quiz
- Homework review
- Chapter assessment
- Quizzes

LEARNING PLAN COMPONENTS

- Algebra & Trigonometry, Blitzer, Section P3, 5.2, 5.7, and 5.8
- TI-83 Graphing Calculator
- Supplementary College Placement Exam Materials

Stratford Public Schools
Trigonometry Unit #2

Unit Name: Trigonometric Functions as Circular Functions Est. # of Weeks: (3 weeks) Synopsis: This unit will extend the concept of the trig functions as circular functions, and introduce radians. The properties of the trig functions will be expanded to include circular motion and the concept of periodicity.	
STUDENT LEARNING GOALS	
Content-Specific Powered Standards Algebraic Reasoning: Patterns And Functions ➤ Patterns and functional relationships can be represented and analyzed using a variety of strategies, tools and technologies	Interdisciplinary Standards (Technology Integration) Standard 1: Information Strategies Students determine their need for information and apply strategies to select, locate, and access information resources. Standard 2: Information Use Students evaluate, analyze, and synthesize information and data to solve problems, conduct research, and pursue personal interests. Standard 3: Information and Technology Application Students use appropriate technologies to create written, visual, oral and multimedia products that communicate ideas and information. Standard 4: Literacy and Literary Appreciation Students extract meaning from fiction and non-fiction resources in a variety of formats. They demonstrate an enjoyment of reading, including an appreciation of literature and other creative expressions. Standard 5: Personal Management Students display evidence of ethical, legal, and social responsibility in regard to information resources and project and self-management
Key Vocabulary ➤ Angle, initial side, terminal side, vertex, standard position, positive angle, negative angle, quadrantal angle, right angle, acute angle, obtuse angle, central angle, radian, coterminal angles, arc length, linear speed, angular speed, reference angle, unit circle, even functions, odd functions, periodic function	
Enduring Understandings: Students should... 1.4 .Understand and describe patterns and functional relationships a. Model real-world situations and make generalizations about mathematical relationships using a variety of patterns and functions. 1.5 Represent and analyze quantitative relationships in a variety of ways a. Relate the behavior of functions and relations to specific parameters and determine functions to model real-world situations. 1.6 Use operations, properties, and algebraic symbols to determine equivalence and solve problems b. Solve problems using a variety of algebraic methods. 4.1 Collect, organize and display data using appropriate statistical and graphical methods. a. Create the appropriate visual or graphical representation of real data.	Essential Questions ➤ How are the trigonometric functions defined in a circle? ➤ How can uniform circular motion be modeled? ➤ How can the trig functions model real-life problems?
21st Century Skills and Expectations Rubric: Critical Skills 1. Use real-world digital and other research tools to access, evaluate, and effectively apply information appropriate for authentic tasks. 2. Work independently and collaboratively to solve problems and accomplish goals. 3. Communicate information clearly and effectively using a variety of tools/media in varied contexts for a variety of purposes.	4. Demonstrate innovation, flexibility, and adaptability in thinking patterns, work habits, and working/learning conditions. 5. Effectively apply the analysis, synthesis, and evaluative processes that enable productive problem solving. 6. Value and demonstrate personal responsibility, character, cultural understanding and ethical behavior.

Learning Objectives: Students will:

- Recognize and use the vocabulary of angles
- Use degree measure
- Use radian measure
- Convert between degrees and radians
- Draw and estimate angles in standard position
- Find conterminal angles
- Find the length of a circular arc
- Find the properties of uniform circular motion
- Use the definitions of the trig functions for any angle
- Use the signs of the trig functions
- Find reference angles
- Use reference angles to evaluate trig functions
- Use a unit circle to define trig functions of real numbers
- Use even and odd properties of the trig functions
- Use periodic properties of the trig functions

Summative Assessment(s)/Performance Based Assessments including 21st Century Learning

Diagnostic Assessment to determine previous knowledge of the trig ratios

Formative and Diagnostic Assessment(s)

- **Formative and Diagnostic Assessment(s)**
- CFA
- Verbal assessments
- Informal assessments of class work
- Weekly quiz
- Homework review
- Chapter assessment
- Quizzes

○ **LEARNING PLAN COMPONENTS**

- Algebra & Trigonometry, Blitzer, Sections 5.1, 5.3, and 5.4
- TI-83 Graphing Calculator
- Supplementary College Placement Exam Materials

Stratford Public Schools
Trigonometry Unit #3

Unit Name: Graphs of Trigonometric Functions		Est. # of Weeks: (4 weeks)
Synopsis: This unit will explore the graphs of the circular functions. Transformations of the sine curve will be studied, and these curves will be used to model real-world situations.		
STUDENT LEARNING GOALS		
Content-Specific Powered Standards Algebraic Reasoning: Patterns And Functions ➤ Patterns and functional relationships can be represented and analyzed using a variety of strategies, tools and technologies	Interdisciplinary Standards (Technology Integration) Standard 1: Information Strategies Students determine their need for information and apply strategies to select, locate, and access information resources. Standard 2: Information Use Students evaluate, analyze, and synthesize information and data to solve problems, conduct research, and pursue personal interests. Standard 3: Information and Technology Application Students use appropriate technologies to create written, visual, oral and multimedia products that communicate ideas and information. Standard 4: Literacy and Literary Appreciation Students extract meaning from fiction and non-fiction resources in a variety of formats. They demonstrate an enjoyment of reading, including an appreciation of literature and other creative expressions. Standard 5: Personal Management Students display evidence of ethical, legal, and social responsibility in regard to information resources and project and self-management	
	Key Vocabulary ➤ period, quarter-period, amplitude, phase shift, sinusoidal graphs, vertical shift, asymptotes	
Enduring Understandings: Students should... 1.7 .Understand and describe patterns and functional relationships a. Model real-world situations and make generalizations about mathematical relationships using a variety of patterns and functions. 1.8 Represent and analyze quantitative relationships in a variety of ways a. Relate the behavior of functions and relations to specific parameters and determine functions to model real-world situations. 1.9 Use operations, properties, and algebraic symbols to determine equivalence and solve problems c. Solve problems using a variety of algebraic methods. 4.1 Collect, organize and display data using appropriate statistical and graphical methods. a. Create the appropriate visual or graphical representation of real data.	Essential Questions ➤ How are sine curves and cosine curves related? ➤ How can sinusoidal functions be used to model real-world phenomena?	
21st Century Skills and Expectations Rubric: Critical Skills 1. Use real-world digital and other research tools to access, evaluate, and effectively apply information appropriate for authentic tasks. 2. Work independently and collaboratively to solve problems and accomplish goals. 3. Communicate information clearly and effectively using a variety of tools/media in varied contexts for a variety of purposes.	4. Demonstrate innovation, flexibility, and adaptability in thinking patterns, work habits, and working/learning conditions. 5. Effectively apply the analysis, synthesis, and evaluative processes that enable productive problem solving. 6. Value and demonstrate personal responsibility, character, cultural understanding and ethical behavior.	

Learning Objectives: Students will:

- Understand the graph of $y = \sin x$
- Identify critical properties of the sin curve
- Graph variations of the sin curve
- Understand the graph of $y = \cos x$ and identify critical properties
- Graph variations of the cos curve
- Use vertical shifts of sine and cosine curves
- Model periodic behavior
- Be able to sketch a graph from its equation
- Be able to write the equation of a graph
- Understand the graphs of $y = \tan x$ and $y = \cot x$
- Understand the graphs of $y = \csc x$ and $y = \sec x$

ASSESSMENT PLAN**Summative Assessment(s)/Performance Based Assessments including 21st Century Learning**

Diagnostic Assessment to determine previous knowledge of the trig ratios

Formative and Diagnostic Assessment(s)

- **Formative and Diagnostic Assessment(s)**
- CFA
- Verbal assessments
- Informal assessments of class work
- Weekly quiz
- Homework review
- Chapter assessment
- Quizzes

LEARNING PLAN COMPONENTS

- Algebra & Trigonometry, Blitzer, Sections 5.5 and 5.6
- TI-83 Graphing Calculator
- Supplementary College Placement Exam Materials

Stratford Public Schools
Trigonometry Unit #4

Unit Name: Additional Topics in Trigonometry Est. # of Weeks (4 weeks) Synopsis: This unit will explore the use of trigonometry in oblique triangles, primarily utilizing the Law of Sines and Law of Cosines.	
STUDENT LEARNING GOALS	
Content-Specific Powered Standards Algebraic Reasoning: Patterns And Functions ➤ Patterns and functional relationships can be represented and analyzed using a variety of strategies, tools and technologies ➤	Interdisciplinary Standards (Technology Integration) Standard 1: Information Strategies Students determine their need for information and apply strategies to select, locate, and access information resources. Standard 2: Information Use Students evaluate, analyze, and synthesize information and data to solve problems, conduct research, and pursue personal interests. Standard 3: Information and Technology Application Students use appropriate technologies to create written, visual, oral and multimedia products that communicate ideas and information. Standard 4: Literacy and Literary Appreciation Students extract meaning from fiction and non-fiction resources in a variety of formats. They demonstrate an enjoyment of reading, including an appreciation of literature and other creative expressions. Standard 5: Personal Management Students display evidence of ethical, legal, and social responsibility in regard to information resources and project and self-management <hr/> Key Vocabulary ➤ oblique triangle, Law of Sines, SAA, ASA, SSA, Ambiguous case, SAS, SSS, Law of Cosines, Heron's Formula
Enduring Understandings: Students should... 1.10. Understand and describe patterns and functional relationships a. Model real-world situations and make generalizations about mathematical relationships using a variety of patterns and functions. 1.11 Represent and analyze quantitative relationships in a variety of ways a. Relate the behavior of functions and relations to specific parameters and determine functions to model real-world situations. 1.12 Use operations, properties, and algebraic symbols to determine equivalence and solve problems d. Solve problems using a variety of algebraic methods. 4.1 Collect, organize and display data using appropriate statistical and graphical methods. a. Create the appropriate visual or graphical representation of real data.	Essential Questions ➤ How can trigonometry be used to solve non-right triangles? ➤ How can trigonometry be used to solve real-life problems with oblique triangles?
21st Century Skills and Expectations Rubric: Critical Skills 1. Use real-world digital and other research tools to access, evaluate, and effectively apply information appropriate for authentic tasks. 2. Work independently and collaboratively to solve problems and accomplish goals. 3. Communicate information clearly and effectively using a variety of tools/media in varied contexts for a variety of purposes.	4. Demonstrate innovation, flexibility, and adaptability in thinking patterns, work habits, and working/learning conditions. 5. Effectively apply the analysis, synthesis, and evaluative processes that enable productive problem solving. 6. Value and demonstrate personal responsibility, character, cultural understanding and ethical behavior.

Learning Objectives: Students will:

- Use the Law of Sines to solve oblique triangles
- Use the Law of Sines to identify the solution(s) of the ambiguous case
- Find the area of an oblique triangle using the sine function
- Solve applied problems using the Law of Sines
- Use the Law of Cosines to solve oblique triangles
- Solve applied problems using the Law of Cosines
- Use Heron's formula to find the area of a triangle
- Identify which technique to use to solve a variety of triangles

ASSESSMENT PLAN**Summative Assessment(s)/Performance Based Assessments including 21st Century Learning**

Diagnostic Assessment to determine previous knowledge of the trig ratios

Formative and Diagnostic Assessment(s)

- **Formative and Diagnostic Assessment(s)**
- CFA
- Verbal assessments
- Informal assessments of class work
- Weekly quiz
- Homework review
- Chapter assessment
- Quizzes

LEARNING PLAN COMPONENTS

- Algebra & Trigonometry, Blitzer, Sections 7.1 and 7.2
- TI-83 Graphing Calculator
- Time permitting, polar coordinates will be studied
- Supplementary College Placement Exam Materials

Stratford Public Schools
Trigonometry Unit #5

Unit Name: Analytic Trigonometry Est. # of Weeks: (4 weeks) Synopsis: This unit will look at variations of the trig functions, and the techniques to find exact values of angles that do not fall in one of the special triangles.	
STUDENT LEARNING GOALS	
Content-Specific Powered Standards Algebraic Reasoning: Patterns And Functions ➤ Patterns and functional relationships can be represented and analyzed using a variety of strategies, tools and technologies	<u>Interdisciplinary Standards (Technology Integration)</u> Standard 1: Information Strategies Students determine their need for information and apply strategies to select, locate, and access information resources. Standard 2: Information Use Students evaluate, analyze, and synthesize information and data to solve problems, conduct research, and pursue personal interests. Standard 3: Information and Technology Application Students use appropriate technologies to create written, visual, oral and multimedia products that communicate ideas and information. Standard 4: Literacy and Literary Appreciation Students extract meaning from fiction and non-fiction resources in a variety of formats. They demonstrate an enjoyment of reading, including an appreciation of literature and other creative expressions. Standard 5: Personal Management Students display evidence of ethical, legal, and social responsibility in regard to information resources and project and self-management
<hr style="border-top: 1px dashed black;"/> Key Vocabulary ➤ Sum and difference formulas, exact values, double-angle formulas, half-angle formulas	
Enduring Understandings: Students should... 1.13. Understand and describe patterns and functional relationships a. Model real-world situations and make generalizations about mathematical relationships using a variety of patterns and functions. 1.14 Represent and analyze quantitative relationships in a variety of ways a. Relate the behavior of functions and relations to specific parameters and determine functions to model real-world situations. 1.15 Use operations, properties, and algebraic symbols to determine equivalence and solve problems e. Solve problems using a variety of algebraic methods. 4.1 Collect, organize and display data using appropriate statistical and graphical methods. a. Create the appropriate visual or graphical representation of real data.	Essential Questions ➤ How can trig functions be evaluated at angles that do not fall in a special triangle? ➤ How can trig ratios of known angles be used to find ratios of unknown angles?
<u>21st Century Skills and Expectations</u> <u>Rubric: Critical Skills</u> 1. Use real-world digital and other research tools to access, evaluate, and effectively apply information appropriate for authentic tasks. 2. Work independently and collaboratively to solve problems and accomplish goals. 3. Communicate information clearly and effectively using a variety of tools/media in varied contexts for a variety of purposes.	4. Demonstrate innovation, flexibility, and adaptability in thinking patterns, work habits, and working/learning conditions. 5. Effectively apply the analysis, synthesis, and evaluative processes that enable productive problem solving. 6. Value and demonstrate personal responsibility, character, cultural understanding and ethical behavior.

Learning Objectives: Students will:

- Use the sum and difference formulas for cosines
- Use the sum and difference formulas for sines
- Use the sum and difference formulas for tangents
- Use the double-angle formulas for sin, cos, and tan
- Use the half-angle formulas for sin, cos, and tan

ASSESSMENT PLAN

Summative Assessment(s)/Performance Based Assessments including 21st Century Learning

Diagnostic Assessment to determine previous knowledge of the trig ratios

Formative and Diagnostic Assessment(s)

- **Formative and Diagnostic Assessment(s)**
- CFA
- Verbal assessments
- Informal assessments of class work
- Weekly quiz
- Homework review
- Chapter assessment
- Quizzes

LEARNING PLAN COMPONENTS

- Algebra & Trigonometry, Blitzer, Sections 6.2 and 6.3
- TI-83 Graphing Calculator
- Time permitting, trig equations (Section 6.5) will be studied
- Supplementary College Placement Exam Materials