Math Planned Course: Trigonometry - Grade 12

Unit: **The Trigonometric Functions**

Content Standard: **Analyze functions, review basic geometry concepts, and evaluate trigonometric functions.**

State Curriculum Standards:
2.3.8C Measure angles in degrees and determine relations of angles.
2.8.11K Apply an appropriate technique to graph a linear function in two variables.
2.8.11O Determine the domain and range of a relation, given a graph or set of ordered pairs.
2.9.5B Classify and compare triangles according to sides or angles.
2.9.8E Construct parallel lines, draw a transversal and measure and compare angles formed.
2.10.5A Identify and compare parts of right triangles, including right angles, acute angles, hypotenuses, and legs.

ISTE Standards:
1 Creativity and Innovation
4 Critical Thinking, Problem Solving, and Decision Making
6 Technology Operations and Concepts

PSSA Anchors:
M11.A.1.1.1 Find the square root of an integer using either a calculator or estimation.
M11.A.1.1.3 Simplify square roots.
M11.B.2.1.1 Measure and/or compare angles in degrees.
M11.C.1.4.1 Solve problems involving right triangles using the Pythagorean Theorem.
M11.C.3.1.1 Calculate the distance and/or midpoint between two points on a number line or on a coordinate plane.

PACING Guide: **(Number of days 10 – 12)**

Math Planned Course: Trigonometry - Grade 12

Course Content	Student Performance	Resources	Assessments
A. Functions and the Coordinate Plane B. Angle Relation and Similar Triangles C. Define Trigonometric Functions From Right Triangles and the Unit Circle D. Using Fundamental Identities to Prove Other Identities E. Spiral Review • Solving one- and two-step equations • Coordinate plane • Types of triangles • Proportions • Similar triangles	• Define relations and functions • Graph functions on the coordinate plane • Calculate the distance between two points using the distance formula • Classify angles and triangles by their measure • Convert between decimal degrees and degrees, minutes, seconds • Define trigonometric functions from right triangles and the unit circle • Rewrite and compare trigonometric functions using fundamental identities	• Trigonometry (Addison Wesley, 2005) • Supplementary workbooks • Teacher generated activities • TI 84 graphing calculators • CPS • Spiral review and project binder • Appendix	• Tests • Quizzes • Teacher observations • Student participation • Projects (group/individual) • Journals • Daily assignments **Remediation** • Software • Tutoring • Internet • Spreadsheet project

Math Planned Course: Trigonometry - Grade 12

Unit: **Acute Angles and Right Triangles**

Content Standard: **Define and find values of the trigonometric function.**

State Curriculum Standards:

2.2.11F Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.
2.5.11A Select, use, and apply mathematical concepts and techniques from different areas of mathematics to solving non-routine and multi-step problems.
2.5.11D Conclude a solution process with a summary of results and evaluate the degree to which the results obtained represent an acceptable response to the initial problem and why the reasoning is valid.
2.10.8A Compute measures of sides and angles using proportions, the Pythagorean Theorem, and right triangle relationships.
2.10.11B Identify, create and solve practical problems involving right triangles using the trigonometric functions and the Pythagorean Theorem.

ISTE Standards:

1 Creativity and Innovation
4 Critical Thinking, Problem Solving, and Decision Making
6 Technology Operations and Concepts

PSSA Anchors:

M11.A.1.1.1 Find the square root of an integer using either a calculator or estimation.
M11.A.1.1.3 Simplify square roots.
M11.B.2.1.1 Measure and/or compare angles in degrees.
M11.C.1.2.1 Identify and/or use properties of triangles

PACING GUIDE: **(Number of days 10 – 12)**

Math Planned Course: Trigonometry - Grade 12

Course Content	Student Performance	Resources	Assessments
A. Trigonometric Functions of Acute Angles B. Trigonometric Functions of Non-Acute Angles C. Solving Right Triangles D. Applications of Right Triangles E. Spiral Review • Solve one- and two-step equations • Coordinate plane • Type of triangles • Similar triangles • Significant digit • Exact number • Complementary angles • Pythagorean Theorem	• Define right triangle based definitions of trigonometric functions • Find trigonometric function values for any non-quadrantal angle • Utilize trigonometric definitions to solve right triangle problems • Solve real-world problem using angles of depression and evaluation	• Trigonometry (Addison Wesley, 2005) • Supplementary workbooks • Teacher generated activities • TI 84 graphing calculators • CPS • Spiral review and project binder • Appendix	• Tests • Quizzes • Teacher observations • Student participation • Projects (group/individual) • Journals • Daily assignments **Remediation** • Software • Tutoring **Enrichment** • Internet • Spreadsheet project

Math Planned Course: Trigonometry - Grade 12

Unit: **Radian Measure and the Circular Functions**

Content Standard: **Convert between degrees and radians and apply radian measure to real world application.**

State Curriculum Standards:
2.2.11F Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.
2.3.11B Measure and compare angles in degrees and radians.
2.5.11A Select, use, and apply mathematical concepts and techniques from different areas of mathematics to solving non-routine and multi-step problems.

ISTE Standards:
1 Creativity and Innovation
4 Critical Thinking, Problem Solving, and Decision Making
6 Technology Operations and Concepts

PSSA Anchors:
M11.A.1.1.1 Find the square root of an integer using either a calculator or estimation.
M11.A.1.1.3 Simplify square roots.
M11.B.2.1.1 Measure and/or compare angles in degrees.
M11.C.1.4.1 Solve problems involving right triangles using the Pythagorean Theorem.
M11.A.3.1.1 Simplify expressions using the order of operations to solve problems.
M11.A.3.2.1 Use estimation to solve problems.

PACING GUIDE: **(Number of days 10 – 12)**

Math Planned Course: Trigonometry - Grade 12

Course Content	Student Performance	Resources	Assessments
A. Radian Measure B. Application of Radian Measure C. Spiral Review • Converting formulas • Area of a circle • Radius • Circumference • Solve one and two-step equations • Significant digit • Proportions • Coordinate plane	• Convert between degrees and radian measures • Solve problems which involve rotary motion • Calculate values of circular functions • Solve real world problems using angular and linear velocity	• Trigonometry (Addison Wesley, 2005) • Supplementary workbooks • Teacher generated activities • TI 84 graphing calculators • CPS • Spiral review and project binder • Appendix	• Tests • Quizzes • Teacher observations • Student participation • Projects (group/individual) • Journals • Daily assignments **Remediation** • Software • Tutoring **Enrichment** • Internet • Spreadsheet project

Math Planned Course: Trigonometry - Grade 12

Unit: **Graphs of the Circular Functions**

Content Standard: **Graph trigonometric functions with and without the use of technology.**

State Curriculum Standard:
2.2.11F Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.
2.5.11B Use symbols, mathematical terminology, standard notation, mathematical rules, graphing, and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas, and results.
2.5.11D Conclude a solution process with a summary of results and evaluate the degree to which the results obtained represent an acceptable response to the initial problem and why the reasoning is valid.
2.10.11A Use graphing calculators to display periodic and circular functions; describe properties of the graphs.

ISTE Standards:
1 Creativity and Innovation: a
4 Critical Thinking, Problem Solving, and Decision Making: d
6 Technology Operations and Concepts: a, b, d

PSSA Anchors:
M11.A.1.1.1 Find the square root of an integer using either a calculator or estimation.
M11.A.1.1.3 Simplify square roots.
M11.B.2.1.1 Measure and/or compare angles in degrees.
M11.C.1.4.1 Solve problems involving right triangles using the Pythagorean Theorem.
M11.D.1.1.2 Determine if a relation is a function given a set of point or a graph.
M11.D.1.1.3 Identify the domain, range or inverse of a relation.
M11.D.4.1.1 Match the graph of a given function to its table or equation.

PACING (**Number of days 10-12**)

Math Planned Course: Trigonometry - Grade 12

Course Content	Student Performance	Resources	Assessments
A. Graph of the Sine and Cosine Function B. Translation of the Graphs of the Sine and Cosine Functions C. Graphs of the Other Circular Function D. Spiral Review • Functions • Translation • Domain • Range • Ordered pair • Plotting • Coordinate plane • Intercepts • Solve one- and two-step equations • Estimations • Formulas	• Sketch the graphs of the six trigonometric function • Determine the amplitude, period, phase shift, and vertical shift • Using the graphing calculator, investigate the effect of: • Changing amplitude • Period • Phase shift • Vertical shift	• Trigonometry (Addison Wesley, 2005) • Supplementary workbooks • Teacher generated activities • TI 84 graphing calculators • CPS • Spiral review and project binder • Appendix	• Tests • Quizzes • Teacher observations • Student participation • Projects (group/individual) • Journals • Daily assignments **Remediation** • Software • Tutoring **Enrichment** • Internet • Spreadsheet project

Math Planned Course: Trigonometry - Grade 12

Unit: **Trigonometric Identities**

Content Standard: **Verify basic trigonometric identities and make substitution using the basic identities.**

State Curriculum Standards:
2.2.11F Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.
2.4.11A Use direct proofs, indirect proofs or proof by contradiction to validate conjectures.
2.4.11C Determine the validity of an argument.
2.5.11A Select, use, and apply mathematical concepts and techniques from different areas of mathematics to solving non-routine and multi-step problems.

ISTE Standards:
1 Creativity and Innovation
4 Critical Thinking, Problem Solving, and Decision Making
6 Technology Operations and Concepts

PSSA Anchors:
M11.A.1.1.1 Find the square root of an integer using either a calculator or estimation.
M11.A.1.1.3 Simplify square roots.
M11.D.2.2.2 Factor algebraic expressions, including the difference of squares and trinomials.

PACING GUIDE: **(Number of days 10 – 12)**

Math Planned Course: Trigonometry - Grade 12

Course Content	Student Performance	Resources	Assessments
A. Fundamental Identities B. Verifying Trigonometric C. Sum and Difference Identities: • Cosine • Sine • Tangent D. Double Angle Identities E. Half Angle Identities F. Spiral Review • Solve one- and two-step equations • Formulas • Substitution • Conversion • Identity • Properties of exponents • Radicals • Significant digits	• Verify fundamental identities • Use fundamental identities to prove other identities • Utilize sum and difference identities for sine, cosine, and tangent • Derive and use: • Double angle • Half angle identities	• Trigonometry (Addison Wesley, 2005) • Supplementary workbooks • Teacher generated activities • TI 84 graphing calculators • CPS • Spiral review and project binder • Appendix	• Tests • Quizzes • Teacher observations • Student participation • Projects (group/individual) • Journals • Daily assignments **Remediation** • Software • Tutoring **Enrichment** • Internet • Spreadsheet project

Math Planned Course: Trigonometry - Grade 12

Unit: **Applications of Oblique Triangles**

Content Standard: **Solve practical problems involving oblique triangles.**

State Curriculum Standards:
2.2.11F Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.
2.5.11C Present mathematical procedures and results clearly, systematically, succinctly and correctly.
2.10.8A Compute measures of sides and angles using proportions, the Pythagorean Theorem, and right triangle relationships.
2.10.11B Identify, create and solve practical problems involving right triangles using the trigonometric functions and the Pythagorean Theorem.

ISTE Standards:
1 Creativity and Innovation
4 Critical Thinking, Problem Solving, and Decision Making
6 Technology Operations and Concepts

PSSA Anchors:
M11.A.1.1.1 Find the square root of an integer using either a calculator or estimation.
M11.A.1.1.3 Simplify square roots.
M11.C.1.2.1 Identify and/or use properties of triangles.
M11.C.1.4.1 Solve problems involving right triangles using the Pythagorean Theorem.

PACING GUIDE: **(Number of days 10 – 12)**

Math Planned Course: Trigonometry - Grade 12

Course Content	Student Performance	Resources	Assessments

A. Law of Sines
 	
B. Law of Cosines
 	
C. Area of Triangles
 	
D. Spiral Review
• Solve one- and two-step equations
• Determine area of triangles
• Median
• Altitude
• Bisector
• Proportions
• Distance formula
• Similar triangles
	• Apply the Laws of Sines to solve triangle problems:
	  • Given any two angles and one side
	  • Given any two sides and an angle opposite one of them
	
	• Investigate the number of possible solutions that arise in the ambiguous case
	
	• Apply the Laws of Cosines to solve triangles:
	  • Given any two sides and an included angle
	  • Given any three sides
	
	• Utilize Heron's Formula to calculate the area of a triangle
		• Trigonometry (Addison Wesley, 2005)
		
		• Supplementary workbooks
		
		• Teacher generated activities
		
		• TI 84 graphing calculators
		
		• CPS
		
		• Spiral review and project binder
		
		• Appendix
			• Tests
			
			• Quizzes
			
			• Teacher observations
			
			• Student participation
			
			• Projects (group/individual)
			
			• Journals
			
			• Daily assignments
			
			Remediation
			• Software
			• Tutoring
			
			Enrichment
			• Internet
			• Spreadsheet project

Math Planned Course: Trigonometry - Grade 12

Unit: **Inverse Trigonometric Functions and Trigonometric Equations**

Content Standard: **Define and evaluate inverse trigonometric functions and utilize these to solve trigonometric equations.**

State Curriculum Standards:
2.2.11F Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.
2.8.11N Solve linear, quadratic and exponential equations both symbolically and graphically.
2.8.11S Analyze properties and relationships of trigonometric functions.
2.8.11T Analyze and categorize functions by their characteristics.

ISTE Standards:
1 Creativity and Innovation
4 Critical Thinking, Problem Solving, and Decision Making
6 Technology Operations and Concepts

PSSA Anchors:
M11.A.1.1.1 Find the square root of an integer using either a calculator or estimation.
M11.A.1.1.3 Simplify square roots.
M11.B.2.1.1 Measure and/or compare angles in degrees.
M11.C.1.4.1 Solve problems involving right triangles using the Pythagorean Theorem.
M11.C.3.1.1 Calculate the distance and/or midpoint between two points on a number line or on a coordinate plane.

PACING GUIDE: **(Number of days 10 – 12)**

Math Planned Course: Trigonometry - Grade 12

Course Content	Student Performance	Resources	Assessments
A. Inverse Trigonometric Functions B. Trigonometric Equations C. Spiral Review • Solve one- and two-step equations • Inverse • Functions • One-on-one Correspondence • Identities • Horizontal line test • Domain • Range • Tables • Graphing	• Define inverse trigonometric functions • Evaluate expressions involving the various trigonometric functions and their inverses • Solve trigonometric equations using algebraic methods	• Trigonometry (Addison Wesley, 2005) • Supplementary workbooks • Teacher generated activities • TI 84 graphing calculators • CPS • Spiral review and project binder • Appendix	• Tests • Quizzes • Teacher observations • Student participation • Projects (group/individual) • Journals • Daily assignments **Remediation** • Software • Tutoring **Enrichment** • Internet • Spreadsheet project

Math Planned Course: Trigonometry - Grade 12

Unit: **Complex Numbers and Polar Coordinates**

Content Standard: **Define polar coordinates and make applications to complex numbers.**

State Curriculum Standards:
2.1.11A Use operations (e.g. raising to a power and finding roots).
2.2.11F Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.
2.8.11D Formulate expressions, equations, inequalities, systems of equations, systems of inequalities, and matrices to model routine and non-routine problem situations.

ISTE Standards:
1 Creativity and Innovation
4 Critical Thinking, Problem Solving, and Decision Making
6 Technology Operations and Concepts

PSSA Anchors:
M11.A.1.1.1 Find the square root of an integer using either a calculator or estimation.
M11.A.1.1.3 Simplify square roots.
M11.B.2.1.1 Measure and/or compare angles in degrees.
M11.C.1.4.1 Solve problems involving right triangles using the Pythagorean Theorem.
M11.C.3.1.1 Calculate the distance and/or midpoint between two points on a number line or on a coordinate plane.

PACING GUIDE: **(Number of days 10 – 12)**

Math Planned Course: Trigonometry - Grade 12

Course Content	Student Performance	Resources	Assessments
A. Complex Numbers B. Trigonometric Form of Complex Numbers C. Product and Quotient Theorems D. De Moivre's Theorem E. Spiral Review • Solve one- and two-step equations • Imaginary numbers • Real numbers • Quadratic equations • Coordinate plane • Exponents • Roots • Absolute value	• Perform operations with complex numbers • Define polar coordinates • Convert from polar coordinates to rectangular form • Express complex numbers in polar form • Utilize De Moivre's theorem to evaluate powers of complex numbers	• Trigonometry (Addison Wesley, 2005) • Supplementary workbooks • Teacher generated activities • TI 84 graphing calculators • CPS • Spiral review and project binder • Appendix	• Tests • Quizzes • Teacher observations • Student participation • Projects (group/individual) • Journals • Daily assignments **Remediation** • Software • Tutoring **Enrichment** • Internet • Spreadsheet project

Math Planned Course: Trigonometry - Grade 12

Unit: **Exponential and Logarithmic Functions**

Content Standard: **Apply laws of logarithms and exponents.**

State Curriculum Standards:
2.1.11A Use operations (e.g. raising to a power and finding logarithms).
2.2.11F Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.
2.8.11N Solve exponential and logarithmic equations both symbolically and graphically.
2.8.11S Analyze properties and relationships of exponential and logarithmic functions.

ISTE Standards:
1 Creativity and Innovation
4 Critical Thinking, Problem Solving, and Decision Making
6 Technology Operations and Concepts

PSSA Anchors:
M11.A.1.1.1 Find the square root of an integer using either a calculator or estimation.
M11.A.1.1.3 Simplify square roots.
M11.B.2.1.1 Measure and/or compare angles in degrees.
M11.C.1.4.1 Solve problems involving right triangles using the Pythagorean Theorem.
M11.C.3.1.1 Calculate the distance and/or midpoint between two points on a number line or on a coordinate plane.

PACING GUIDE: **(Number of days 10 – 12)**

Math Planned Course: Trigonometry - Grade 12

Course Content	Student Performance	Resources	Assessments
A. Exponential Functions B. Logarithms Functions C. Evaluating Logarithms D. Exponential and Logarithmic Equations E. Spiral Review • Solve one- and two-step equations • Properties of exponents • Functions • Graphs-reflections and translations • Formulas	• Define exponential functions • Define logarithmic functions • Apply laws of logarithms • Evaluate common and natural logarithms • Solve exponential and logarithmic equations • Solve real world problems using exponential and logarithmic equations	• Trigonometry (Addison Wesley, 2005) • Supplementary Workbooks • Teacher generated activities • TI 84 graphing calculators • CPS • Spiral review and project binder • Appendix	• Tests • Quizzes • Teacher observations • Student participation • Projects (group/individual) • Journals • Daily assignments **Remediation** • Software • Tutoring **Enrichment** • Internet • Spreadsheet project