
Trigonometry

Curriculum Guide

Scranton School District

Scranton, PA



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Curriculum Guide

Trigonometry

Prerequisite: Algebra II, Geometry, Algebra I

Intended Audience: This course is designed for the student who has successfully completed Algebra II by the end of 11th grade.

This course enables students to understand trigonometric principles and to be able to apply them in various fields of mathematics. The topics include a study of functions of angles of any size, radian measure, trigonometric equations, identities, graphing of trigonometric functions, solution of triangles, and the use of various trigonometric formulas.

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Year-at-a-glance

Subject: Trigonometry	Grade Level: 12	Date Completed: 2/9/15
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1st Quarter

Topic	Resources	CCSS
1. Algebra Review Evaluate Algebraic Expressions Determine the Domain Graph Inequalities Laws of Exponents Evaluate Square Roots	<ul style="list-style-type: none"> • Worksheets • Kuta Software* • Trigonometry: Enhanced with Graphing Utilities Textbook 	A1.1.2.1.1 A1.1.3.1.2 A1.1.3.1.1 A2.1.2.1.1 A2.1.2.1.3
2. Geometry Review Pythagorean Theorem Geometric Formulas	<ul style="list-style-type: none"> • Worksheets • Kuta Software* • Trigonometry: Enhanced with Graphing Utilities Textbook 	G2.1.1.1 G2.1.2.1 G2.2.2.1 G1.2.1.2 G2.2.2.2 G2.2.3.1
3. Solving Equations With Algebra Solve Linear Equations Factoring Quadratics	<ul style="list-style-type: none"> • Worksheets • Kuta Software* • Trigonometry: Enhanced with Graphing Utilities Textbook 	A1.1.2.1.1 A2.2.2.1.1 A2.2.2.1.3
4. Complex Numbers +, -, x, / Complex Numbers Powers of i	<ul style="list-style-type: none"> • Worksheets • Kuta Software* • Trigonometry: Enhanced with Graphing Utilities Textbook 	A2.1.3.1.1 A2.1.1.1.1 A2.1.1.2.1 A2.1.1.2.2

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<p>5. Roots, Rational Exponents, Radical Equations</p> <p>Work with Roots Simplify Radicals Rationalize Denominators Solve Radical Equations Simplify Expressions with Rational Exponents</p>	<ul style="list-style-type: none"> • Worksheets • Kuta Software* • Trigonometry: Enhanced with Graphing Utilities Textbook 	<p>A2.1.3.1.2 A2.2.1.1.3</p>
<p>6. Lines</p> <p>Using Slope, Point Slope, Slope Intercept Graph Lines Write Equations of Lines Parallel and Perpendicular</p>	<ul style="list-style-type: none"> • Worksheets • Kuta Software* • Trigonometry: Enhanced with Graphing Utilities Textbook 	<p>A1.2.2.1.3</p>

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2nd Quarter

Topic	Resources	CCSS
1. Functions and Graphs Use Distance and Midpoint Formulas Graphing Points and Lines by Hand and Graphing Utility	<ul style="list-style-type: none"> • Worksheets • Kuta Software* • Trigonometry: Enhanced with Graphing Utilities Textbook • Graphing Calculators 	G2.2.1.2.1 A1.1.2.1.1 A1.1.3.2.2
2. Circles Standard Form Graphing Circles by Hand and Graphing Utility	<ul style="list-style-type: none"> • Worksheets • Kuta Software* • Trigonometry: Enhanced with Graphing Utilities Textbook 	G.1.3.1.1 G.1.3.1.2
3. Functions Relations – Vertical Line Test Values of Functions Domain of Functions +, -, x, / of 2 functions	<ul style="list-style-type: none"> • Worksheets • Kuta Software* • Trigonometry: Enhanced with Graphing Utilities Textbook 	A1.1.3.2.2 A2.1.3.1.1 A2.1.3.1.2 A2.1.3.1.3 A2.1.3.1.4
4. Graphing Techniques Using Vertical and Horizontal Shifts Using Compressions and Stretching	<ul style="list-style-type: none"> • Worksheets • Kuta Software* • Trigonometry: Enhanced with Graphing Utilities Textbook 	A1.2.1.2.1 A1.2.1.2.2 A2.1.3.1.3 A2.1.3.1.4 A2.1.3.2.1
5. Use of Functions Composite Functions 1 to 1 Functions Inverse Functions	<ul style="list-style-type: none"> • Worksheets • Kuta Software* • Trigonometry: Enhanced with Graphing Utilities Textbook 	A2.2.1.1.2 A2.2.1.1.3 A2.2.1.1.4 A2.2.2.1.1

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3rd Quarter

Topic	Resources	CCSS
1. Angles and their Measure Converting DMS to Decimal, vice versa Arc Length Degrees to Radians, vice versa Area of a sector of a circle Linear Speed	<ul style="list-style-type: none"> • Worksheets • Kuta Software* • Trigonometry: Enhanced with Graphing Utilities Textbook • Graphing Calculators 	G.2.2.2.2 G.2.2.2.3 G.2.2.2.5 G.2.2.3.1 HSF.TF.A.1
2. Right Triangle Trigonometry Values of Acute Angles Complementary Angle Theorem	<ul style="list-style-type: none"> • Worksheets • Kuta Software* • Trigonometry: Enhanced with Graphing Utilities Textbook • Graphing Calculators 	HSG.SRT.C.8 HSF.TF.C.8
3. Computing Values of Trig Functions Exacts Values of 45,30, 60, Use a Calculator to Approximate	<ul style="list-style-type: none"> • Worksheets • Kuta Software* • Trigonometry: Enhanced with Graphing Utilities Textbook • Graphing Calculators 	HSG.SRT.C.8 HSF.TF.C.8
4. Trig Functions Of General Angles Quadrant Values Terminal Sides Reference Angle Unit Circle	<ul style="list-style-type: none"> • Worksheets • Kuta Software* • Trigonometry: Enhanced with Graphing Utilities Textbook • Graphing Calculators 	HSF.TF.C.8 HSF.TF.A.1 HSF.TF.A.3
5. Graphs of Trig Functions Sine, Cos, Tan, Csc, Sec, Cot Phase Shifts Curve Fitting	<ul style="list-style-type: none"> • Worksheets • Kuta Software* • Trigonometry: Enhanced with Graphing Utilities Textbook • Graphing Calculators 	HSF.TF.B.5 HSF.TF.C.8

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4th Quarter

Topic	Resources	CCSS
1. Inverses Sine, Cos, Tan	<ul style="list-style-type: none"> • Worksheets • Kuta Software* • Trigonometry: Enhanced with Graphing Utilities Textbook • Graphing Calculators 	HSG.SRT.C.8 HSF.TF.B.5
2. Trigonometric Identities Quotient Identity Reciprocal Identity Pythagorean Identity Sum and Difference Double Angle Half Angle	<ul style="list-style-type: none"> • Worksheets • Kuta Software* • Trigonometry: Enhanced with Graphing Utilities Textbook • Graphing Calculators 	HSF.TF.A.1 HSF.TF.C.8 HSF.TF.C.9
3. Applications of Right Triangles Law of Sine and Cosines Area of Triangle	<ul style="list-style-type: none"> • Worksheets • Kuta Software* • Trigonometry: Enhanced with Graphing Utilities Textbook • Graphing Calculators 	HSF.TF.B.5
4. Polar Coordinates Polar to Rectangular, vice versa Graphing Vectors	<ul style="list-style-type: none"> • Worksheets • Kuta Software* • Trigonometry: Enhanced with Graphing Utilities Textbook • Graphing Calculators 	HSN.CN.B.4

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General Topic	Academic Standard(s)	Essential Knowledge, Skills & Vocabulary	Resources & Activities	Assessments	Suggested Time
Algebra Review	A1.1.2.1.1 A1.1.3.1.2 A1.1.3.1.1 A2.1.2.1.1 A2.1.2.1.3	<ul style="list-style-type: none"> Write, solve and/or apply a linear equation (including problem situations). Identify or graph the solution set to a linear inequality on a number line. Write or solve compound inequalities and/or graph their solution sets on a number line (may include absolute value inequalities). Use exponential expressions to represent rational numbers. Simplify/evaluate expressions involving multiplying with exponents, powers of powers and powers of products (limit to rational exponents). 	<p>Trigonometry: Enhanced with Graphing Utilities Textbook: A-1</p> <p>Worksheets</p> <p>Kuta Software*</p>	Teacher prepared tests, quizzes, etc.	5 Days

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Geometry Review	G2.1.1.1 G2.1.2.1 G2.2.2.1 G1.2.1.2 G2.2.2.2 G2.2.3.1	<ul style="list-style-type: none"> • Verify and apply geometric theorems as they relate to geometric figures. • Apply trigonometric ratios to solve problems involving right triangles. • Estimate area, perimeter, or circumference of an irregular figure • Identify and/or use properties of quadrilaterals. • Find the measurement of a missing length given the area, perimeter, or circumference. • Describe how a change in the linear dimension of a figure affects its perimeter, circumference, and area. 	<p>Trigonometry: Enhanced with Graphing Utilities Textbook: A-2</p> <p>Worksheets</p> <p>Kuta Software Geometry *</p> <p>Trigonometry: Enhanced with Graphing Utilities Textbook</p>		5 Days
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Solving Equations with One Variable, Inequalities	A1.1.2.1.1 A2.2.2.1.1 A2.2.2..1.3	<ul style="list-style-type: none"> • Write, solve and/or apply a linear equation. • Create, interpret, and/or use the equation, graph, or table of a polynomial function (including quadratics). • Determine, use, and/or interpret minimum and maximum values over a specified interval of a graph of a polynomial, exponential, or logarithmic function. 	Trigonometry: Enhanced with Graphing Utilities Textbook: A-3, A-5 Worksheets Kuta Software*		10 Days
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Complex Numbers	A2.1.3.1.1 A2.1.1.1.1 A2.1.1.2.1 A2.1.1.2.2	<ul style="list-style-type: none"> • Write and/or solve quadratic equations (including factoring and using the Quadratic Formula). • Simplify/write square roots in terms of i (e.g., $\sqrt{-24} = 2i\sqrt{6}$). • Add and subtract complex numbers (e.g., $(7 - 3i) - (2 + i) = 5 - 4i$). • Multiply and divide complex numbers (e.g., $(7 - 3i)(2 + i) = 17 + i$). 	<p>Trigonometry: Enhanced with Graphing Utilities Textbook: A-3, A-5</p> <p>Worksheets</p> <p>Kuta Software*</p>		10 Days
Nth Roots, Radicals	A2.1.3.1.2 A2.2.1.1.3	<ul style="list-style-type: none"> • Solve equations involving rational and/or radical expressions (e.g., $10/(x + 3) + 12/(x - 2) = 1$ or $x^2 + 21x = 14$). • Determine the domain, range, or inverse of a relation. 	<p>Trigonometry: Enhanced with Graphing Utilities Textbook: A-6</p> <p>Worksheets Practice</p>		10 Days

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Lines	A1.2.2.1.3	<ul style="list-style-type: none">• Write or identify a linear equation when given<ul style="list-style-type: none">· the graph of the line· two points on the line· the slope and a point on the line.Note: Linear equation may be in point-slope, standard, and/or slope-intercept form.	Trigonometry: Enhanced with Graphing Utilities Textbook: A-7 Practice Worksheets Graphing Calculators Graph Paper		7 Days
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Functions/Graphs	G2.2.1.2.1 A1.1.2.1.1 A1.1.3.2.2	<ul style="list-style-type: none"> • Use properties of angles formed by intersecting lines to find the measures of missing angles. • Write, solve, and/or apply a linear equation (including problem situations). • Interpret solutions to problems in the context of the problem situation. Note: Limit systems to two linear inequalities. 	<p>Trigonometry: Enhanced with Graphing Utilities Textbook: 1.1,1.2</p> <p>Graph Paper</p> <p>Graphing Calculators</p>		5 Days
Circles	G.1.3.1.1 G.1.3.1.2	<ul style="list-style-type: none"> • Identify and/or use properties of congruent and similar polygons or solids. • Identify and/or use proportional relationships in • similar figures. 	<p>Trigonometry: Enhanced with Graphing Utilities Textbook: 1.3</p> <p>Graphing Calculators</p> <p>Graph Paper</p>		7 Days

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Functions	A1.1.3.2.2 A2.1.3.1.1 A2.1.3.1.2 A2.1.3.1.3 A2.1.3.1.4	<ul style="list-style-type: none"> Interpret solutions to problems in the context of the problem situation. Note: Limit systems to two linear inequalities. Write and/or solve quadratic equations (including factoring and using the Quadratic Formula). Solve equations involving rational and/or radical expressions (e.g., $10/(x + 3) + 12/(x - 2) = 1$ or $x^2 + 21x = 14$). Write and/or solve a simple exponential or logarithmic equation (including common and natural logarithms). Write, solve, and/or apply linear or exponential growth or decay. 	Trigonometry: Enhanced with Graphing Utilities Textbook: 1.4 Graphing Calculators	7 Days
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Graphing Techniques	A1.2.1.2.1 A1.2.1.2.2 A2.1.3.1.3 A2.1.3.1.4 A2.1.3.2.1	<ul style="list-style-type: none"> • Create, interpret, and/or use the equation, graph, or table of a linear function. • Translate from one representation of a linear function to another (i.e., graph, table, and equation). • Write and/or solve a simple exponential or logarithmic equation (including common and natural logarithms). • Write, solve, and/or apply linear or exponential growth or decay (including problem situations). • Determine how a change in one variable relates to a change in a second variable (e.g., $y = 4/x$; if x doubles, what happens to y?). 	Trigonometry: Enhanced with Graphing Utilities Textbook: 1.5, 1.6, 1.7 Graphing Calculators Graph Paper	5 Days
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Use of Functions	A2.2.1.1.2 A2.2.1.1.3 A2.2.1.1.4 A2.2.2.1.1	<ul style="list-style-type: none"> • Identify and/or extend a pattern as either an arithmetic or geometric sequence (e.g., given a geometric sequence, find the 20th term). • Determine the domain, range, or inverse of a relation. • Identify and/or determine the characteristics of an exponential, quadratic, or polynomial function (e.g., intervals of increase/decrease, intercepts, zeros, and asymptotes). • Create, interpret, and/or use the equation, graph, or table of a polynomial function (including quadratics). 	Trigonometry: Enhanced with Graphing Utilities Textbook: 1.8		5 Days
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Angles and Their Measure	G.2.2.2.2 G.2.2.2.3 G.2.2.2.5 G.2.2.3.1 HSF.TF.A.1	<ul style="list-style-type: none"> Find the measurement of a missing length, given the perimeter, circumference, or area. Find the side lengths of a polygon with a given perimeter to maximize the area of the polygon. Find the area of a sector of a circle. Describe how a change in the linear dimension of a figure affects its perimeter, circumference, and area. Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. 	Trigonometry: Enhanced with Graphing Utilities Textbook: 2.1 Graphing Calculators		10 Days
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Right Triangle Trigonometry	HSF.TF.A.3 HSG.SRT.C.8 HSF.TF.C.8	<ul style="list-style-type: none"> • Use special angles to determine geometrically the values of sine, cosine, tangent for 30,45, and 60 and use the unit circle to express the values of sine, cosine, and tangent for x, $x + \pi$ and $2\pi - x$ in terms of their values for x, where x is any real number • Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems • Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it to find $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ given $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ and the quadrant of the angle. 	Trigonometry: Enhanced with Graphing Utilities Textbook: 2.2, 2.3 Graphing Calculators		20 Days
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Trigonometric Functions	HSG.SRT.C.8 HSF.TF.B.5 HSF.TF.C.8 HSF.TF.A.1	<ul style="list-style-type: none"> • Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems • Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline. • Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it to find $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ given $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ and the quadrant of the angle. • Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. 	Trigonometry: Enhanced with Graphing Utilities Textbook: 2.4-2.7 Graphing Calculators Unit Circle Computer Graphing Programs	20 Days
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Inverses	HSG.SRT.C.8 HSF.TF.B.5	<ul style="list-style-type: none">• Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems• Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.	Trigonometry: Enhanced with Graphing Utilities Textbook: 3.1, 3.2 Graphing Calculators		10 Days
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Trigonometric Identities	HSF.TF.A.1 HSF.TF.C.8 HSF.TF.C.9	<ul style="list-style-type: none"> • Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. • Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it to find $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ given $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ and the quadrant of the angle. • Prove the addition and subtraction formulas for sine, cosine, and tangent and use them solve problems 	Trigonometry: Enhanced with Graphing Utilities Textbook: 3.3, 3.4, 3.8 Formulas in Trigonometry: Enhanced with Graphing Utilities Textbook		10 Days
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Applications of Trigonometric Functions with Triangles	HSF.TF.B.5	<ul style="list-style-type: none"> Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline. 	Trigonometry: Enhanced with Graphing Utilities Textbook: 4.1-4.4 Calculators Formulas Of Laws of Sines, Cosines Areas Formulas (Heron's)		10 Days
Polar Coordinates	HSN.CN.B.4	<ul style="list-style-type: none"> Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers), and explain why the rectangular and polar forms of a given complex number represent the same number. 	Trigonometry: Enhanced with Graphing Utilities Textbook: 5.1-5.2 Graphing Calculators Graph Paper		10 Days
Final Exam Preparation					14 Days

* **Kutasoftware.com** - Test and Worksheet Generators for Math Teachers