# PRECALCULUS
2020-2021

Houston County's system-wide initiatives center around building fully functional, intensely focused professional learning communities in our schools.
This initiative includes a <u>focus on learning</u> which <u>clarifies</u> and <u>monitors essential learning</u>.

Not all content in a given grade or course is emphasized equally in the standards, nor should it be. Some clusters require greater emphasis than others based on the depth of the ideas, the time that they take to master, and/or their importance to future mathematics or the demands of college and career readiness. More time in these areas may also be necessary for students to meet the demands of the Georgia Milestones assessments.

*To say that some standards have greater emphasis is **not** to say that anything in the standards can safely be neglected in instruction!* Neglecting material will leave gaps in student skill and understanding and may leave students unprepared for the challenges of a later grade. This new guide not only gives calendar pacing at the unit level, but also pacing at the standard level and one of three levels of content, listed below.
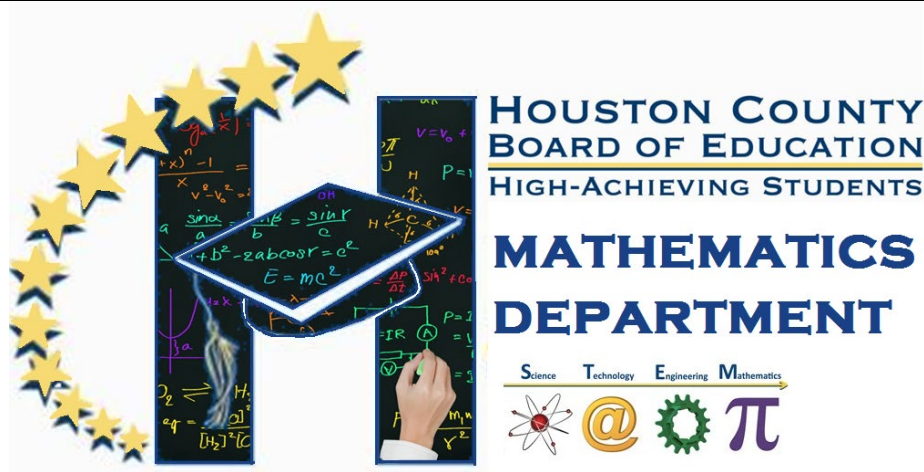
PACING GUIDE & TEACHER PLANNER

Math teachers from every school in Houston County were invited to meet to identify "Essential Standards." Teachers considered the content expectations for future units within their grade, for future grades, on state assessments, and in other content areas to determine which standards were "Essential" "Supporting," or "Additional." Their designations are color-coded within the list of standards as below and the included calendar shows approximate within-unit time allocations by standard or cluster.

μ Essential   Σ Supporting   *Additional

SharePoint course materials (including lesson plans, study guides, assessments, and POD's) reflect the content of greatest emphasis for this math course because of their prioritization of standards.
==**This document shows where students and teachers should spend the large majority of their time in order to meet the expectations of the standards. It includes a standard-by-standard calendar for teachers to use to plan and allocate teaching/learning time appropriately.**==

What resources are available?

| What's on my SharePoint Course page? From Office 365, navigate to > SharePoint > Departments > Teaching & Learning > Math > Grade Band > Course Home	• Unit Plans • Lessons and Tasks • Assessment Banks *(instructions for ExamView banks after the calendars)* • Fluency Unit for RTI • Milestones Resources including Mock Assessments • HRW Teacher/Student Instructions • And much more
Textbook	HCBE has two different textbooks – different schools choose different books. Please turn in any student books that need to be rebound at the end of each year for rebinding over the summer to the Math Coordinator for HCBE. **Purple PreCal Book** / **Orange PreCal Book** *(Houghton Mifflin Harcourt "Advanced Mathematics; PRECALCULUS with Discrete Mathematics and Data Analysis," by Richard G. Brown)* / *(Houghton Mifflin "PRECALCULUS with Limits, a Graphing Approach" by Larson, Hostetler, and Edwards)*
Student Weeblys	http://hcbemath.weebly.com/

How do I sync the mathematics material to my file library on my desktop?

From Office 365, navigate to > SharePoint > Departments > Teaching & Learning > Math > Grade Band > Course Home.
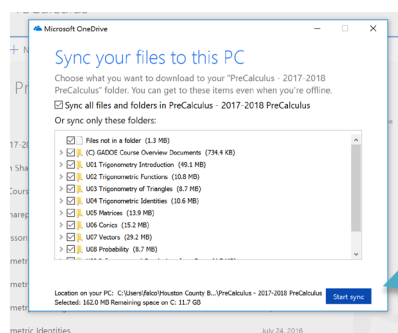
1. Navigate to your course home on SharePoint and click the icon below.
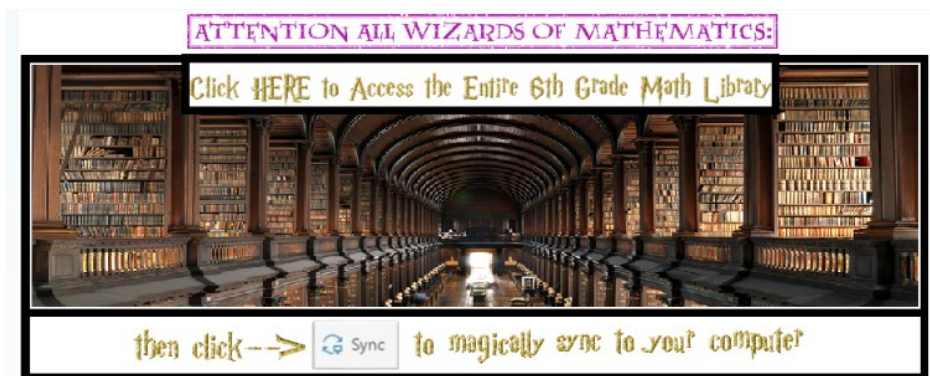
2. You are now in your course's document library. Click the Sync Button.
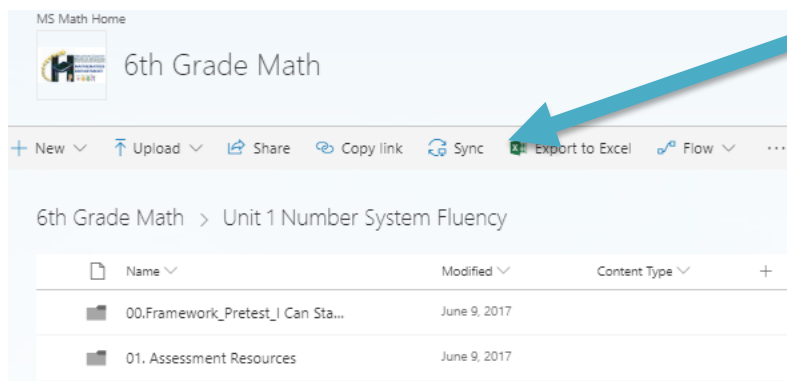
3. A window will open and all the folders in this library should be checked. Keep them checked and choose Start sync. ***Note, you may encounter two screens before this in which you choose ALLOW and then must SIGN IN with your HCBE email.

4. After a few seconds, you will get notified that the files are syncing to your Houston County BOE One Drive and the files will be located in your file library. These files work like Dropbox and are updated in real time as changes are made by Dr. Rape or Jennifer Farrow. BE SURE YOU SEE GREEN CHECK MARK. This means it is synced and your files are updated. If you open at a later date and do not see your checkmark, repeat this process.
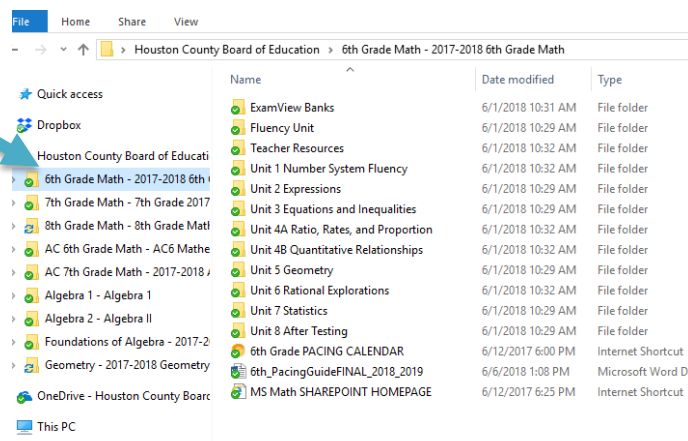
NOTE*** These files are locked for editing and saving to these folders. You may open, edit, and save to your personal files in another file location.

NOTE**** ExamView Tests/Test Banks may not open directly from the synced Houston County Board of Education File Folders. To open, right-click copy and right-click save to a folder on your desktop or My Documents. Then, open the file from this location.
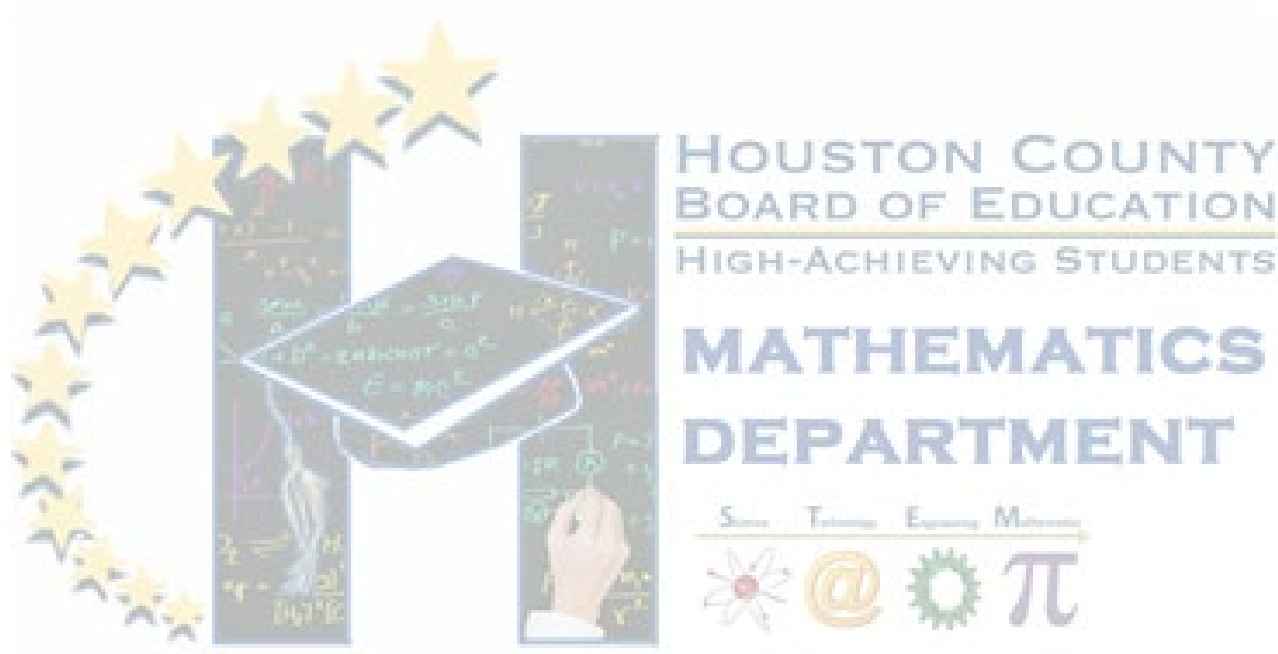
How to Make ExamView Banks Easily Accessible

Open ExamView Test Generator

1. After closing the welcome menu, choose the EDIT tab. Select "Preferences"
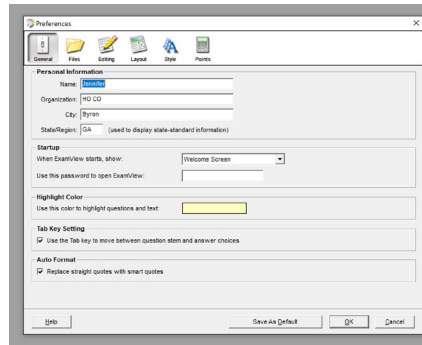
2. In this window, choose "Files" and then the file folder icons next to Question banks.
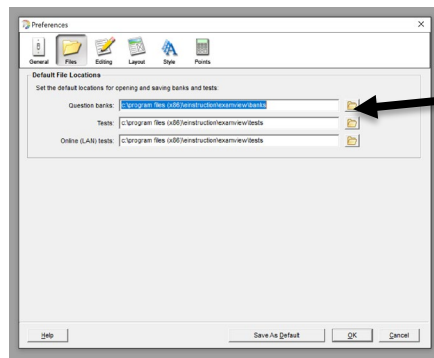
3. Navigate to the location of the course materials on your computer -Houston County Board of Education Synced Files. Highlight and select. Click OK.
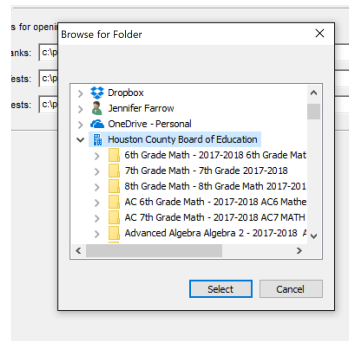
4. Now when you go to create a test and select questions, ExamView will default to this location. ExamView Banks are located in the ExamView folder and in each Unit's Assessment folder.

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^μ Essential   ^ΣSupporting   *Additional

Unit 1: Introduction to Trigonometry (≈4.5 weeks)

Unit 1 – Trigonometry Introduction-Sine, Cosine, Tangent, Secant, Cosecant, Cotangent Functions.

This unit covers the unit circle, radians, basic trig functions, basic trig graphs and their characteristics like midline, period, amplitude, vertical and phase shifts, modeling with trig functions, and the basic trig identities (specifically, the quotient identities, Pythagorean identities, reciprocal identities, co-function identities, even/odd identities).

GA Unit Tasks – in Word Document on Sharepoint (called ALL of GA Unit 1 Tasks – in Word)

Clock Problem ☆☆

Figuring Out All the AnglesReal Numbers and the Unit Circle

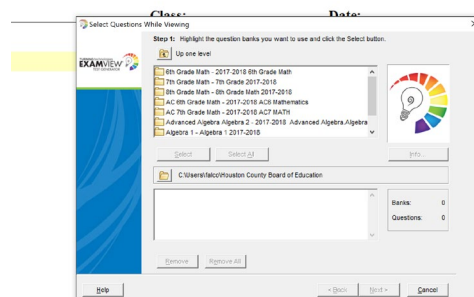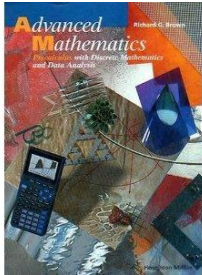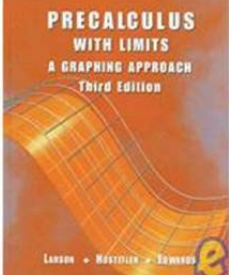Trigonometric Functions on the Unit Circle☆☆

UnWrapping the Unit Circle☆   } ← Both tasks do essentially the same thing. No need to do both.

Exploring Sine and Cosine Graphs☆

A Better Mouse Trap (Spotlight Task) ★★★ *Honors (challenging)*

Formative Assessment Lesson: Ferris Wheel☆☆

As the Wheel Turns☆☆

Transforming Sinusoidal Graphs

Modeling with Sinusoidal Functions☆★★

Discovering a Pythagorean Identity☆☆

Cuminating Task: Graphing Other Trigonometric Functions

Other Tasks and Materials on SharePoint:

See Tasks 0-6 in Folder

The way that the units are divided up in the state plan jumps between units 7, 8, 9, and 10 within the purple textbook. In general, if you start at unit 7 and finish at unit 10 by the end of first semester, you will have covered all of the content required. The tasks in green are the tasks that your book does not cover. You will need to do those to cover the standards in this course.

The way that the units are divided up in the state plan jumps between units 4, 5, and 6 within the orange textbook. In general, if you start at unit 4 and finish at unit 6 by the end of first semester, you will have covered all of the content required. The tasks in green are the tasks that your book does not cover. You will need to do those to cover the standards in this course.

Interpret functions that arise in applications in terms of the context

^Σ**F.IF.4** Using tables, graphs, and verbal descriptions, interpret the key characteristics of a function, which models the relationship between two quantities. Sketch a graph showing key features including: intercepts; interval where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.

Analyze functions using different representations

^μ **F.IF.7** Graph functions expressed algebraically and show key features of the graph both by hand and by using technology.

^Σ**F.IF.7e** Graph trigonometric functions, showing period, midline, and amplitude.

Extend the domain of trigonometric functions using the unit circle

^μ **F.TF.1** Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.

^μ **F.TF.2** Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.

Model periodic phenomena with trigonometric functions

^Σ**F.TF.5** Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline

Prove and apply trigonometric identities

*F.TF.8 Prove the Pythagorean identity $(\sin A)^2 + (\cos A)^2 = 1$ and use it to find sin A, cos A, or tan A, given sin A, cos A, or tan A, and the quadrant of the angle.

August 4 – December 18

September 7 (Labor Day Holiday); October 13-16 (Fall Holiday); November 11 (Veteran's Day);

November 23-27 (Thanksgiving Holiday)

PRECALCULUS – UNIT 1 CALENDAR

Monday	Tuesday	Wednesday	Thursday	Friday
Aug **3**	Aug **4**	Aug **5**	Aug **6**	Aug **7**
Pre-Planning				
Aug **10**	Aug **11**	Aug **12**	Aug **13**	Aug **14**
Aug **17**	Aug **18**	Aug **19**	Aug **20**	Aug **21**
Aug **24**	Aug **25**	Aug **26**	Aug **27**	Aug **28**
Aug **31**	Sept **1**	Sept **2**	Sept **3**	Sept **4**

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<p align="center">ᵘ Essential Σ Supporting *Additional</p>

<u>Unit 2:</u> Trigonometric Functions (≈5.5 weeks)

(The Odysseyware equivalent is: Unit 2A-Trigonometric Functions, and Unit 2B-Trigonometry Continued, which should take approximately 2.5 weeks and 3 weeks, respectively).

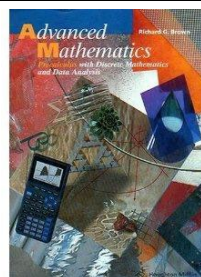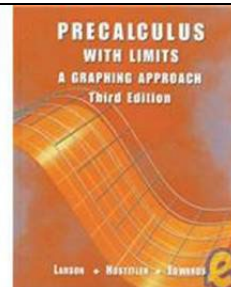| Unit 2 – Trigonometric Functions	GA Unit Tasks – in Word Document on Sharepoint		
This unit continues the trigonometry explorations into inverse functions and extends the domain of trig functions to all real numbers by showing multiple rotations clockwise and counter-clockwise on the unit circle. Students will use inverse functions to solve trigonometric equations and they will graph inverse trig functions by restricting the domains. To solve equations students are expected to know trig values around the unit circle at each 45 and 30 degree increment.	Right Triangles and the Unit Circle Inverse Trigonometric Functions ⭐⭐⭐ **Other Tasks and Materials on SharePoint:** See Tasks 1-14 in Folder	The way that the units are divided in the state plan jumps between units 7, 8, 9, and 10 within the purple textbook. In general, if you start at unit 7 and finish at unit 10 by the end of first semester, you will have covered all of the content required. The tasks in green are the tasks that your book does not cover. You will need to do those to cover the standards in this course.	The way that the units are divided in the state plan jumps between units 4, 5, and 6 within the orange textbook. In general, if you start at unit 4 and finish at unit 6 by the end of first semester, you will have covered all of the content required. The tasks in green are the tasks that your book does not cover. You will need to do those to cover the standards in this course.

<u>Build new functions from existing functions</u>

ΣF.BF.4 Find inverse functions.

ΣF.BF.4d Produce an invertible function from a non-invertible function by restricting the domain.

ᵘF.TF.3 Use special triangles to determine geometrically the values of sine, cosine, tangent for π/3, π/4 and π/6, and use the unit circle to express the values of sine, cosine, and tangent for π -x, π + x, and 2π -x in terms of their values for x, where x is any real number.

ΣF.TF.4 Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.

ΣF.TF.6 Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed.

ᵘF.TF.7 Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context.

PRECALCULUS – UNIT 2 CALENDAR

Monday	Tuesday	Wednesday	Thursday	Friday
Sept **7** **Labor Day**	Sept **8**	Sept **9**	Sept **10**	Sept **11**
Sept **14**	Sept **15**	Sept **16**	Sept **17**	Sept **18**
Sept **21**	Sept **22**	Sept **23**	Sept **24**	Sept **25**
Sep **28**	Sep **29**	Sep **30**	Oct **1**	Oct **2**
Oct **5**	Oct **6**	Oct **7**	Oct **8**	Oct **9** *In Service*

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^{μ}Essential ^{Σ}Supporting   *Additional

Unit 3: Trigonometry of Triangles ($\approx$3 weeks)

*(The Odysseyware equivalent is: **Unit 2A-Trigonometric Functions**, and **Unit 2B-Trigonometry Continued**, which should take approximately 2.5 weeks and 3 weeks, respectively).*

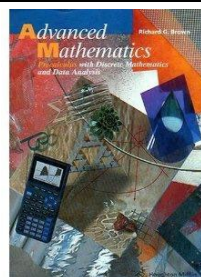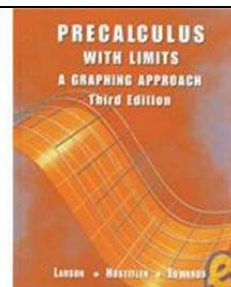| **Unit 3 – Trigonometry of Triangles**	**GA Unit Tasks – in Word Document on Sharepoint**		
This unit starts with just basic solving of all sides of a right triangle, and then moves into the proof of and the usage of three Laws: Area of triangle $A = \frac{1}{2}absin(C)$, Law of Sines, and Law of Cosines.	Finding a New Area Formula ★★ Proving the Law of Cosines ★★ Proving the Law of Sines ★★ The Hinge Theorem ★ Culminating Task: Combining Lots ★★★ *Honors (challenging)* **Other Tasks and Materials on SharePoint:** See Tasks 1-4 in Folder	The way that the units are divided in the state plan jumps between units 7, 8, 9, and 10 within the purple textbook. In general, if you start at unit 7 and finish at unit 10 by the end of first semester, you will have covered all of the content required. The tasks in green are the tasks that your book does not cover. You will need to do those to cover the standards in this course.	The way that the units are divided in the state plan jumps between units 4, 5, and 6 within the orange textbook. In general, if you start at unit 4 and finish at unit 6 by the end of first semester, you will have covered all of the content required. The tasks in green are the tasks that your book does not cover. You will need to do those to cover the standards in this course.

Apply trigonometry to general triangles

*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.

^{Σ}G.SRT.10 Prove the Laws of Sines and Cosines and use them to solve problems.

^{Σ}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).

PRECALCULUS MATH – UNIT 3 CALENDAR

Monday	Tuesday	Wednesday	Thursday	Friday
Oct **12**	Oct **13**	Oct **14**	Oct **15**	Oct **16**
Fall Break				
Oct **19**	Oct **20**	Oct **21**	Oct **22**	Oct **23**
Oct **26**	Oct **27**	Oct **28**	Oct **29**	Oct **30**
Oct **2**	Oct **3**	Oct **4**	Oct **5**	Oct **6**

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^μEssential   ^ΣSupporting   *Additional

Unit 4: Trigonometric Identities (≈5 weeks)

*(The Odysseyware equivalent is: **Unit 2A-Trigonometric Functions**, and **Unit 2B-Trigonometry Continued**, which should take approximately 2.5 weeks and 3 weeks, respectively).*

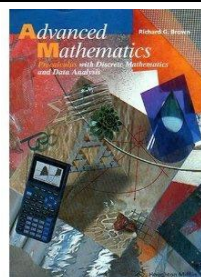| Unit 4 – Trigonometric Identities	GA Unit Tasks – in Word Document on Sharepoint		
This unit covers the proof of sum/difference, double angle, and half angle identities. These identities are used to solve trigonometric equations.	Proving the Sine Addition/Subtraction Identities ⭐ Proving the Cosine Addition/Subtraction Identities ⭐ A Distance Formula Proof for the Cosine Addition Identity ⭐ Proving the Tangent Addition and Subtraction Identities ⭐ Double-Angle Identities for Sine, Cosine, and Tangent ⭐ The Cosine Double-Angle: A Man with Many Identities ⭐ Culminating Task: How Many Angles Can You Find? ⭐⭐⭐ **Other Tasks and Materials on SharePoint:** See Tasks 1-4 in Folder	The way that the units are divided in the state plan jumps between units 7, 8, 9, and 10 within the purple textbook. In general, if you start at unit 7 and finish at unit 10 by the end of first semester, you will have covered all of the content required. The tasks in green are the tasks that your book does not cover. You will need to do those to cover the standards in this course.	The way that the units are divided in the state plan jumps between units 4, 5, and 6 within the orange textbook. In general, if you start at unit 4 and finish at unit 6 by the end of first semester, you will have covered all of the content required. The tasks in green are the tasks that your book does not cover. You will need to do those to cover the standards in this course.

Prove and apply trigonometric identities

^μ**F.TF.9** Prove addition, subtraction, double and half-angle formulas for sine, cosine, and tangent and use them to solve problems

PRECALCULUS MATH – UNIT 4 CALENDAR

Monday	Tuesday	Wednesday	Thursday	Friday
Nov **9**	Nov **10**	Nov **11** **Veteran's Day**	Nov **12**	Nov **13**
Nov **16**	Nov **17**	Nov **18**	Nov **19**	Nov **20**
Nov **23**	Nov **24**	Nov **25**	Nov **26**	Nov **27**
THANKSGIVING				
Nov **30**	Dec **1**	Dec **2**	Dec **3**	Dec **4**
Dec **7**	Dec **8**	Dec **9**	Dec **10**	Dec **11**
Dec **14**	Dec **15**	Dec **16**	Dec **17**	Dec **18**

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^µ Essential   ^ΣSupporting   *Additional

Unit 5: Matrices (≈4 weeks)

*(The Odysseyware equivalent is: **Unit 2A-Trigonometric Functions**, and **Unit 2B-Trigonometry Continued**, which should take approximately 2.5 weeks and 3 weeks, respectively).*

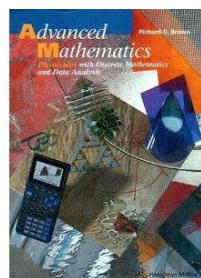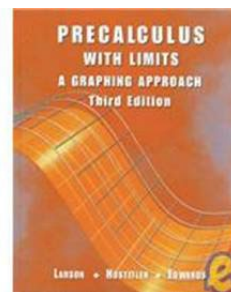| Unit 5 – Matrices	GA Unit Tasks – in Word Document on Sharepoint		
This unit is about matrix usage (why/how) and matrix operations, as well as solving systems of linear equations using matrix inverses. Operations include scalar multiplication, addition, subtraction, and multiplication of matrices (with understanding of dimensions needed to perform the operations). A parallel between the properties of the real numbers is drawn with matrices to show that a "zero matrix" isn't the number zero (0), and an "Identity matrix" isn't the number one (1). Students will calculate the determinants, inverses, and absolute value of matrices as well as use matrices to calculate areas on a coordinate plane.	00 Central High Booster Club ⭐⭐⭐ 01 Walk like a Mathematician⭐ 17 Candy? What Candy? Learning Task⭐⭐⭐ 18 An Okeefenokee Food Web⭐ *Honors (extension)* 20 Culminating Task: Vacationing in Georgia⭐ **Other Tasks and Materials on SharePoint:** See Tasks 2-16,19 in Folder	All of 14 & 12.7, 12.8, & 12.9	All of 8 & 7.1, 7.2, & 7.3

Perform operations on matrices and use matrices in applications

^µ**N.VM.6** Use matrices to represent and manipulate data, e.g., transformations of vectors.

^Σ**N.VM**.7 Multiply matrices by scalars to produce new matrices.

^Σ**N.VM.8** Add, subtract, and multiply matrices of appropriate dimensions.

^µ**N.VM.9** Understand that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and distributive properties.

^Σ**N.VM.10** Understand that the zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. The determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse.

^Σ**N.VM.12** Work with 2 X 2 matrices as transformations of the plane, and interpret the absolute value of the determinant in terms of area.

Solve systems of equations

^µ**A.REI.8** Represent a system of linear equations as a single matrix equation in a vector variable

^µ**A.REI.9** Find the inverse of a matrix if it exists and use it to solve systems of linear equations (using technology for matrices of dimension 3 × 3 or greater).

PRECALCULUS MATH – UNIT 5 CALENDAR

Monday	Tuesday	Wednesday	Thursday	Friday
Jan **4** IN SERVICE	Jan **5**	Jan **6**	Jan **7**	Jan **8**
Jan **11**	Jan **12**	Jan **13**	Jan **14**	Jan **15**
Jan **18**	Jan **19**	Jan **20**	Jan **21**	Jan **22**
Jan **25**	Jan **26**	Jan **27**	Jan **28**	Jan **29**

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<div align="center">

ᵘEssential   ᶻSupporting   *Additional

</div>

Unit 6: Conic Sections (≈5 weeks)

*(The Odysseyware equivalent is: **Unit 2A-Trigonometric Functions**, and **Unit 2B-Trigonometry Continued**, which should take approximately 2.5 weeks and 3 weeks, respectively).*

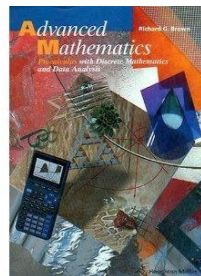| Unit 6 – Conic Sections	GA Unit Tasks – in Word Document on Sharepoint		
This unit "circles" back to circles from Geometry (a reminder of how to complete the square will be needed probably), and then students graph and identify characteristics of ellipses, hyperbolas, and parabolas. Students solve systems with lines and conic sections by hand and using technology (Solve→Intersect on TI84 Calculator). The standard specifically notes that (for parabolas, ellipses, and hyperbolas) a proof of the conic section based on the definition is the expectation. If the connection between matrices and vectors is not lost on you (the teacher), feel free to flip Units 6 and 7 and do vectors with matrices.	Our Only Focus: Circles and Parabolas in Review ☹ (assumes parabolas are review – not so for this group). The Focus is the Foci: Ellipses and Hyperbolas ☹ (a good teacher could explain this better-the proof is not in this one). Deriving the General Equation of a Parabola ⭐ (includes the derivation of the formula by definition). Parabolas in Other Directions ☹ (textbook can do this just as well…) Writing Equations of Parabolas ☹ (this is not much of a task…more of a warm-up or discussion) The Intersection of a Line and a Quadratic⭐ (good because it is short…maybe a warm up not a "task"). A Conic Application☹ (again – warmup? Very Short, but good in that it introduces area of the interior of an ellipse). Culminating Task: Dr. Cone's New House ⭐⭐⭐(not really "culminating" since it only covers parabolas). **Other Tasks and Materials on SharePoint:** See Tasks in Folder	**6** (6.1 *is* needed to derive equations of parabola, ellipse, and hyperbolas)	**10.1-10.4**
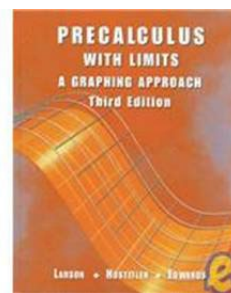
Translate between the geometric description and the equation for a conic section
*G.GPE.2 Derive the equation of a parabola given a focus and directrix.
*G.GPE.3 Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant.

Solve systems of equations
ᶻA.REI.7 Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line $y = -3x$ and the circle $x^2 + y^2 = 3$.

PRECALCULUS – UNIT 6 CALENDAR

Monday	Tuesday	Wednesday	Thursday	Friday
Feb **1**	Feb **2**	Feb **3**	Feb **4**	Feb **5**
Feb **8**	Feb **9**	Feb **10**	Feb **11**	Feb **12**
Feb **15** PRESIDENTS' DAY	Feb **16** INSERVICE	Feb **17**	Feb **18**	Feb **19**
Feb **22**	Feb **23**	Feb **24**	Feb **25**	Feb **26**
Mar **1**	Mar **2**	Mar **3**	Mar **4**	Mar **5**
Mar **8**	Mar **9**	Mar **10**	Mar **11**	Mar **12**

2nd Semester

January 5 – May 26 *January 18 (MLK Holiday); February 15 (President's Day Holiday); February 16 (Student Holiday)March 29-April 2 (Spring Break)*

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^μ Essential   ^ΣSupporting   *Additional

Unit 7: Vectors (≈4 weeks)
*(The Odysseyware equivalent is: **Unit 2A-Trigonometric Functions**, and **Unit 2B-Trigonometry Continued**, which should take approximately 2.5 weeks and 3 weeks, respectively).*

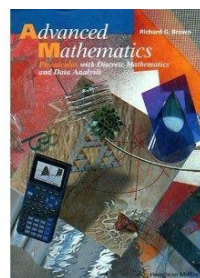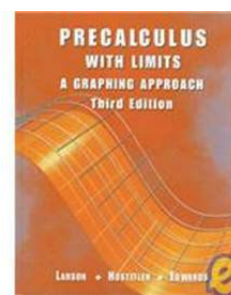|			
Unit 7 – Vectors and Complex Numbers' Similarities Complex Numbers – Add, Subtract, Multiply. Graph on the Imaginary Plane, use both polar and rectangular coordinates to describe complex numbers. Calculate distance between two complex numbers and their midpoint. Repeat same operations with vectors. This unit shows how "absolute value" of complex numbers is very similar to "magnitude" of vectors and the similarities between the two in terms of operations. Vectors are used as matrix for transformations of functions.	**GA Unit Tasks – in Word Document on Sharepoint** ⭐⭐⭐ *Themed Unit – GA Created Cute Tasks (Enjoyable). Loved all of these tasks.* Walking and Flying Around Hogsmeade A Delicate Operation Hedwig and Errol Putting Vectors to Use He Who Must Not Be Named It's Not That Complex! A Plane that Can't Fly Complex Operations How Far and Halfway in Hogsmeade Culminating Task: Putting it All Together **Other Tasks and Materials on SharePoint (Extensions)** Sub-Folder #1: Vector Applications and Transformations and Video Games (Tasks 17-27) Sub-Folder #2: Vectors' Notation and Connection To Trig (Tasks 18-30)	11&12	6.3, 6.4, 6.5, & 11.1 - 11.4

Use properties of rational and irrational numbers

^Σ**N.CN.3** Find the conjugate of a complex number; use the conjugate to find the absolute value (modulus) and quotient of complex numbers.

Represent complex numbers and their operations on the complex plane

^Σ**N.CN.4** 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.

^Σ**N.CN.5** Represent addition, subtraction, multiplication, and conjugation of complex numbers geometrically on the complex plane; use properties of this representation for computation. For example, $(-1 + \sqrt{3i})^3 = 8$ because $(-1 + \sqrt{3i})$ has modulus 2 and argument 120°.

^Σ**N.CN.6** Calculate the distance between numbers in the complex plane as the modulus of the difference, and the midpoint of a segment as the average of the numbers at its endpoints.

Represent and model with vector quantities

^μ**N.VM.1** Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v, |v|, ||v||, v).

^μ**N.VM.2** Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point.

^μ**N.VM.3** Solve problems involving velocity and other quantities that can be represented by vectors.

Perform operations on vectors

^μ**N.VM.4** Add and subtract vectors.

^μ**N.VM4a** Add vectors end-to-end, component-wise, and by the parallelogram rule. Understand that the magnitude of a sum of two vectors is typically not the sum of the magnitudes.

^μ**N.VM4b** Given two vectors in magnitude and direction form, determine the magnitude and direction of their sum.

^Σ**N.VM4c** Understand vector subtraction $v - w$ as $v + (-w)$, where $(-w)$ is the additive inverse of w, with the same magnitude as w and pointing in the opposite direction. Represent vector subtraction graphically by connecting the tips in the appropriate order, and perform vector subtraction component-wise.

^Σ**N.VM.5** Multiply a vector by a scalar.

^Σ**N.VM.5a** Represent scalar multiplication graphically by scaling vectors and possibly reversing their direction; perform scalar multiplication component-wise, e.g., as $c(v_x, v_y) = (cv_x, cv_y)$.

^Σ**N.VM.5b** Compute the magnitude of a scalar multiple cv using $||cv|| = |c|v$. Compute the direction of cv knowing that when $|c|v = 0$, the direction of cv is either along v (for $c > 0$) or against v (for $c < 0$).

^Σ**N.VM.11** Multiply a vector (regarded as a matrix with one column) by a matrix of suitable dimensions to produce another vector. Work with matrices as transformations of vectors.

PRECALCULUS – UNIT 7 CALENDAR

Monday	Tuesday	Wednesday	Thursday	Friday
Mar **15**	Mar **16**	Mar **17**	Mar **18**	Mar **19**
			Exact testing date TBD	*Exact testing date TBD*
Mar **22**	Mar **23**	Mar **24**	Mar **25**	Mar **26**
Mar **29**	Mar **30**	Mar **31**	Apr **1**	Apr **2**
Apr **5**	Apr **6**	Apr **7**	Apr **8**	Apr **9**
Apr **12**	Apr **13**	Apr **14**	Apr **15**	Apr **16**

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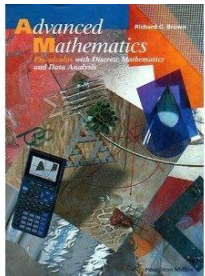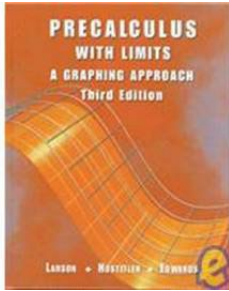ᵘEssential   ᶻSupporting   *Additional

Unit 8: Probability (≈5 weeks)

*(The Odysseyware equivalent is: **Unit 2A-Trigonometric Functions**, and **Unit 2B-Trigonometry Continued**, which should take approximately 2.5 weeks and 3 weeks, respectively).*

Unit 8 – Probability This unit covers multiplication rule, permutations, combinations, expected value, probability distributions (theoretical and experimental), payoffs, and analysis.	**GA Unit Tasks – in Word Document on Sharepoint** **Permutations and Combinations Learning Task** ▯**(Develops the Permutation Formula)** **Testing Learning Task** ▯ **Please Be Discrete Learning Task** **Formative Assessment Lesson: Medical Testing** **Georgia Lottery Learning Task** **Formative Assessment Lesson: Modeling Conditional Probabilities 2 Mega Millions Practice Task** **Culminating Task: Design a Lottery Game** (There are roughly 20 other probability tasks on Sharepoint).	Unit 16	Unit 9

Use the rules of probability to compute probabilities of compound events in a uniform probability model

ᵘ**S.CP.8** Apply the general Multiplication Rule in a uniform probability model, P(A and B) = [P(A)]x[P(B|A)] =[P(B)]x[P(A|B)], and interpret the answer in terms of the model.

ᵘ**S.CP.9** Use permutations and combinations to compute probabilities of compound events and solve problems.

Calculate expected values and use them to solve problems

ᶻ**S.MD.1** Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions.

ᶻ**S.MD.2** Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.

ᶻ**S.MD.3** Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value. *For example, find the theoretical probability distribution for the number of correct answers obtained by guessing on all five questions of a multiple-choice test where each question has four choices, and find the expected grade under various grading schemes.*

ᶻ**S.MD.4** Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value. *For example, find a current data distribution on the number of TV sets per household in the UnitedStates, and calculate the expected number of sets per household. How many TV sets would you expect to find in 100 randomly selected households?*

Use probability to evaluate outcomes of decisions

ᵘ**S.MD.5** Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values.

ᶻ**S.MD.5a** Find the expected payoff for a game of chance. *For example, find the expected winnings from a state lottery ticket or a game at a fast-food restaurant.*

ᶻ**S.MD.5b** Evaluate and compare strategies on the basis of expected values. *For example, compare a high-deductible versus a low-deductible automobile insurance policy using various, but reasonable, chances of having a minor or a major accident.*

ᶻ**S.MD.6** Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator)

ᵘ**S.MD.7** Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).

PRECALCULUS MATH – UNIT 8 CALENDAR

Monday	Tuesday	Wednesday	Thursday	Friday
Apr **19**	Apr **20**	Apr **21**	Apr **22**	Apr **23**
Apr **26**	Apr **27**	Apr **28**	Apr **29**	Apr **30**
May **3**	May **4**	May **5**	May **6**	May **7**
May **10**	May **11**	May **12**	May **13**	May **14**
May **17**	May **18**	May **19**	May **20**	May **21**
May **24**	May **25**	May **26**	May **27**	May **28**