Curriculum Guide Precalculus

Unit 1: Review

Biblical Worldview Essential Questions:
Rational expressions mean a ratio of polynomial expressions. Another meaning of rational is "based on facts or reason."
Is it rational to believe in the God of the Bible?

5 Lessons

PC#4

Objectives	Methods	Resources	Assessment
The students will 1. Reduce/add/subtract/mult/divide rational expressions. 2. Work with nth roots and rational exponents. 3. Simplify radical expressions.	• teacher lecture • teacher working examples on the board • teacher showing problems on overhead projector • student guided practice of problems in book • cooperative learning groups • individual assistance • partner work • worksheets • homework • video • internet websites	Precalculus: graphical, numerical, algebraic 8th ed, Pearson education, 2011	• 5 minute checks • check homework • Quizzes • Mid-Chapter Test • Free-Response Chapter test • Oral response • Board work

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Unit 2: Equations and Inequalities

Biblical Worldview Essential Questions:
What are some biblical guidelines for solving problems we encounter in our everyday lives?

20 Lessons

PC#4, PC#5

Objectives	Methods	Resources	Assessment
The students will 1. Solve linear equations or equations that lead to linear equations. 2. Solve quadratic equations using factoring, completing the square, and quadratic formula. 3. Perform the four basic operations on complex numbers. 4. Solve quadratic equations in the complex number system. 5. Solve equations involving radicals. 6. Solve equations quadratic in form. 7. Solve higher degree polynomial equations by factoring. 8. Solve linear inequalities and express the answer in interval notation. 9. Solve equations and inequalities involving absolute value. 10. Solve applied problems.	• teacher lecture • teacher working examples on the board • teacher showing problems on overhead projector • student guided practice of problems in book • cooperative learning groups • individual assistance • partner work • worksheets • homework • video • internet websites	Precalculus: graphical, numerical, algebraic 8th ed, Pearson education, 2011	• 5 minute checks • check homework • Quizzes • Mid-Chapter Test • Free-Response Chapter test • Oral response • Board work

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Unit 3: Graphs

Biblical Worldview Essential Questions:
A rectangular coordinate system allows one to locate any point with respect to the origin or to another point.
How does the Bible provide a frame of reference for our own personal Christian life, with respect to God and with respect to other people?

8 Lessons

PC#2, PC#4

Objectives	Methods	Resources	Assessment
The students will 1. Use the distance and midpoint formulas. 2. Graph equations by plotting points. 3. Find the intercepts of an equation. 4. Determine whether the graph of an equation has symmetry. 5. Find the slope of a line. 6. Graph a line. 7. Given sufficient information, find the equation of a line in slope-intercept and general form. 8. Using the concept of slope, determine whether two lines are parallel, perpendicular, or neither. 9. Given the equation of a line, find the equation of a line that is either parallel or perpendicular to the given line. 10. Write the equation of a circle in standard form. 11. Given an equation of a circle in general form, write it in standard form, find the center and radius, and graph the circle.	• teacher lecture • teacher working examples on the board • teacher showing problems on overhead projector • student guided practice of problems in book • cooperative learning groups • individual assistance • partner work • worksheets • homework • video • internet websites	Precalculus: graphical, numerical, algebraic 8th ed, Pearson education, 2011	• 5 minute checks • check homework • Quizzes • Mid-Chapter Test • Free-Response Chapter test • Oral response • Board work

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Unit 4: Functions and Their Graphs

Biblical Worldview Essential Questions:
Functions have dependent and independent variables.
How is mankind dependent on God? How is God independent of mankind?

12 Lessons

PC#1, PC#4

Objectives	Methods	Resources	Assessment
The students will 1. Determine whether a relation determines a function. 2. Evaluate a function. 3. Find the domain of a function. 4. Find the sum, difference, product, and quotient of two functions. 5. Determine whether a particular graph represents a function. 6. Obtain information such as domain, range, and intercepts from the graph of a function. 7. Determine whether a function is even, odd, or neither from the equation and graph of the function. 8. Determine from the graph of a function where it is increasing, decreasing or constant. 9. Use the graph of a function to determine its local minimum and maximum values. 10. Find the average rate of change of a function. 11. Graph the functions in the library of functions which is a list of commonly encountered function. 12. Be familiar with piecewise-defined functions. 13. Graph functions using horizontal and vertical shifts, using compressions and stretches, and using reflections about the x-axis or y-axis.	• teacher lecture • teacher working examples on the board • teacher showing problems on overhead projector • student guided practice of problems in book • cooperative learning groups • individual assistance • partner work • worksheets • homework • video • internet websites	Precalculus: graphical, numerical, algebraic 8th ed, Pearson education, 2011	• 5 minute checks • check homework • Quizzes • Mid-Chapter Test • Free-Response Chapter test • Oral response • Board work

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Unit 5: Polynomial and Rational Inequalities

Biblical Worldview Essential Questions:
If God is just, why are there gross inequalities among mankind?
Why are there exuberantly rich people and devastatingly poor people?

9 Lessons

PC#3, PC#4

Objectives	Methods	Resources	Assessment
The students will 1. Identify polynomial functions and their degree. 2. Analyze the graph of a polynomial function. 3. Find the domain and asymptotes of rational functions. 4. Analyze the graph of a polynomial function. 5. Solve polynomial and rational inequalities	• teacher lecture • teacher working examples on the board • teacher showing problems on overhead projector • student guided practice of problems in book • cooperative learning groups • individual assistance • partner work • worksheets • homework • video • internet websites	Precalculus: graphical, numerical, algebraic 8th ed, Pearson education, 2011	• 5 minute checks • check homework • Quizzes • Mid-Chapter Test • Free-Response Chapter test • Oral response • Board work

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Unit 6: Exponential and Logarithmic Functions

Biblical Worldview Essential Questions:
Why did the lifespans of the patriarchs from Noah to Joseph decrease exponentially?

20 Lessons

PC#1, PC#4, PC#5

Objectives	Methods	Resources	Assessment
The students will 1. Form a composite function and find its domain. 2. Determine the inverse of a one-to-one function. 3. Obtain the graph of the inverse function from the graph of the original function. 4. Be familiar with exponential functions. 5. Graph exponential functions. 6. Solve exponential equations. 7. Convert exponential expressions to logarithmic expressions and visa versa. 8. Evaluate logarithmic functions. 9. Determine the domain of a logarithmic function. 10. Graph logarithmic functions. 11. Solve logarithmic equations. 12. Work with the properties of logarithms. 13. Evaluate logarithms whose base is neither 10 nor e. 14. Solve application problems involving either exponential or logarithmic functions. 15. Determine future and present value of a lump sum of money. 16. Work with applications involving the law of uninhibited growth and the law of decay.	• teacher lecture • teacher working examples on the board • teacher showing problems on overhead projector • student guided practice of problems in book • cooperative learning groups • individual assistance • partner work • worksheets • homework • video • internet websites	Precalculus: graphical, numerical, algebraic 8th ed, Pearson education, 2011	• 5 minute checks • check homework • Quizzes • Mid-Chapter Test • Free-Response Chapter test • Oral response • Board work

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Unit 7: Trigonometric Functions

Biblical Worldview Essential Questions:
What did God create or establish that are periodic in nature? (i.e. they recur repetitively and regularly)

24 Lessons

PC#1, PC#6

Objectives	Methods	Resources	Assessment
The students will 1. Convert between degrees, minutes, seconds, and decimal forms for angles. 2. Find the arc length of a circle. 3. Convert from degree to radians and from radians to degrees. 4. Find the area of a sector of a circle. 5. Find the linear speed of an object traveling in circular motion. 6. Find the values of trigonometric functions of acute angles. 7. Use the fundamental identities. 8. Find the exact values of the trigonometric functions of $\pi/4 = 45°$, $\pi/6 = 30°$ and $\pi/3 = 60°$. 9. Use a calculator to approximate the value of the trigonometric functions. 10. Determine the signs of the trigonometric functions of an angle in a given quadrant. 11. Find the reference angle of a general angle. 12. Find the exact values of trigonometric functions of an angle given one of them. 13. Find the exact values of the trigonometric functions using the unit circle. 14. Know the domain and range of the trigonometric functions. 15. Graph all the trigonometric functions. 16. Graph transformations of the trigonometric function.	• teacher lecture • teacher working examples on the board • teacher showing problems on overhead projector • student guided practice of problems in book • cooperative learning groups • individual assistance • partner work • worksheets • homework • video • internet websites	Precalculus: graphical, numerical, algebraic 8th ed, Pearson education, 2011	• 5 minute checks • check homework • Quizzes • Mid-Chapter Test • Free-Response Chapter test • Oral response • Board work

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Unit 8: Analytical Trigonometry

Biblical Worldview Essential Questions:
Many of God's commands are negatively stated, such as "Thou shall not steal." Is it possible to restate them in a positive way? Is there benefit in doing so?

9 Lessons

PC#6

Objectives	Methods	Resources	Assessment
The students will 1. Evaluate the inverse trigonometric functions. 2. Use properties of inverse functions. 3. Solve equations involving inverse functions. 4. Use algebra to simplify trigonometric expressions. 5. Use sum and difference, double-angle, half-angle, sum-to-product, and product-to-sum formulas. 4. Solve trigonometric equations.	• teacher lecture • teacher working examples on the board • teacher showing problems on overhead projector • student guided practice of problems in book • cooperative learning groups • individual assistance • partner work • worksheets • homework • video • internet websites	Precalculus: graphical, numerical, algebraic 8th ed, Pearson education, 2011	• 5 minute checks • check homework • Quizzes • Mid-Chapter Test • Free-Response Chapter test • Oral response • Board work

Unit 9: Applications of Trigonometric functions

Biblical Worldview Essential Questions:
Word problems or "story" problems are important for applying math concepts to the real world.
Why did Jesus tell "stories" or parables as a regular part of His teaching?

10 Lessons

PC#1, PC#6

Objectives	Methods	Resources	Assessment
The students will 1. Solve right triangles. 2. Solve oblique triangles using the law of sines and the law of cosines. 3. Solve applied problems involving right and oblique triangles.	• teacher lecture • teacher working examples on the board • teacher showing problems on overhead projector • student guided practice of problems in book • cooperative learning groups • individual assistance • partner work • worksheets • homework • video • internet websites	Precalculus: graphical, numerical, algebraic 8th ed, Pearson education, 2011	• 5 minute checks • check homework • Quizzes • Mid-Chapter Test • Free-Response Chapter test • Oral response • Board work

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Unit 10: Polar Coordinates; Vectors

Biblical Worldview Essential Questions:
Vector quantities have magnitude and direction. What's the magnitude and direction of your Christian walk?

9 Lessons

PC#7

Objectives	Methods	Resources	Assessment
The students will 1. Plot points using polar coordinates. 2. Convert from polar coordinates to rectangular coordinates and visa versa. 3. Convert a complex number from rectangular form to polar form and visa versa. 4. Plot points in the complex plane. 5. Find products and quotients of complex numbers in polar form. 6. Use De Moivre's theorem. 7. Find complex roots. 8. Graph vectors. 9. Find the position vector for an arbitrary vector. 10. Add and subtract vectors. 11. Find the magnitude of a vector. 11. Find a scalar product of two vectors. 12. Find the corresponding unit vector for an arbitrary vector. 13. Find a vector given its direction and magnitude.	• teacher lecture • teacher working examples on the board • teacher showing problems on overhead projector • student guided practice of problems in book • cooperative learning groups • individual assistance • partner work • worksheets • homework • video • internet websites	Precalculus: graphical, numerical, algebraic 8th ed, Pearson education, 2011	• 5 minute checks • check homework • Quizzes • Mid-Chapter Test • Free-Response Chapter test • Oral response • Board work

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Unit 11: Analytic Geometry

Biblical Worldview Essential Questions:
A parabola has a focus, in which rays parallel to the axis of symmetry would reflect off the curve and head towards. What should be the focus of our Christian life and how do we stay on course?

9 Lessons

PC#8

Objectives	Methods	Resources	Assessment
The students will 1. Analyze parabolas with vertex (h,k). 2. Solve applied problems involving parabolas. 3. Analyze ellipses with center (h,k). 4. Solve applied problems involving ellipses. 5. Analyze hyperbolas with center (h,k).	• teacher lecture • teacher working examples on the board • teacher showing problems on overhead projector • student guided practice of problems in book • cooperative learning groups • individual assistance • partner work • worksheets • homework • video • internet websites	Precalculus: graphical, numerical, algebraic 8th ed, Pearson education, 2011	• 5 minute checks • check homework • Quizzes • Mid-Chapter Test • Free-Response Chapter test • Oral response • Board work

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Unit 12: Sequences; Induction; Binomial Theorem

Biblical Worldview Essential Questions:
Inductive reasoning may be used to observe a specific numerical pattern, and then generalize it.
What is inductive Bible study?

9 Lessons

PC#9

Objectives	Methods	Resources	Assessment
The students will 1. Write the first several terms of a sequence. 2. Write the terms of a sequence defined by a recursive formula. 3. Use summation notation. 4. Determine if a sequence is arithmetic, geometric, or neither 5. Find a formula for the n_{th} term of an arithmetic and geometric sequence. 6. Find the sum of an arithmetic and geometric sequence.	• teacher lecture • teacher working examples on the board • teacher showing problems on overhead projector • student guided practice of problems in book • cooperative learning groups • individual assistance • partner work • worksheets • homework • video • internet websites	Precalculus: graphical, numerical, algebraic 8th ed, Pearson education, 2011	• 5 minute checks • check homework • Quizzes • Mid-Chapter Test • Free-Response Chapter test • Oral response • Board work

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Unit 13: Systems of Equations and Inequalities

Biblical Worldview Essential Questions:
The original meaning of the word "matrix" is womb.
What are some passages in the Bible that speak about the womb?

5 Lessons

PC#3

Objectives	Methods	Resources	Assessment
The students will 1. Solve a system of linear equations by substitution and elimination. 2. Solve a system of equations using matrices. .	• teacher lecture • teacher working examples on the board • teacher showing problems on overhead projector • student guided practice of problems in book • cooperative learning groups • individual assistance • partner work • worksheets • homework • video • internet websites	Precalculus: graphical, numerical, algebraic 8th ed, Pearson education, 2011	• 5 minute checks • check homework • Quizzes • Mid-Chapter Test • Free-Response Chapter test • Oral response • Board work