# ENGLISH: *Literature* cont.

Reading Skills Development

- Develop skills in reading comprehension
- Further develop oral reading skills
- Be able to identify significant quotations and the selections in which they are featured
- Increase vocabulary
- Further develop writing skills
- ➤ Study various literary forms: lyric and epic poetry, drama, allegory, Romantic and Victorian poetry, and modern fiction
- Study meaning and use of literary terms and devices such as theme, plot, imagery, figurative language, analogy, aside, caesura, carol, exemplum, idyll, kenning, madrigal, metonymy, ode, rondeau, scop, currealism, and terza rima
- Study historical backgrounds and writing techniques to better understand each literary period
- ➤ Study the development of plot, theme, setting, and character(s) in short stories, essays, and other notable works of English literature

Comprehension, Discussion, & Analysis Skills Development

- ➤ Read entire works: *The Pilgrim's Progress* and *Macbeth*
- Develop proper discernment according to the truths of Scripture
- Answer factual, interpretive, and inferential comprehension and discussion questions
- Improve ability to use deductive reasoning, understand cause and effect, and draw conclusions
- Build appreciation for good literature and a love of reading
- Develop an understanding of people's motives and feelings while recognizing consequences of particular actions
- Learn to analyze literature while studying selections
- Comprehend and appreciate the basic elements of a work of literature
- Learn to appreciate the rhyme, rhythm, and figurative language of poetry

MATHEMATICS: *Precalculus*
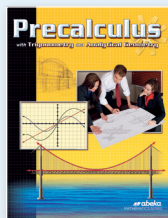
The purpose of *Precalculus* is to teach the student how to select and apply various techniques to solve mathematical problems in a skillful, systematic, and logical manner. Students will learn the underlying principles of trigonometry and interrelationships of lines and functions with graphical and analytical problem-solving techniques from a study in analytical geometry. The study culminates with an introduction to selected calculus topics.

Also available: Consumer Mathematics and Business Mathematics on Electives pp. 199-203.

Topical Interest Essays

- The History of Pi
- Distance of travel due to earth's rotation
- Mathematics in Astronomy—Eratosthenes' calculation of earth's circumference
- Sir Isaac Newton
- Oscilloscope Measurement of Household Voltage
- Mathematics in Engineering
- The Place of Imaginary Numbers
- Euler's Formula $e^{i\pi} + 1 = 0$
- Missile Guidance Technology
- Mathematics in Physics—Projectile Motion
- Mathematics in Biology
- Summation—A Calculation of Pi
- The Design of Cylindrical Containers
- Mathematics in Physics—Fluid pressure on a vertical surface

Evaluation

- Quizzes (49)
- Tests (9)
- 9-weeks exam (2)
- Semester exam
- Final exam

Trigonometry & Analytical Trigonometry

- Basic trigonometric ratios
- Solving right triangles
- ➤ Advanced trigonometric ratios
- ➤ Trigonometric functions
- ➤ Solving trigonometric equations
- Trigonometric graphs:
  - Intercepts
  - ➤ Symmetry, sinusoid
  - ➤ Amplitude, period, key angles, key points
  - ➤ Vertical and horizontal scaling
  - ➤ Vertical and horizontal translation
  - ➤ Phase shift
  - ➤ Vertical asymptotes
- ➤ Signs of the functions by quadrant
- ➤ Periodic motion: simple harmonic motion, frequency, rotating object, suspended object
- ➤ Identities:
  - ➤ Reciprocal, cofunction, Pythagorean, quotient
- ➤ Negative angle, double angle, half angle
- ➤ Sum and difference, product to sum, sum to product
- ➤ Verifying
- ➤ Used to find unknown values
- Special angle function values (30°, 45°, etc.; $\frac{\pi}{6}$, $\frac{\pi}{4}$, etc.)
- Inverse function values using a calculator
- Function values:
  - Angles in degrees
  - ➤ Angles in radians
  - ➤ Finding unknown function values
  - ➤ Function values using the unit circle, line diagrams of function values
  - Using a calculator, using right triangles, using special triangles:
    - 30°–60°–90°
    - 45°–45°–90°
    - 90°; $\frac{\pi}{6} - \frac{\pi}{3} - \frac{\pi}{2}$, $\frac{\pi}{4} - \frac{\pi}{4} - \frac{\pi}{2}$
- ➤ Reducing trigonometric function angles: reference angle, reference triangle
- ➤ Rewriting as a cofunction

MATHEMATICS: *Precalculus* cont.

Coordinate Geometry
- Basic review, terminology
- ➤ Trigonometric Function graphs:
  - ➤ Intercepts, symmetry, sinusoid
  - ➤ Amplitude, period, key angles, key points
  - ➤ Vertical and horizontal scaling
  - ➤ Vertical and horizontal translation, phase shift
  - ➤ Vertical asymptotes
- ➤ Angles in degrees and radians
- ➤ Graphing by addition of ordinates
- ➤ Inverse functions, inverse trigonometric functions
- Intercepts: x-intercept, y-intercept
- ➤ Symmetry: x-axis, y-axis, origin
- Domain:
  - Limiting operations
  - ➤ Determining
- Complex number plane
- Points of intersection
- Distance
- Slope:
  - ➤ Variation, inclination
  - Parallel and perpendicular lines
  - ➤ Angle between two intersecting lines
- Straight line:
  - ➤ Inclination
  - ➤ Distance to a point
  - Systems of lines
  - Equation forms:
    - Slope-intercept
    - ➤ Point-slope, two-point, intercept, parallel to axes, general
- Midpoint
- Parametric equations:
  - ➤ Eliminating the parameter
  - ➤ Developing equations: Shrödinger's wave model graph
  - ➤ Involute of a circle, brachistochrone, cycloids
- Locus of a point
- ➤ Conic sections:
  - Circle: center, radius
  - Ellipse:
    - ➤ Vertexes, foci, major and minor axes, latus rectum, eccentricity
  - Parabola:
    - Vertex
    - ➤ Focus, latus rectum, eccentricity
  - ➤ Hyperbola: vertexes, foci, transverse and conjugate axes, latus rectum, eccentricity, asymptotes, conjugate hyperbolas
  - ➤ Horizontal and vertical translation, rotation of axes
- ➤ Graphing in three dimensions:
  - ➤ Traces, cylinders, elements
  - ➤ Graphs: ellipsoid, paraboloid, hyperboloid of one sheet, hyperboloid of two sheets, hyperbolic paraboloid, cone

Polar Coordinates
- ➤ Graphing techniques
- ➤ Terminology, conversions
- ➤ Analysis techniques: branch tangents at the pole, symmetry, determining angles resulting in undefined values
- ➤ Rotation of axes
- ➤ Graphs: lines, circles, roses, cardioids, limaçons, parabolas

Angles
- Angles on the Cartesian plane:
  - In degrees
  - ➤ In radians
- ➤ Initial side, terminal side, standard position
- ➤ Quadrant of an angle, coterminal angles, positive and negative angles: in degrees, in radians, conversions
- ➤ Bearing
- ➤ Key angles for a trigonometric function graph
- Trigonometric function values:
  - ➤ Reference angle by quadrant: in degrees, in radians
- Special angles: $30°$, $45°$, etc.; $\frac{\pi}{6}$, $\frac{\pi}{4}$, etc.

Functions
- Functional notation
- Domain and range:
  - ➤ Finding, using inequalities, using intervals, characteristics
- ➤ Functions: even, odd, periodic, inverse
- ➤ Horizontal line test, vertical line test, one-to-one functions

Triangles
- Solving right triangles
- ➤ Solving oblique triangles:
  - Law of sines, law of cosines
  - ➤ The ambiguous case
- Using angles of elevation and depression
- Finding area
- Right triangle trigonometry
- ➤ Reference triangle
- $30°$-$60°$-$90°$, $45°$-$45°$-$90°$; $\frac{\pi}{6}$-$\frac{\pi}{3}$-$\frac{\pi}{2}$, $\frac{\pi}{4}$-$\frac{\pi}{4}$-$\frac{\pi}{4}$

Complex Numbers
- Imaginary numbers and basic quantities
- Standard form
- Graphing on the complex plane
- ➤ Magnitude, argument, trigonometric form, polar form, conversions
- ➤ Multiplying and dividing complex numbers
- ➤ Finding roots and powers: De Moivre's theorem

Distance
- Length of an arc:
  - Using degrees
  - ➤ Using radians
- Distance between two points:
  - In two dimensions
  - ➤ In three dimensions
  - ➤ Horizontal and vertical distance
  - ➤ From a line to a point

Vectors
- ➤ Scalar, equal vectors, unequal vectors, negative vector, resultant, vector sum

Regression Analysis
- ➤ Method of least squares: general equations for solution
- ➤ Close-fit curve
- ➤ Summation notation
- ➤ Pearson-r correlation coefficient
- ➤ Linear and non-linear data: $y = mx + b$, $y = ae^{tx}$, $y = ax^t$, $y = a + bx + cx^2 \ldots + mx^n$

> **RED** *indicates first introduction of content.*

MATHEMATICS: *Precalculus* cont.

Introductory Calculus

> History, limits
> First derivative of a polynomial: using limits, using the short method
> Slope using derivatives
> Second derivative of a polynomial: maximum and minimum, critical points
- Rate of change:
  - Average
  > Instantaneous

- Velocity:
  - Average
  > Instantaneous
- Acceleration:
  - Average
  > Instantaneous
> Anti-derivative
> Area under a curve

HISTORY & GEOGRAPHY: *American Government* (one semester)

American Government in Christian Perspective seeks to give students a clear understanding of the historical and philosophical elements that make the United States a unique nation. Only when students fully understand these foundational elements will they be able to love and appreciate our republic. *American Government in Christian Perspective* traces the roots of our political institutions and examines the Constitution itself. Through a clear explanation of the legislative, executive, and judicial branches of government, students learn how a republic actually functions. Students will also study state and local government and be better able to understand their local systems, which will in turn develop a better understanding of and a greater appreciation for American philosophy and ideology.

Added Enrichment

- Special feature boxes (44):
  - Give better understanding of the following:
    - Foundations of American liberty
    - Operation of opposing government systems
    - Symbols of American government
    - Concepts of American government
  - Highlight those who have helped shape American government through their writings and biographical sketches
- Important U.S. documents: the Constitution of the United States, the Declaration of Independence, and the Articles of Confederation
- *State and Local Government* (5 sections)
  - Helps students understand the state and local government by completing the study outline for their state

Evaluation

- Reading quizzes (15)
- Review quizzes (19); (includes memorization quizzes for "The Star-Spangled Banner," the Preamble to the Constitution, and four Scripture passages totaling 15 verses)
- Current events (14; each counts as quiz grade)
- Patriotic project (counts as test grade)
- Tests (4), 9-weeks exam (1)
- Final exam

> **RED** *indicates first introduction of content.*

Foundations of American Government

> America—a unique nation:
  > Miracle of America:
    > A blessed nation
    > American character
    > Need for vigilance
  > American symbols
  > Patriotism versus nationalism
> Government under God:
  > Foundations of civil government: nature of government
  > Forms of government:
    > Theocracy and human governments
    - Constitutional republic
    > Dictatorship
  > Christians and government:
    > Christian's response and responsibilities to government
    > Character and government
- Shaping of the American republic:
  - English heritage:
    - Bible and Christianity in England
    - English common law and government
    - Struggle for liberty

- English tradition takes root in America:
  - Compacts, colonies, and charters
  - Colonial law and government
  - Local government
- Steps toward unity:
  - Spiritual revival in the colonies
  - Early efforts at political union
- A nation is born:
  - Steps toward independence
  - Independence declared

Our Constitutional Republic

- Constitution of the United States:
  - From Plymouth to Philadelphia:
    - Roots of America's Constitution
    - Articles of Confederation
  - New Constitution adopted:
    - Constitutional Convention, 1787
    - Bundle of compromises
    - Federalists and Anti-Federalists
  - Main features of the Constitution:
    - Supreme law of the land
    > Purposes of our government