

# Superintendent's Message



Dear Parents and Students,

This booklet contains revised and updated objectives for students' learning in the "core" areas of English, mathematics, science, and social studies. These learning objectives are closely aligned with the Virginia Standards of Learning (SOL) to enhance students' opportunities for successful performance on SOL tests.

The purpose of this booklet is to provide parents and students a practical tool to use in planning and monitoring learning. Students are encouraged to preview course objectives at the beginning of the year and to evaluate their progress periodically by monitoring the objectives. Parents can play a significant role in increasing their children's achievement by reviewing these expectations with their student(s) on a regular basis.

Research repeatedly shows that by having high expectations for students' learning, we can make a positive contribution to students' success. Please join me in communicating to all students our expectation that they can succeed academically and become prepared for a rewarding future.

Sincerely,

Stewart D. Roberson  
Superintendent of Schools

## English Nine Objectives

9.1 The student will plan, present, and critique dramatic readings of literary selections.

- Choose a literary form for presentation, such as a poem, monologue, scene from a play, or a story.
- Adapt presentation techniques to fit literary form.
- Use verbal and nonverbal techniques for presentation.
- Evaluate impact of presentation.

9.2 The student will make planned oral presentations.

- Include definitions to increase clarity.
- Use relevant details to support main ideas.
- Illustrate main ideas through anecdotes and examples.
- Cite information sources.
- Make impromptu responses to questions about presentation.
- Use grammatically correct language, including vocabulary appropriate to the topic, audience, and purpose.

9.3 The student will read and analyze a variety of literature.

- Identify format, text structure, and main idea.
- Identify and define distinguishing characteristics of narratives, drama, poetry, and essays.
- Use literary terms in describing and analyzing selections.
- Explain the relationships between and among elements of literature: characters, plot, setting, tone, point of view, and theme.
- Explain the relationship between author's style and literary effect.
- Describe the use of images and sounds to elicit the reader's emotions.
- Explain the influence of historical context on the form, style, and point of view of a written work.

9.4 The student will read and analyze a variety of informational materials (manuals, textbooks, business letters, newspapers, brochures, reports, catalogs) and nonfiction materials, including journals, essays, speeches, biographies, and autobiographies.

- Identify a position/argument to be confirmed, disproved, or modified.
- Evaluate clarity and accuracy of information.
- Synthesize information from sources and apply it in written and oral presentations.
- Identify questions not answered by a selected text.
- Extend general and specialized vocabulary through speaking, reading, and writing.
- Read and follow instructions to complete an assigned project or task.

9.5 The student will read dramatic selections.

- Identify the two basic parts of drama: staging and scripting.
- Compare and contrast the elements of character, setting, and plot in one-act plays and full-length plays.
- Describe how stage directions help the reader understand a play's setting, mood, characters, plot, and theme.

- 9.6 The student will develop narrative, expository, and informational writings to inform, explain, analyze, or entertain.
- Generate, gather, and organize ideas for writing.
  - Plan and organize writing to address a specific audience and purpose.
  - Communicate clearly the purpose of the writing.
  - Write clear, varied sentences.
  - Use specific vocabulary and information.
  - Arrange paragraphs into a logical progression.
  - Revise writing for clarity.
  - Proofread and prepare final product for intended audience and purpose.
- 9.7 The student will edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure, and paragraphing.
- Use and apply rules for the parts of a sentence, including subject/verb, direct/indirect object, and predicate nominative/predicate adjective.
  - Use parallel structures across sentences and paragraphs.
  - Use appositives, main clauses, and subordinate clauses.
  - Use commas and semicolons to distinguish and divide main and subordinate clauses.
- 9.8 The student will credit the sources of both quoted and paraphrased ideas.
- Define the meaning and consequences of plagiarism.
  - Distinguish one's own ideas from information created or discovered by others.
  - Use a style sheet, such as that of the Modern Language Association (MLA) or American Psychological Association (APA), for citing sources.
- 9.9 The student will use print, electronic databases, and online resources to access information.
- Identify key terms specific to research tools and processes.
  - Narrow the focus of a search.
  - Scan and select resources.
  - Distinguish between reliable and questionable Internet sources and apply responsible use of technology.

## English Ten Objectives

- 10.1 The student will participate in and report small-group learning activities.
- Assume responsibility for specific group tasks.
  - Participate in the preparation of an outline or summary of the group activity.
  - Include all group members in oral presentation.
  - Use grammatically correct language, including vocabulary appropriate to the topic, audience, and purpose.
- 10.2 The student will critique oral reports of small-group learning activities.
- Evaluate one's own role in preparation and delivery of oral reports.
  - Evaluate effectiveness of group process in preparation and delivery of oral reports.
- 10.3 The student will read, comprehend, and critique literary works.
- Identify text organization and structure.
  - Identify main and supporting ideas.
  - Make predictions, draw inferences, and connect prior knowledge to support reading comprehension.
  - Explain similarities and differences of techniques and literary forms represented in the literature of different cultures and eras.
  - Identify universal themes prevalent in the literature of different cultures.
  - Examine a literary selection from several critical perspectives.
- 10.4 The student will read and interpret informational materials.
- Analyze and apply the information contained in warranties, contracts, job descriptions, technical descriptions, and other informational sources, including labels, warnings, manuals, directions, applications, and forms, to complete specific tasks.
  - Skim manuals or information sources to locate information.
  - Compare and contrast product information contained in advertisements with that found in instruction manuals and warranties.
- 10.5 The student will read and analyze a variety of poetry.
- Compare and contrast the use of rhyme, rhythm, and sound to convey a message.
  - Compare and contrast the ways in which poets use techniques to evoke emotion in the reader.
  - Interpret and paraphrase the meaning of selected poems.
- 10.6 The student will read and critique dramatic selections.
- Explain the use of asides, soliloquies, and monologues in the development of a single character.
  - Compare and contrast character development in a play to characterization in other literary forms.

- 10.7 The student will develop a variety of writing, with an emphasis on exposition.
- Generate, gather, plan, and organize ideas for writing.
  - Elaborate ideas clearly through word choice and vivid description.
  - Write clear, varied sentences.
  - Organize ideas into a logical sequence.
  - Revise writing for clarity and content of presentation.
  - Proofread and prepare final product for intended audience and purpose.
- 10.8 The student will edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure, and paragraphing.
- Use a style manual, such as that of the Modern Language Association (MLA) or the American Psychological Association (APA), to apply rules for punctuation and formatting of direct quotations.
  - Apply rules governing use of the colon.
  - Distinguish between active and passive voice.
- 10.9 The student will critique professional and peer writing.
- Analyze the writing of others.
  - Describe how the author accomplishes the intended purpose of a writing.
  - Suggest how writing might be improved.
- 10.10 The student will use writing to interpret, analyze, and evaluate ideas.
- Explain concepts contained in literature and other disciplines.
  - Translate concepts into simpler or more easily understood terms.
- 10.11 The student will collect, evaluate, organize, and present information.
- Organize information from a variety of sources.
  - Develop the central idea or focus.
  - Verify the accuracy and usefulness of information.
  - Credit sources for both quoted and paraphrased ideas.
  - Present information in an appropriate format, such as an oral presentation, written report, or visual product.
  - Use technology to access information, organize ideas, and develop writing.

## English Eleven Objectives

- 11.1 The student will make informative and persuasive presentations.
- Gather and organize evidence to support a position.
  - Present evidence clearly and convincingly.
  - Support and defend ideas and thoughts in public forums.
  - Use grammatically correct language, including vocabulary appropriate to the topic, audience, and purpose.
  - Use effective public speaking skills including eye contact, note cards, etc.
- 11.2 The student will analyze and evaluate informative and persuasive presentations.
- Critique the accuracy, relevance, and organization of evidence.
  - Critique the clarity and effectiveness of delivery.
- 11.3 The student will read and analyze relationships among American literature, history and culture.
- Describe contributions of different cultures to the development of American literature.
  - Compare and contrast the development of American literature in its historical context.
  - Discuss American literature as it reflects traditional and contemporary themes, motifs, universal characters, and genres.
  - Describe how use of context and language structures conveys an author's intent and viewpoint in contemporary and historical essays, speeches, and critical reviews.
- 11.4 The student will read and analyze a variety of informational material.
- Use information from texts to clarify or refine understanding of academic concepts.
  - Read and follow directions to complete an application for college admission, for a scholarship, or for employment.
  - Apply concepts and use vocabulary in informational and technical materials to complete a task.
  - Generalize ideas from selections to make predictions about other texts.
  - Analyze information from a text to draw conclusions.
- 11.5 The student will read and critique a variety of poetry.
- Analyze the poetic elements of contemporary and traditional poems.
  - Identify the poetic elements and techniques that are most appealing and that make poetry enjoyable.
  - Compare and contrast the works of contemporary and past American poets.
- 11.6 The student will read and critique a variety of dramatic selections.
- Describe the dramatic conventions or devices used by playwrights to present ideas.
  - Compare and evaluate adaptations and interpretations of a script for stage, film, or television.
  - Explain the use of verbal, situational, and dramatic irony.

- 11.7 The student will write in a variety of forms, with an emphasis on persuasion.
- Generate, gather, plan, and organize ideas for writing.
  - Develop a focus for writing.
  - Evaluate and cite applicable information.
  - Organize ideas in a logical manner.
  - Elaborate ideas clearly and accurately.
  - Adapt content, vocabulary, voice, and tone to audience, purpose, and situation.
  - Revise writing for accuracy and depth of information.
  - Proofread final copy and prepare document for intended audience and purpose.
- 11.8 The student will edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure, and paragraphing.
- Use a style manual, such as that of the Modern Language Association (MLA) or the American Psychological Association (APA), for producing research projects.
  - Use verbals and verbal phrases to achieve sentence conciseness and variety.
  - Adjust sentence and paragraph structures for a variety of purposes and audiences.
- 11.9 The student will write, revise, and edit personal, professional, and informational correspondence to a standard acceptable in the workplace and higher education.
- Apply a variety of planning strategies to generate and organize ideas.
  - Organize information to support purpose and form of writing.
  - Present information in a logical manner.
  - Revise writing for clarity.
  - Use technology to access information, organize ideas, and develop writing.
- 11.10 The student will analyze, evaluate, synthesize, and organize information from a variety of sources to produce a research product.
- Narrow a topic.
  - Develop a plan for research.
  - Collect information to support a thesis.
  - Evaluate quality and accuracy of information.
  - Synthesize information in a logical sequence.
  - Document sources of information, using a style sheet, such as that of the Modern Language Association (MLA) or the American Psychological Association (APA).
  - Edit writing for clarity of content and effect.
  - Edit copy for grammatically correct use of language, spelling, punctuation, and capitalization.
  - Proofread final copy and prepare document for publication or submission.
  - Use technology to access information, organize ideas, and develop writing.

## English Twelve Objectives

- 12.1 The student will make a 5 to 10 minute formal oral presentation.
- Choose the purpose of the presentation: to defend a position, to entertain an audience, or to explain information.
  - Use a well-structured narrative or logical argument.
  - Use details, illustrations, statistics, comparisons, and analogies to support purposes.
  - Use visual aids or technology to support presentation.
  - Use grammatically correct language, including vocabulary appropriate to the topic, audience, and purpose.
- 12.2 The student will evaluate formal presentations.
- Critique relationships among purpose, audience, and content of presentations.
  - Critique effectiveness of presentations.
- 12.3 The student will read and analyze the development of British literature and literature of other cultures.
- Recognize major literary forms and their elements.
  - Recognize the characteristics of major chronological eras.
  - Relate literary works and authors to major themes and issues of their eras.
- 12.4 The student will read and analyze a variety of informational materials, including electronic resources.
- Identify formats common to new publications and information resources.
  - Recognize and apply specialized informational vocabulary.
  - Evaluate a product based on analysis of the accompanying warranty and instruction manual.
  - Evaluate the quality of informational and technical materials.
- 12.5 The student will read and critique a variety of poetry.
- Explain how the choice of words in a poem creates tone and voice.
  - Explain how the sound of a poem (rhyme, rhythm, onomatopoeia, repetition, alliteration, assonance, and parallelism) supports the subject and mood.
  - Explain how imagery and figures of speech (personification, simile, metaphor) appeal to the reader's senses and experience.
  - Compare and contrast traditional and contemporary works of poets from many cultures.
- 12.6 The student will read and critique dramatic selections from a variety of authors.
- Describe the conflict, plot, climax, and setting.
  - Compare and contrast ways in which character, scene, dialogue, and staging contribute to the theme and the dramatic effect.
  - Identify the most effective elements of selected plays.
  - Compare and contrast dramatic elements of plays from American, British, and other cultures.

- 12.7 The student will develop expository and informational writings.
- Generate, gather, and organize ideas for writing.
  - Consider audience and purpose when planning for writing.
  - Write analytically about literary, informational, and visual materials.
  - Elaborate ideas clearly and accurately.
  - Revise writing for depth of information and technique of presentation.
  - Apply grammatical conventions to edit writing for correct use of language, spelling, punctuation, and capitalization.
  - Proofread final copy and prepare document for publication or submission.
- 12.8 The student will write documented research papers.
- Identify and understand the ethical issues of research and documentation.
  - Evaluate the accuracy and usefulness of information.
  - Synthesize information to support the thesis.
  - Present information in a logical manner.
  - Cite sources of information using a standard method of documentation, such as that of the Modern Language Association (MLA) or American Psychological Association (APA).
  - Edit copies for correct use of language, spelling, punctuation, and capitalization.
  - Proofread final copy and prepare document for publication or submission.

### **Algebraic Concepts Objectives**

- AC.1 The student will represent verbal quantitative situations algebraically and evaluate these expressions for given replacement values of the variables.
- The student will identify and define the following terms: whole number, real number, integer, variable, expression, and equation.
  - The student will add, subtract, multiply, and divide real numbers.
  - The student will simplify numerical expressions using Order of Operations.
  - The student will write verbal expressions and sentences as algebraic expressions and equations and apply Order of Operations to evaluate expressions.
  - The student will use the Distributive property.
  - The student will find the absolute value of a number and relate it to distance on the number line.
  - The student will collect, interpret, and graph data.
- AC.2 The student will use matrices to organize and manipulate data, including matrix addition, subtraction and scalar multiplication. Data will arise from business, industrial, and consumer situations.
- The student will organize data within a matrix and use correct terminology to describe the matrix, (including terms, dimensions, elements, rows and columns).
  - The student will add, subtract, and do scalar multiplication with matrices.
  - The student will solve addition, subtraction and scalar multiplication problems using a graphing calculator.
- AC.3 The student will solve multi-step first degree equations and inequalities in one variable and apply these skills to solve practical problems. Graphing calculators will be used to confirm algebraic solutions.

- The student will define and identify equations/inequalities and their symbols and terms, including coefficient, constant and variable.
- The student will solve one-step equation/inequalities and will display their solutions on a number line.
- The student will solve multi-step equations/inequalities, including those which require using the distributive property, and will display their solutions on a number line.
- The student will solve literal equations (formulas) for a given variable.

AC.4 The student will solve problems involving the use of proportions.

- The student will solve problems involving proportions using algebraic methods.
- The student will set up ratios and proportions from practical applications and will solve them algebraically.
- The student will use percents to solve practical problems.
- The student will define similar figures and set up a ratio of corresponding parts in quadrilaterals and triangles and solve the proportions for missing sides.

AC.5 The student will determine the slope of a line when given an equation of the line or a graph of the line.

- The student will identify the parts of a coordinate plane and will plot points on the plane.
- The student will define and visually identify the slope of a graphed line as positive, negative, zero, or undefined.
- The student will investigate the effects of changes in slope on a graphing calculator.
- The student will define slope in terms of rate of change, rise/run, and will find the slope of a line between two given points.
- The student will find the slope of a line given the graph of a line.

AC.6 The student will determine the domain and range of a relation given a graph or a set of ordered pairs.

- The student will define and describe domain and range of a relation and will state the domain and range given an equation, a table of values, and a set of ordered pairs.
- The student will determine whether a relation is a function given a table, set of ordered pairs, or a graph.
- The student will evaluate functions for given numerical values.

AC.7 The student will select, justify, and apply an appropriate technique to graph a linear function in two variables. Techniques will include slope-intercept, x- and y-intercepts, and the use of the graphing calculator.

- The student will graph the equation of a line using a table of values.
- The student will graph an equation of a line using x- and y- intercepts and point-slope form.
- The student will graph the equation of a line.
- The student will, given a set of data points, use the graphing calculator to find the equation and the lines of best fit, and use the equation and graph to make predictions.

AC.8 The student will solve systems of two linear equations in two variables.

- The student will graph a system of linear equations in order to find the point of intersection.
- Given a system of linear equations, the student will put the equations in slope-intercept form, enter the equations into the graphing calculator, and determine the solution.

AC.9 The student will use the Laws of Exponents and perform basic operations on polynomials.

- The student will use the Laws of Exponents to multiply and divide monomials.
- The student will use scientific notation.
- The student will add and subtract polynomials.
- The student will multiply polynomials using Algeblocks as well as other methods.

AC.10 The student will describe with models the connection between a perfect square and its root and will use the radical to find the square root of perfect squares and their multiples.

- The student will find perfect squares.
- The student will simplify radicals by finding pairs.
- The student will use the Pythagorean Theorem to find the missing side of a right triangle.

AC.11 The student will write an equation of a line when given the graph of the line.

- The student will state the slope-intercept form of a linear equation, be able to identify the slope and y-intercept from the slope-intercept equation, and be able to write the slope-intercept equation given the slope and y-intercept.
- The student will be able to convert an equation of the form  $y = mx + b$  to the form  $Ax + By = C$  and vice-versa.
- The student will be able to write the equation of a line when given the slope and a point on the line.

## Algebra I Objectives

- AI.1 The student will solve multistep linear equations and inequalities in one variable, solve literal equations (formulas) for a given variable, and apply these skills to solve practical problems. Graphing calculators will be used to confirm algebraic solutions.
- AI.2 The student will represent verbal quantitative situations algebraically and evaluate these expressions for given replacement values of the variables. Students will choose an appropriate computational technique, such as mental mathematics, calculator, or paper and pencil.
- AI.3 The student will justify steps used in simplifying expressions and solving equations and inequalities. Justifications will include the use of concrete objects; pictorial representations; and the properties of real numbers, equality, and inequality.
- AI.4 The student will use matrices to organize and manipulate data, including matrix addition, subtraction, and scalar multiplication. Data will arise from business, industrial, and consumer situations.
- AI.5 The student will create and use tabular, symbolic, graphical, verbal, and physical representations to analyze a given set of data for the existence of a pattern, determine the domain and range of relations, and identify the relations that are functions.
- AI.6 The student will select, justify, and apply an appropriate technique to graph linear functions and linear inequalities in two variables. Techniques will include slope-intercept, x- and y-intercepts, graphing by transformation, and the use of the graphing calculator.
- AI.7 The student will determine the slope of a line when given an equation of the line, the graph of the line, or two points on the line. Slope will be described as rate of change and will be positive, negative, zero, or undefined. The graphing calculator will be used to investigate the effect of changes in the slope on the graph of the line.
- AI.8 The student will write an equation of a line when given the graph of the line, two points on the line, or the slope and a point on the line.
- AI.9 The student will solve systems of two linear equations in two variables both algebraically and graphically and apply these techniques to solve practical problems. Graphing calculators will be used both as a primary tool for solution and to confirm an algebraic solution.
- AI.10 The student will apply the laws of exponents to perform operations on expressions with integral exponents, using scientific notation when appropriate.
- AI.11 The student will add, subtract, and multiply polynomials and divide polynomials with monomial divisors, using concrete objects, pictorial and area representations, and algebraic manipulations.
- AI.12 The student will factor completely first- and second-degree binomials and trinomials in one or two variables. The graphing calculator will be used as a tool for factoring and for confirming algebraic factorizations.
- AI.13 The student will express the square root of a whole number in simplest radical form and approximate square roots to the nearest tenth.

- AI.14 The student will solve quadratic equations in one variable both algebraically and graphically. Graphing calculators will be used both as a primary tool in solving problems and to verify algebraic solutions.
- AI.15 The student will, given a rule, find the values of a function for elements in its domain and locate the zeros of the function both algebraically and with a graphing calculator. The value of  $f(x)$  will be related to the ordinate on the graph.
- AI.16 The student will, given a set of data points, write an equation for a line of best fit and use the equation to make predictions.
- AI.17 The student will compare and contrast multiple one-variable data sets, using statistical techniques that include measures of central tendency, range, and box-and-whisker graphs.
- AI.18 The student will analyze a relation to determine whether a direct variation exists and represent it algebraically and graphically, if possible.

## Geometry Objectives

- G.1 The student will construct and judge the validity of a logical argument consisting of a set of premises and a conclusion. This will include
- identifying the converse, inverse, and contra positive of a conditional statement;
  - translating a short verbal argument into symbolic form;
  - using Venn diagrams to represent set relationships; and
  - using deductive reasoning, including the law of syllogism.
- G.2 The student will use pictorial representations, including computer software, constructions, and coordinate methods, to solve problems involving symmetry and transformation. This will include
- investigating and using formulas for finding distance, midpoint, and slope;
  - investigating symmetry and determining whether a figure is symmetric with respect to a line or a point; and
  - determining whether a figure has been translated, reflected, or rotated.
- G.3 The student will solve practical problems involving complementary, supplementary, and congruent angles that include vertical angles, angles formed when parallel lines are cut by a transversal, and angles in polygons.
- G.4 The student will use the relationships between angles formed by two lines cut by a transversal to determine if two lines are parallel and verify, using algebraic and coordinate methods as well as deductive proofs.
- G.5 The student will
- investigate and identify congruence and similarity relationships between triangles; and
  - prove two triangles are congruent or similar, given information in the form of a figure or statement, using algebraic and coordinate as well as deductive proofs.
- G.6 The student, given information concerning the lengths of sides and/or measures of angles, will apply the triangle inequality properties to determine whether a triangle exists and to order sides and angles. These concepts will be considered in the context of practical situations.
- G.7 The student will solve practical problems involving right triangles by using the Pythagorean Theorem, properties of special right triangles, and right triangle trigonometry. Solutions will be expressed in radical form or as decimal approximations.
- G.8 The student will
- investigate and identify properties of quadrilaterals involving opposite sides and angles, consecutive sides and angles, and diagonals;
  - prove these properties of quadrilaterals, using algebraic and coordinate methods as well as deductive reasoning; and
  - use properties of quadrilaterals to solve practical problems.
- G.9 The student will use measures of interior and exterior angles of polygons to solve problems. Tessellations and tiling problems will be used to make connections to art, construction, and nature.
- G.10 The student will investigate and solve practical problems involving circles, using properties of

angles, arcs, chords, tangents, and secants. Problems will include finding arc length and the area of a sector, and may be drawn from applications of architecture, art, and construction.

- G.11 The student will construct a line segment congruent to a given line segment, the bisector of a line segment, a perpendicular to a given line from a point not on the line, a perpendicular to a given line at a point on the line, the bisector of a given angle, and an angle congruent to a given angle.
- G.12 The student will make a model of a three-dimensional figure from a two-dimensional drawing and make a two-dimensional representation of a three-dimensional object. Models and representations will include scale drawings, perspective drawings, blueprints, or computer simulations.
- G.13 The student will use formulas for surface area and volume of three-dimensional objects to solve practical problems. Calculators will be used to find decimal approximations for results.
- G.14 The student will
- use proportional reasoning to solve practical problems, given similar geometric objects; and
  - determine how changes in one dimension of an object affect area and/or volume of the object.

## Algebra II Objectives

- AII.1 The student will identify field properties, axioms of equality and inequality, and properties of order that are valid for the set of real numbers and its subsets, complex numbers, and matrices.
- AII.2 The student will add, subtract, multiply, divide, and simplify rational expressions, including complex fractions.
- AII.3 The student will
- add, subtract, multiply, divide, and simplify radical expressions containing positive rational numbers and variables and expressions containing rational exponents; and
  - write radical expressions as expressions containing rational exponents and vice versa.
- AII.4 The student will solve absolute value equations and inequalities graphically and algebraically. Graphing calculators will be used as a primary method of solution and to verify algebraic solutions.
- AII.5 The student will identify and factor completely polynomials representing the difference of squares, perfect square trinomials, the sum and difference of cubes, and general trinomials.
- AII.6 The student will select, justify, and apply a technique to solve a quadratic equation over the set of complex numbers. Graphing calculators will be used for solving and for confirming the algebraic solutions.
- AII.7 The student will solve equations containing rational expressions and equations containing radical expressions algebraically and graphically. Graphing calculators will be used for solving and for confirming the algebraic solutions.
- AII.8 The student will recognize multiple representations of functions (linear, quadratic, absolute value, step, and exponential functions) and convert between a graph, a table, and symbolic form. A transformational approach to graphing will be employed through the use of graphing calculators.
- AII.9 The student will find the domain, range, zeros, and inverse of a function; the value of a function for a given element in its domain; and the composition of multiple functions. Functions will include exponential, logarithmic, and those that have domains and ranges that are limited and/or discontinuous. The graphing calculator will be used as a tool to assist in investigation of functions.
- AII.10 The student will investigate and describe through the use of graphs the relationships between the solution of an equation, zero of a function, x-intercept of a graph, and factors of a polynomial expression.
- AII.11 The student will use matrix multiplication to solve practical problems. Graphing calculators or computer programs with matrix capabilities will be used to find the product.

- AII.12 The student will represent problem situations with a system of linear equations and solve the system, using the inverse matrix method. Graphing calculators or computer programs with matrix capability will be used to perform computations.
- AII.13 The student will solve practical problems, using systems of linear inequalities and linear programming, and describe the results both orally and in writing. A graphing calculator will be used to facilitate solutions to linear programming problems.
- AII.14 The student will solve nonlinear systems of equations, including linear-quadratic and quadratic-quadratic, algebraically and graphically. The graphing calculator will be used as a tool to visualize graphs and predict the number of solutions.
- AII.15 The student will recognize the general shape of polynomial, exponential, and logarithmic functions. The graphing calculator will be used as a tool to investigate the shape and behavior of these functions.
- AII.16 The student will investigate and apply the properties of arithmetic and geometric sequences and series to solve practical problems, including writing the first  $n$  terms, finding the  $n$ th term, and evaluating summation formulas. Notation will include  $\Sigma$  and  $a_n$ .
- AII.17 The student will perform operations on complex numbers and express the results in simplest form. Simplifying results will involve using patterns of the powers of  $i$ .
- AII.18 The student will identify conic sections (circle, ellipse, parabola, and hyperbola) from his/her equations. Given the equations in  $(h, k)$  form, the student will sketch graphs of conic sections, using transformations.
- AII.19 The student will collect and analyze data to make predictions and solve practical problems. Graphing calculators will be used to investigate scatterplots and to determine the equation for a curve of best fit. Models will include linear, quadratic, exponential, and logarithmic functions.
- AII.20 The student will identify, create, and solve practical problems involving inverse variation and a combination of direct and inverse variations.

## Algebra III with Trigonometry Objectives

- AIII.1 The student will use the definitions of the six trigonometric functions to find the sine, cosine, tangent, cotangent, secant, and cosecant of an angle in standard position, given a point, other than the origin, on the terminal side of the angle. Circular function definitions will be connected with trigonometric function definitions.
- AIII.2 The student, given the value of one trigonometric function, will find the values of the other trigonometric functions. Properties of the unit circle and definitions of circular functions will be applied.
- AIII.3 The student will find the values of the trigonometric functions of the special angles and their related angles as found in the unit circle without the aid of a calculating utility. This will include converting radians to degrees and vice versa.
- AIII.4 The student will use a calculator to find the value of any trigonometric function and inverse trigonometric function.
- AIII.5 The student will verify basic trigonometric identities and make substitutions using the basic identities
- AIII.6 The student, given one of the six trigonometric functions in standard form (e.g.,  $y = A\sin(Bx + C) + D$ , where A, B, C, and D are real numbers), will
- state the domain and the range of the function;
  - determine the amplitude, period, phase shift, and vertical shift; and
  - sketch the graph of the function by using transformations for at least a one-period interval.
- The graphing calculator will be used to investigate the effect of changing A, B, C, and D on the graph of a trigonometric function.
- AIII.7 The student will identify the domain and range of the inverse trigonometric functions and recognize the graph of these functions. Restrictions on the domains of the inverse trigonometric functions will be included.
- AIII.8 The student will solve trigonometric equations that include both infinite solutions and restricted domain solutions and solve basic trigonometric inequalities. Graphic utilities will be used to solve equations to check for reasonableness of results, and to verify algebraic solutions.
- AIII.9 The student will identify, create, and solve practical problems involving triangles. Techniques will include using the trigonometric functions, the Pythagorean Theorem, the Law of Sines, and the Law of Cosines.
- AIII.10 The student will add, subtract, multiply, divide, and simplify rational expressions, including complex fractions.
- AIII.11 The student will
- add, subtract, multiply, divide, and simplify radical expressions containing positive rational numbers and variables and expressions containing rational exponents; and
  - write radical expressions as expressions containing rational exponents and vice versa.

- AIII.12 The student will identify and factor completely polynomials representing the difference of squares, perfect square trinomials, the sum and difference of cubes, and general trinomials.
- AIII.13 The student will investigate and identify the characteristics of exponential and logarithmic functions in order to graph these functions and to solve equations and practical problems. This will include the role of  $e$ , natural and common logarithms, laws of exponents and logarithms, and the solution of logarithmic and exponential equations. Graphing utilities will be used to investigate and verify the graphs and solutions.
- AIII.14 The student will solve equations and inequalities involving the following: polynomials, rational expressions, radicals, logarithmic expressions, and exponential expressions.
- AIII.15 The student will apply the techniques of translation in the coordinate plane to graph functions and conic sections. A graphing utility will be used to investigate and verify the graphs.
- AIII.16 The student will use linear programming to solve real world applications. Procedures will include solving systems of equations and inequalities.

## Precalculus Objectives

- PC1. The student will use the definitions of the six trigonometric functions to find the sine, cosine, tangent, cotangent, secant, and cosecant of an angle in standard position, given a point, other than the origin, on the terminal side of the angle. Circular function definitions will be connected with trigonometric function definitions.
- PC2. The student, given the value of one trigonometric function, will find the values of the other trigonometric functions. Properties of the unit circle and definitions of circular functions will be applied.
- PC3. The student will find the values of the trigonometric functions of the special angles and their related angles as found in the unit circle without the aid of a calculating utility. This will include converting radians to degrees and vice versa.
- PC4. The student will use a calculator to find the value of any trigonometric function and inverse trigonometric function.
- PC5. The student will verify basic trigonometric identities and make substitutions using the basic identities.
- PC6. The student, given one of the six trigonometric functions in standard form (e.g.,  $y = A\sin(Bx + C) + D$ , where  $A$ ,  $B$ ,  $C$ , and  $D$  are real numbers), will do the following:
- state the domain and the range of the function;
  - determine the amplitude, period, phase shift, and vertical shift; and
  - sketch the graph of the function by using transformations for at least a one-period interval.
- The graphing calculator will be used to investigate the effect of changing  $A$ ,  $B$ ,  $C$ , and  $D$  on the graph of a trigonometric function.
- PC7. The student will identify the domain and range of the inverse trigonometric functions and recognize the graph of these functions. Restrictions on the domains of the inverse trigonometric functions will be included.
- PC8. The student will solve trigonometric equations that include both infinite solutions and restricted domain solutions and solve basic trigonometric inequalities. Graphing utilities will be used to solve equations to check for reasonableness of results, and to verify algebraic solutions.
- PC9. The student will identify, create, and solve practical problems involving triangles and vectors. Techniques will include using the trigonometric functions, the Pythagorean Theorem, the Law of Sines, and the Law of Cosines.
- PC10. The student will investigate and identify the characteristics of polynomial and rational functions and use these to sketch the graphs of the functions. This will include determining zeros, upper and lower bounds, y-intercepts, symmetry, asymptotes, intervals for which the function is increasing or decreasing, and maximum or minimum points. Graphing utilities will be used to investigate and verify these characteristics.

- PC11. The student will perform operations, including composition and inversion of functions, and determine the domain and range of results. Continuity of functions and special functions such as absolute value, step functions, and piece-wise, will be included. Curve sketching and transformations will be included. Graphing utilities will be used to investigate and verify the graphs.
- PC12. The student will use graphs to investigate and describe the continuity of functions. The functions will include piece-wise-defined and step functions.
- PC13. The student will expand binomials having positive integral exponents through the use of the Binomial Theorem, the formula for combinations, and Pascal's Triangle.
- PC14. The student will solve problems involving arithmetic and geometric sequences and series. This will include finding the sum (sigma notation included) of finite and infinite convergent series that will lead to an intuitive approach to a limit.
- PC15. The student will apply the method of mathematical induction to prove formulas/statements.
- PC16. The student will find the limit of an algebraic function, if it exists, as the variable approaches either a finite number or infinity. A graphing utility will be used to verify intuitive reasoning, algebraic methods, and numerical substitution.
- PC17. The student will apply the techniques of translation in the coordinate plane to graphing functions and conic sections. A graphing utility will be used to investigate and verify the graphs.
- PC18. The student will investigate and identify the characteristics of exponential and logarithmic functions in order to graph these functions and to solve equations and practical problems. This will include the role of  $e$ , natural and common logarithms, laws of exponents and logarithms, and the solution of logarithmic and exponential equations. Graphing utilities will be used to investigate and verify the graphs and solutions.
- PC19. The student will investigate and identify the characteristics of the graphs of polar equations using graphing utilities. This will include classification of polar equations, the effects of changes in the parameters in polar equations, conversion of complex numbers from rectangular form to polar form and vice versa.
- PC20. The student will perform operations with vectors in the coordinate plane and solve practical problems using vectors. This will include the operations of addition, subtraction, scalar multiplication, and dot product, norm of a vector, unit vector, graphing, properties, simple proofs, complex numbers (as vectors), and perpendicular components.
- PC21. The student will use parametric equations to model and solve application problems. Graphing utilities will be used to develop an understanding of the graph of parametric equations.

## Advanced Placement Calculus Objectives

- APC.1 The student will define and apply the properties of elementary functions, including algebraic, trigonometric, exponential, and composite functions and their inverses, and graph these functions, using a graphing calculator. Properties of functions will include:
- domains, ranges, combinations, odd, even, periodicity, symmetry, asymptotes, zeros, upper and lower bounds,
  - intervals where the function is increasing or decreasing.
- APC.2 The student will define and apply the properties of limits of functions. Limits will be evaluated graphically and algebraically. This will include
- limits of a constant;
  - limits of a sum, product, and quotient;
  - one-sided limits; and
  - limits at infinity, infinite limits, and non-existent limits.
- APC.3 The student will use limits to define continuity and determine where a function is continuous or discontinuous. This will include
- continuity in terms of limits;
  - continuity at a point and over a closed interval;
  - application of the Intermediate Value Theorem and the Extreme Value Theorem; and
  - geometric understanding and interpretation of continuity and discontinuity.
- APC.4 The student will investigate asymptotic and unbounded behavior in functions. This will include
- describing and understanding asymptotes in terms of graphical behavior and limits involving infinity; and
  - comparing relative magnitudes of functions and their rates of change.
- APC.5 The student will investigate derivatives presented in graphic, numerical, and analytic contexts and the relationship between continuity and differentiability. The derivative will be defined as the limit of the difference quotient and interpreted as an instantaneous rate of change.
- APC.6 The student will investigate the derivative at a point on a curve. This will include
- finding the slope of a curve at a point, including points at which the tangent is vertical and points at which there are no tangents;
  - using local linear approximation to find the slope of a tangent line to a curve at the point;
  - defining instantaneous rate of change as the limit of average rate of change; and
  - approximating rate of change from graphs and tables of values.
- APC.7 The student will analyze the derivative of a function as a function in itself. This will include
- comparing corresponding characteristics of the graphs of  $f$ ,  $f'$ , and  $f''$ ;
  - defining the relationship between the increasing and decreasing behavior of  $f$  and the sign of  $f'$ ;
  - translating verbal descriptions into equations involving derivatives and vice versa;
  - analyzing the geometric consequences of the Mean Value Theorem;
  - defining the relationship between the concavity of  $f$  and the sign of  $f''$ ; and
  - identifying points of inflection as places where concavity changes and finding points of inflection.

APC.8 The student will apply the derivative to solve problems. This will include

- analysis of curves and the ideas of concavity and monotonicity;
- optimization involving global and local extrema;
- modeling of rates of change and related rates;
- use of implicit differentiation to find the derivative of an inverse function;
- interpretation of the derivative as a rate of change in applied contexts, including velocity, speed, and acceleration; and
- geometric interpretation of differential equations via slope fields and the relationship between slope fields and the solution curves for the differential equations.

APC.9 The student will apply formulas to find derivatives. This will include

- derivatives of algebraic, trigonometric, exponential, logarithmic, and inverse trigonometric functions;
- derivations of sums, products, quotients, inverses, and composites (chain rule) of elementary functions;
- derivatives of implicitly defined functions; and
- higher order derivatives of algebraic, trigonometric, exponential, and logarithmic, functions.

APC.10 The student will use Riemann sums and the Trapezoidal Rule to approximate definite integrals of functions represented algebraically, graphically, and by a table of values and will interpret the definite integral as the accumulated rate of change of a quantity over an interval interpreted as the change of the quantity over the interval

$$\int_a^b f'(x) dx = f(b) - f(a).$$

Riemann sums will use left, right, and midpoint evaluation points over equal subdivisions.

APC.11 The student will find antiderivatives directly from derivatives of basic functions and by substitution of variables (including change of limits for definite integrals).

APC.12 The student will identify the properties of the definite integral. This will include additivity and linearity, the definite integral as an area, and the definite integral as a limit of a sum as well as the fundamental theorem:

$$\frac{d}{dx} \int_a^x f(t) dt = f(x).$$

APC.13 The student will use the Fundamental Theorem of Calculus to evaluate definite integrals, represent a particular antiderivative, and the analytical and graphical analysis of functions so defined.

APC.14 The student will find specific antiderivatives, using initial conditions (including applications to motion along a line). Separable differential equations will be solved and used in modeling (in particular, the equation  $y' = ky$  and exponential growth).

APC.15 The student will use integration techniques and appropriate integrals to model physical, biological, and economic situations. The emphasis will be on using the integral of a rate of change to give accumulated change or on using the method of setting up an approximating Riemann sum and representing its limit as a definite integral. Specific applications will include

- the area of a region;
- the volume of a solid with known cross-section;
- the average value of a function; and
- the distance traveled by a particle along a line.

## Advanced Placement Statistics Objectives

- PS.1 The student will analyze graphical displays of data, including dotplots, stemplots, and histograms, to identify and describe patterns and departures from patterns, using central tendency, spread, clusters, gaps, and outliers. Appropriate technology will be used to create graphical displays.
- PS.2 The student will analyze numerical characteristics of univariate data sets to describe patterns and departure from patterns, using mean, median, mode, variance, standard deviation, interquartile range, range, and outliers. Appropriate technology will be used to calculate statistics.
- PS.3 The student will compare distributions of two or more univariate data sets, analyzing center and spread (within group and between group variations), clusters and gaps, shapes, outliers, or other unusual features. Appropriate technology will be used to generate graphical displays.
- PS.4 The student will analyze scatterplots to identify and describe the relationship between two variables, using shape; strength of relationship; clusters; positive, negative, or no association; outliers; and influential points. Appropriate technology will be used to generate scatterplots and identify outliers and influential points.
- PS.5 The student will find and interpret linear correlation, use the method of least squares regression to model the linear relationship between two variables, and use the residual plots to assess linearity. Appropriate technology will be used to compute correlation coefficients and residual plots.
- PS.6 The student will make logarithmic and power transformations to achieve linearity. Appropriate technology will be used.
- PS.7 The student, using two-way tables, will analyze categorical data to describe patterns and departure from patterns and to find marginal frequency and relative frequencies, including conditional frequencies.
- PS.8 The student will describe the methods of data collection in a census, sample survey, experiment, and observational study and identify an appropriate method of solution for a given problem setting.
- PS.9 The student will plan and conduct a survey. The plan will address sampling techniques (e.g., simple random and stratified) and methods to reduce bias.
- PS.10 The student will plan and conduct an experiment. The plan will address control, randomization, and measurement of experimental error.
- PS.11 The student will identify and describe two or more events as complementary, dependent, independent, and/or mutually exclusive.
- PS.12 The student will find probabilities (relative frequency and theoretical), including conditional probabilities for events that are either dependent or independent, by applying the “law of large numbers” concept, the addition rule, and the multiplication rule.
- PS.13 The student will develop, interpret, and apply the binomial probability distribution for discrete random variables, including computing the mean and standard deviation for the binomial

variable.

- PS.14 The student will simulate probability distributions, including binomial and geometric.
- PS.15 The student will identify random variables as independent or dependent and find the mean and standard deviations for sums and differences of independent random variables.
- PS.16 The student will identify properties of a normal distribution and apply the normal distribution to determine probabilities, using a table or graphing calculator.
- PS.17 The student, given data from a large sample, will find and interpret point estimates and confidence intervals for parameters. The parameters will include proportion and mean, difference between two proportions, and difference between two means (independent and paired).
- PS.18 The student will apply and interpret the logic of a hypothesis-testing procedure. Tests will include large sample test for proportion, mean, difference between two proportions, and difference between two means (independent and paired) and Chi-squared test for goodness to fit, homogeneity of proportions, and independence.
- PS.19 The student will identify the meaning of sampling distribution with reference to random variable, sampling statistic, and parameter and explain the Central Limit Theorem. This will include sampling distribution of a sample proportion, a sample mean, a difference between two sample proportions, and a difference between two sample means.
- PS.20 The student will identify properties of a t-distribution and apply t-distributions to single-sample and two-sample (independent and matched pairs) t-procedures, using tables or graphing calculators.

Probability and Statistics Objectives  
(semester course)

- PS.1 The student will analyze graphical displays of data, including dotplots, stemplots, and histograms to identify and describe patterns and departures from patterns utilizing central tendency, spread, clusters, gaps, and outliers. Appropriate technology will be used to create graphical displays.
- PS.2 The student will analyze numerical characteristics of univariate data sets to describe patterns and departure from patterns utilizing mean, median, mode, variance, standard deviation, interquartile range, range, and outliers. Appropriate technology will be used to calculate statistics.
- PS.3 The student will compare distributions of two or more univariate data sets, analyzing center and spread (within group and between group variations), clusters and gaps, shapes, outliers, or other unusual features. Appropriate technology will be used to generate graphical displays.
- PS.4 The student will analyze scatterplots to identify and describe the relationship between two variables using shape; strength of relationship; clusters; positive, negative or no association; outliers and influential points. Appropriate technology will be used to generate scatterplots and to identify outliers and influential points.
- PS.5 The student will find and interpret linear correlation and use the method of least squares regression to model the linear relationship between two variables and use the residual plots to assess linearity. Appropriate technology will be used to compute correlation coefficients and residual plots.
- PS.6 The student will describe the methods of data collection in a census, sample survey, experiment, and observational study and identify an appropriate method for a given problem setting.
- PS.7 The student will plan and conduct a survey. The plan will address sampling techniques (e.g., simple random and stratified) and methods to reduce bias.
- PS.8 The student will compute and distinguish between permutations and combinations and use technology for applications.
- PS.9 The student will identify and describe two or more events as complementary, dependent, independent, and/or mutually exclusive.
- PS.10 The student will find probabilities (relative frequency and theoretical), including conditional probabilities for events that are either dependent or independent, by applying the “law of large numbers” concept, the addition rule, and the multiplication rule.
- PS.11 The student will develop, interpret, and apply the binomial probability distribution for discrete random variables, including computing the mean and standard deviation for the binomial variable.
- PS.12 The student will identify properties of a normal distribution and apply the normal distribution to determine probabilities using a table or graphing calculator.

Discrete Mathematics Objectives  
(semester course)

- DM1. The student will model problems using vertex-edge graphs. The concepts of valence, connectedness, paths, planarity, and directed graphs will be investigated. Adjacency matrices and matrix operations will be used to solve problems (e.g., food chains, number of paths).
- DM2. The student will solve problems through investigation and application of circuits, cycles, Euler Paths, Euler Circuits, Hamilton Paths, and Hamilton Circuits. Optimal solutions will be sought using existing algorithms and student-created algorithms.
- DM3. The student will apply graphs to conflict resolution problems such as map coloring, scheduling, matching, and optimization. Graph coloring and chromatic number will be used.
- DM4. The student will apply algorithms, such as Kruskal's, Prim's, or Dijkstra's, relating to trees, networks, and paths. Appropriate technology will be used to determine the number of possible solutions and to generate solutions when a feasible number exists.
- DM5. The student will use algorithms to schedule tasks to determine a minimum project time. The algorithms will include critical path analysis, the list-processing algorithm, and student-created algorithms.
- DM6. The student will analyze and describe the issue of fair division (e.g., cake cutting, estate division). Algorithms for continuous and discrete cases will be applied.

## Biology Objectives

BIO.1 The student will plan and conduct investigations.

- Record observations about living organisms in the lab and in the field.
- Formulate hypotheses based on direct observations and information from scientific literature.
- Define and investigate variables to test hypotheses.
- Make clear distinctions among observations, inferences, and predictions.
- Use graphing and arithmetic calculations as tools to analyze data.
- Form conclusions based on recorded quantitative and qualitative data.
- Identify and discuss sources of error inherent in experimental design.
- Determine the validity and accuracy of data.
- Record data and show relationships using labeled diagrams, tables with units, and graphs.
- Determine range, mean, and data values.
- Use chemicals and equipment in a safe manner.
- Use appropriate technology, including computers, microscopes, graphing calculators, and probeware, to gather data, analyze data, and communicate results.
- Use scientific literature in research.
- Differentiate between a scientific hypothesis and a theory.
- Recognize and analyze alternative scientific explanations and models.
- Construct and defend a scientific viewpoint.

BIO.2 The student will investigate and understand the history of biological concepts.

- Describe how the development of the cell theory was accelerated by the ability to make observations using magnifying lenses and microscopes.
- Discuss the contributions of Hooke, Schleiden, Schwann, and van Leeuwenhoek.
- Describe the cell theory and provide evidence to support it.
- Discuss how conditions on early Earth led to the formation of organic molecules, an oxygen rich atmosphere, prokaryotic cells, and eukaryotic cells.
- Describe the process of natural selection.
- Describe the experiments of Redi and Spallanzani which helped to disprove the concept of spontaneous generation.
- Discuss Pasteur and Koch's experimentation with disease-causing microorganisms and the germ theory of infectious disease.
- Analyze how modern sanitation, aseptic techniques, and vaccinations have been employed to destroy microorganisms.
- Trace the development of the structural model of DNA.
- Discuss the collaborative efforts of scientists, past and present.

BIO.3 The student will investigate and understand biochemical principles essential for life.

- Identify basic atomic structure.
- Relate the formation of ionic and covalent bonds to atom stability.
- Explain the nature of mixtures, solutions, and suspensions.
- Explain that water molecules are cohesive and adhesive due to polar covalent and hydrogen bonding.
- Discuss the unique properties of water.
- Explain how water's ability to dissolve many substances impacts nutrient and waste movement.
- Explain how the pH scale measures the strength of acids and bases.
- List the most abundant elements found in living things.

- Explain how polymers are formed and broken down by living things.
- Compare and contrast the structure and function of carbohydrates, lipids, proteins, and nucleic acids, and identify their roles in cellular processes.
- Describe the structure of enzymes and how their three-dimensional shapes allow them to bind with specific substrates.
- Describe the role of enzymes as catalysts in controlling the rate of chemical reactions.
- Explain how enzymes can become denatured with pH and temperature changes.
- Explain how photosynthesis and cell respiration are complementary processes for cycling carbon dioxide and oxygen.
- Recognize the equations for photosynthesis and cell respiration, identifying the reactants and products.
- Discuss the capture, storage, transformation, and flow of energy through the processes of photosynthesis and cell respiration.
- Identify autotrophic organisms that use photosynthesis to convert light energy to chemical energy.
- Discuss the role of ATP in photosynthesis and cell respiration.
- Compare and contrast aerobic and anaerobic respiration and the products that result from each.

BIO.4 The student will investigate and understand relationships between cell structure and function.

- Summarize the discoveries and the contributions of scientists that led to the development of the cell theory.
- Compare and contrast characteristics of prokaryotic and eukaryotic cells including size, genetic material location, and membrane-bound organelles.
- Classify prokaryotic cells as either eubacteria or archaeobacteria.
- Compare and contrast plant and animal cells using the cell wall, chloroplast, and number of vacuoles.
- Describe the functions of the following cell structures: nucleus, ribosome, mitochondria, chloroplast, endoplasmic reticulum, Golgi body, lysosome, cell membrane, and cell wall.
- Explain the levels of organization (cells, tissues, organs, organ systems) that compose multicellular organisms.
- Explain that cell specialization occurs during the development of a multicellular organism and that the genetic information necessary for all cellular functions remains in each cell but may not be used.
- Identify and discuss the functions of the phospholipid bilayer, transport proteins, and cholesterol in the fluid mosaic model of the cell membrane.
- Define homeostasis.
- Explain how the ratio between a cell's volume and its surface area might impact the life of the cell.
- Explain how diffusion and osmosis occur in cells.
- Explain how endocytosis and exocytosis (both forms of active transport) occur in cells.

BIO.5 The student will investigate and understand life functions of archaeobacteria, (eubacteria), protists, fungi, plants and animals, including humans.

- Discuss how organisms vary between and within the kingdoms in terms of feeding relationships, multicellular vs. unicellular make-up, motility vs. non-motility, cellular structure, reproduction, and behavioral responses to their individual environments.
- Discuss how the body uses energy for repair, growth, and maintenance.

- Describe how respiration helps the body maintain homeostasis.
- Describe how the circulatory system transports substances and maintains homeostasis by increasing or decreasing blood flow and heart rate.
- Describe how the urinary system and intestinal tract dispose of waste.
- Describe how the skin and lungs rid the body of heat energy.
- Explain how the immune system protects the body from invaders and cancer cells.
- Explain how hormones and the nervous system allow for communication between cells.
- Describe how environmental factors and genetic predispositions can impact human health.
- Explain the unique characteristics of viruses including their basic structure and reproductive processes.

BIO.6 The student will investigate and understand common mechanisms of inheritance and protein synthesis.

- Discuss the mechanism of the cell cycle as a process of growth, development, and reproduction.
- Discuss the possible results of uncontrolled cell growth.
- Explain the importance of interphase as a part of the cell cycle.
- Define cytokinesis.
- Define gamete.
- Summarize the role of chromosomes during mitosis and describe basic chromosome structure.
- Diagram, label, and explain the events that occur during each phase of mitosis (prophase, metaphase, anaphase, and telophase).
- Compare and contrast mitosis and meiosis in terms of process, diploid vs. haploid number, and number of cells produced.
- Describe how the process of meiosis allows sexually reproducing organisms to produce genetically different offspring.
- Sequence the events of meiosis and explain how these events result in the formation of male and female gametes.
- Describe what happens to a fertilized egg after it begins dividing.
- Describe Mendel's experiments and discuss his results and conclusions.
- Discuss Mendel's laws of heredity and their basis in mathematical probability.
- Differentiate between genotype and phenotype, dominant and recessive, and heterozygous and homozygous.
- Predict the possible gametes in a dihybrid cross, given parental genotypes.
- Use a Punnett square to show the likelihood that particular combinations will occur in monohybrid and dihybrid crosses.
- Distinguish between incomplete dominance and co-dominance.
- Use the concept of multiple alleles to explain human phenotypes including blood types.
- Discuss sex-linked traits and use a Punnett square to illustrate why sex-linked traits appear more often in males than in females.
- Discuss how inserting, deleting, or substituting DNA bases can alter a gene, which in turn can alter a phenotype.
- Discuss how entire chromosomes can be added or deleted, resulting in a genetic disorder such as Trisomy 21 (Down Syndrome).
- Identify possible causes of gene and chromosomal mutations.
- Explain how human traits are inherited.
- Construct and draw a family pedigree to trace an inherited trait.
- Describe several genetic diseases and medical treatments presently known.

- Evaluate karyotype charts.
- Analyze the structure of DNA.
- Explain the process of DNA replication.
- Differentiate between RNA and DNA.
- Sequence the steps in protein synthesis using the processes of transcription and translation.
- Given a DNA sequence, be able to write a complementary mRNA strand.
- Discuss how DNA technologies allow scientists to identify, study, and modify genes.
- Explain how genetic engineering techniques are used in agriculture, basic research, and medicine.
- Discuss the uses and impact of inbreeding and selective breeding.
- Debate some of the ethical issues involved in human genetic engineering.
- Explore the use, limitations, and misuse of genetic information using examples from Eugenics, the Human Genome Project, and cloning.

BIO.7 The student will investigate and understand the basis for modern classification systems.

- Use binomial nomenclature to identify a species.
- Define species.
- Construct and use a dichotomous key to classify objects or organisms.
- Compare and contrast the characteristics of organisms within the five kingdoms.
- Use homologous structures to interpret relationships between organisms.
- Compare modern organisms with extinct organisms utilizing the fossil record.
- Discuss similarities in embryonic development within the animal kingdom.
- Interpret a cladogram or phylogenetic tree to show evolutionary relationships among organisms.
- Determine relationships between organisms using biochemical similarities or differences.
- Analyze the absolute or relative age of a fossil given information about its position in rock or radioactive decay data.
- Explain that scientists have used the fossil record to construct a history of life on Earth.
- Discuss how systems of classification are adaptable to new scientific discoveries.

BIO.8 The student will investigate and understand how populations change through time.

- Describe how eukaryotic and prokaryotic cells might have evolved.
- Explain that organisms with certain genetic variations will be favored to survive and pass their traits on to the next generation.
- Discuss the observations Charles Darwin made in the Galapagos Islands.
- Compare Lamarck's and Darwin's theories of evolution.
- Differentiate between divergent and convergent evolution.
- Define population.
- Explain how natural selection over many generations can cause changes in populations and the emergence of new species.
- Explain the impact of mutations on a population's gene pool.
- Explain the Hardy-Weinberg principle in general terms and the conditions under which it applies.
- Discuss adaptations including antibiotic resistance, pesticide resistance, and morphological changes as shown in the peppered moth example.
- Contrast Stephen J. Gould's idea of punctuated equilibrium with the concept of gradualism.

BIO.9 The student will investigate and understand dynamic equilibria within populations, communities and ecosystems.

- Distinguish between populations, communities, and ecosystems.
- Graph and interpret population growth curves.
- Compare and contrast exponential and linear population growth.
- Discuss limiting factors on the growth of a population.
- Define carrying capacity.
- Explain the difference between a niche and a habitat.
- Discuss mutualistic, commensalistic, and parasitic symbiotic relationships.
- Differentiate between abiotic and biotic factors.
- Discuss how nutrients cycle through an ecosystem.
- Use a food web or food pyramid to describe the trophic levels in an ecosystem.
- Analyze succession patterns in an ecosystem.
- Identify a climax community.
- Discuss the impact of human activities on Earth's land, oceans, and atmosphere.
- Discuss trends in the growth of the human population.
- Observe organisms in Virginia's ecosystems, including the Chesapeake Bay and its tributaries.

## Chemistry Objectives

- CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed, and evaluated, produce observations and verifiable data.
- Measure length, volume, mass, temperature, time, and pressure to the correct number of significant digits.
  - Use chemicals properly.
  - Identify, locate, and be able to use laboratory safety equipment.
  - Demonstrate the safe lighting and handling of a burner, filtering, decanting, and use of chromatography.
  - Identify basic laboratory equipment.
  - Demonstrate correct handling and storage of glassware.
  - Understand Material Safety Data Sheet information.
  - Demonstrate safe laboratory practice, procedures, and techniques.
  - Conduct an experiment having one or two independent variables and write a formal report of the research.
  - Use data tables to record and organize measurements.
  - Use repeated trials during experimentation to ensure verifiable data.
  - Predict outcomes when a variable is changed.
  - Demonstrate precision and accuracy in measurement.
  - Discover and eliminate procedural errors.
  - Calculate percent error.
  - Express measurements in appropriate SI units.
  - Construct graphs to summarize relationships including the dependent variable, independent variable, scale and units, and best fit curve (regression line).
  - Calculate mole ratios, percent composition, conversions, and relative atomic mass.
  - Correctly use graphing calculators and probeware.
  - Read a measurement from a graduated scale.
  - Use dimensional analysis to solve problems, reporting answers in scientific notation and correct number of significant digits.
  - Determine the mean of a set of measurements.
  - Explain the emergence of modern theories based on historical development.
- CH.2 The student will investigate and understand that the placement of elements on the periodic table is a function of their atomic structure.
- Discuss that all atoms of the same element have the same number of protons and that in a neutral atom, the number of electrons is the same as the number of protons.
  - Describe electrons, neutrons, and protons.
  - Define atomic number, mass number, isotope, and half-life.
  - Describe alpha, beta, and gamma radiation with respect to penetrating power, shielding, and composition.
  - Use the periodic table to determine mass and atomic number of elements.
  - List the major groups and periods of the periodic table and give examples of common properties.
  - Identify the elements that occur naturally as diatomic molecules.
  - Define and identify trends within the periodic table including atomic radius, electronegativity, reactivity, ionization energy, and shielding effect.
  - Locate electrons in orbitals and energy levels and specify their quantum numbers using electron configurations and orbital diagrams.

- Explain that atoms can gain, lose, or share electrons within the outer energy level.
- Differentiate between elements, compounds, mixtures, and solutions.
- Identify and classify chemical and physical properties of elements.
- Explain how discoveries have changed the model of the atom over time.
- Relate the work of early atomic physicists to the Quantum Mechanical Model.

CH.3 The student will investigate and understand how conservation of energy and matter is expressed in chemical formulas and balanced equations.

- Use empirical, molecular, and structural formulas to represent a compound.
- Differentiate between ionic and covalent bonds.
- Demonstrate the conservation of matter in balanced chemical equations.
- Use chemical formulas (with appropriate subscripts) to represent compounds.
- Discuss how ionization energy impacts the creation of anions and cations.
- Explain how polar molecules are formed.
- Give the name and charge for common polyatomic ion groups.
- Use the IUPAC system for naming compounds.
- Know the chemical formulas for common substances such as ammonia, water, carbon monoxide, carbon dioxide, sulfur dioxide, and carbon tetrafluoride.
- Draw Lewis diagrams to show covalent bonding.
- Identify and give examples of synthesis, decomposition, single replacement, double replacement and neutralization reactions.
- Differentiate between exothermic and endothermic reactions.
- Describe how catalysts decrease the activation energy needed for a reaction to occur.
- Explain how entropy and enthalpy affect the spontaneity of a reaction.
- Describe the factors affecting reaction rate.
- Describe factors affecting chemical equilibrium and predict the resulting changes in the chemical system.
- Identify oxidation-reduction reactions and the corresponding oxidizing and reducing agents.
- Interpret reaction rate diagrams.

CH.4 The student will investigate and understand that quantities in a chemical reaction are based on molar relationships.

- Define the mole, Avogadro's number, and Avogadro's principle.
- Find the molar mass of a substance using information from the periodic table.
- Use stoichiometry to calculate the following relationships:
  - mole-mole
  - mass-mass
  - mole-mass
  - mass-volume
  - mole-volume
  - volume-volume
  - particle-particle
- Identify the limiting reagent in a reaction.
- Calculate percent yield of a reaction.
- Find the percent composition and empirical formula for compounds.
- Use Dalton's law to calculate partial pressure.
- Calculate the temperature of a gas with changing volume and pressure.
- Calculate the volume of a gas with changing temperature and pressure.
- Use the Ideal Gas Law to solve problems.

- Calculate the concentration of a solution using molarity, percent solutions, and dilutions.
- Identify the solute and solvent in a solution.
- Define Arrhenius and Bronsted-Lowry acids and bases and list properties of each.
- Write acid and base equations and predict the salts that will form.
- Calculate pH and pOH.
- Use indicators to determine the pH of unknown and known solutions.
- Use the process of titration to demonstrate the neutralization of acids and bases.
- Explain that strong electrolytes dissociate completely and weak electrolytes dissociate partially.

CH.5 The student will investigate and understand that the phases of matter are explained by kinetic theory and forces of attraction between particles.

- Describe how pressure, temperature, and volume changes can cause a change in physical state.
- Explain the forces of attraction including hydrogen bonding, dipole-dipole attraction, and van der Waals forces.
- Explain how intermolecular forces determine vapor pressure.
- Describe molecular motion during a phase change using the Kinetic Molecular Theory.
- Explain how boiling point and freezing point are affected by changes in atmospheric pressure and the presence of certain solutes.
- Use phase diagrams to discuss various compounds' behaviors at different pressures and temperatures.
- Determine the specific heat capacity of a substance.
- List factors affecting solubility.
- Calculate energy changes using molar heat of fusion and molar heat of vaporization.
- Perform calorimetry calculations.
- Recognize polar molecules and nonpolar molecules.

## Physics Objectives

- PH.1 The student will investigate and understand how to plan and conduct investigations.
- Use appropriate instruments to measure displacement, time, mass, volume, temperature, heat exchange, energy transformations, motion, and electric charge.
  - Determine percent error from experimental and theoretical values.
  - Follow safe practices in all laboratory procedures.
  - Use tables and graphs to interpret and organize data.
  - Use appropriate SI units for measurements and calculations.
  - Use significant digits when reporting or analyzing data.
  - Distinguish between accuracy and precision.
  - Identify the components in an experimental design.
  - Convert numbers into/out of scientific notation and add, subtract, multiply, and divide numbers in scientific notation.
  - Recognize experimental limitations due to instruments and design, and suggest improvements.
- PH.2 The student will investigate and understand how to analyze and interpret data.
- Use dimensional analysis to verify the appropriateness of units.
  - Apply inferential statistical tests to evaluate experimental data.
  - Recognize linear, quadratic, and inverse relationships in graphed data.
  - Interpret position-time, velocity-time, and acceleration-time graphs and use to make predictions.
  - Calculate the area under the curve of a velocity-time graph and interpret it.
  - Make predictions based on trends in data.
  - Determine slope of a straight line through experimental data points.
  - Combine and resolve vectors into components.
  - Sketch vectors and trigonometrically solve for the resultant.
  - Show an ability to add vectors by the graphical method.
- PH.3 The student will investigate and understand how to demonstrate scientific reasoning and logic.
- Using a current literature review of primary sources, develop background information pertaining to a particular topic about which conclusions will be drawn.
  - Collect and analyze experimental data to predict relationships.
  - Compare and contrast experimental data analysis to background information to justify findings.
  - Examine how new discoveries result in the modification of existing theories and the establishment of new paradigms.
- PH.4 The student will investigate and understand how applications of physics affect the world.
- Identify the contributions, discoveries, and inventions of scientists who have influenced the advancement of the sciences and society.
  - Identify and describe current research in the sciences as it pertains to principles being studied.

PH.5 The student will investigate and understand the interrelationships among mass, distance, force, and time through mathematical and experimental processes.

- Solve motion problems in one and two dimensions, utilizing trigonometry.
- Distinguish scalar from vector quantities.
- Distinguish distance from displacement.
- Define, using examples, and/or calculate instantaneous, average, initial and final velocities.
- Define, using examples, and/or calculate acceleration, both positive and negative.
- Recognize situations with zero velocity with nonzero acceleration and vice versa.
- Write the equations relating distance, velocity, and acceleration, and be able to use them in the solution of problems.
- Recognize situations with the acceleration due to gravity and be able to use this value in the acceleration equations.
- State the conditions for equilibrium.
- Resolve vectors into perpendicular components. Recognize the independence of perpendicular components. Apply to appropriate situations.
- Given a projectile-type problem, write equations for the horizontal and vertical components of velocity and position as functions of time. Solve for range, trajectory, height of the projectile, and time of flight.
- Distinguish between centripetal and centrifugal force.
- State Newton's laws of motion and solve problems involving force, mass, and acceleration.
- Demonstrate an understanding of the nature of frictional forces. Be able to use the coefficient of friction in solving problems.
- Explain that for small angles of oscillation, a pendulum exhibits simple harmonic motion.
- Draw a fully labeled free-body diagram showing all the forces on the body.
- Apply Newton's law of gravitation to calculate the force that one spherical mass exerts on another.
- Apply Newton's second law to circular motion and celestial mechanics.
- Calculate work for force and distance.
- Explain that energy is the capacity to do work. When work is done, energy converts from one form to another and energy is conserved.
- Utilize the relationship between work and power.

PH.6 The student will investigate and understand that quantities including mass, energy, momentum, and charge are conserved.

- Define energy.
- Cite the relationship between work and energy.
- Define and calculate the two forms of energy: kinetic and gravitational potential.
- Relate work to kinetic and gravitational potential energy.
- State the law of conservation of energy; solve problems involving energy transfers.
- Define electric power, current, and voltage.
- Define linear momentum and impulse.
- Describe the difference between elastic and inelastic collisions and how energy and momentum are affected in both types.

PH.7 The student will investigate and understand properties of fluids.

- Demonstrate an understanding of the concept of pressure.
- Demonstrate the ability to calculate pressure and total force.
- Understand Pascal's and Archimedes's Principles and their applications.
- Explain Bernoulli's Principle and its applications.

PH.8 The student will investigate and understand that energy can be transferred and transformed to provide usable work.

- Discuss ways in which various forms of energy can be transformed.
- Using the law of conservation of energy, solve problems relating KE, GPE, thermal energy, and electric potential energy.
- Describe the different types of simple machines.
- Compute the efficiency of simple machines.

PH.9 The student will investigate and understand how to use models of transverse and longitudinal waves to interpret wave phenomena.

- Apply the theory of simple harmonic motion to a pendulum and mass on a string.
- Distinguish between longitudinal and transverse waves.
- Define wavelength and frequency.
- Solve problems involving frequency, period, wavelength, and velocity.
- Define the dependence of the speed of a wave on the medium.
- Discuss the behavior of waves at the boundaries between media.
- State the principles of superposition; define constructive and destructive interference.
- Define node and antinode as they relate to resonance.
- State the law of reflection.
- Define diffraction.
- List the properties of sound waves, using the terms pitch and intensity or loudness.
- Relate the Doppler effect to everyday situations.
- Recognize the source of beat notes and define overtones.
- Demonstrate an understanding of the polarization of light.
- Define refraction and predict the bending of light as it crosses a boundary.

PH.10 The student will investigate and understand that different frequencies and wavelengths in the electromagnetic spectrum are phenomena ranging from radio waves through visible light to gamma radiation.

- State the wavelength and frequency range of light as an electromagnetic wave.
- Rank the types of electromagnetic waves by wavelength or frequency and list applications for each.
- Identify electromagnetic waves by the corresponding wavelength or frequency.

PH.11 The student will investigate and understand how light behaves in the fundamental processes of reflection, refraction, and image formation in describing optical systems.

- Construct and interpret a ray diagram produced by a plane mirror.
- State and apply Snell's law.
- Relate the index of refraction to the speed of light in the medium.
- Explain total internal reflection and the critical angle.
- Construct and interpret ray diagrams to locate images produced by a concave or convex mirror.
- Define focal point.

- Calculate image location for mirrors and lenses using the mirror/lens equation.
- Distinguish between real and virtual images.
- Distinguish between converging and diverging lenses.
- Calculate the image height or magnification using the magnification equation.

PH.12 The student will investigate and understand how to use the field concept to describe the effects of gravitational, electric, and magnetic forces.

- Compare and contrast the formulas for gravitational and electric fields, with respect to the inverse square law.
- Determine the force that acts between point charges, and describe the electric field of a single point charge.
- Use vector addition to determine the electric field produced by two or more point charges.
- Define electric field in terms of the force on a test charge.
- Calculate the magnitude and direction of the force on a positive or negative charge in a field.
- Analyze the motion of a charged particle and mass in a uniform electric field.
- Determine the force that one spherical mass exerts on another.
- Determine the strength of the gravitational field at a point outside a spherical mass.
- Calculate the magnitude and direction of the magnetic force in terms of  $q$ ,  $V$ , and  $B$ .
- Deduce the direction of magnetic field from information about the forces experienced by charged particles moving through the field.
- Recognize that electric currents produce magnetic fields; describe the field around a current-carrying wire using the right hand rule.
- Explain the generation of current by a rotating armature in an electric generator.

PH.13 The student will investigate and understand how to diagram and construct basic electrical circuits and explain the function of various circuit components.

- Identify series and parallel resistors on a circuit diagram.
- Determine the relationship of the voltages across resistors in series or parallel.
- Calculate the equivalent resistance of two or more resistors connected in series, in parallel, or of a combination of resistors in parallel and series.
- Design a simple series and/or parallel circuit.
- Draw a schematic for a series and parallel circuit using conventional symbols.
- Calculate the terminal voltage of a battery of specified EMF and internal resistance from which a known current is flowing.
- Apply Ohm's Law and Kirchhoff's rule to DC circuits to determine an unknown current, voltage, or resistance.
- Demonstrate correct methods of connecting meters into circuits to measure voltage or current.
- Calculate the power of different electrical devices and the cost per kW-h.

PH.14 The student will investigate and understand that extremely large and extremely small quantities are not necessarily described by the same laws as those studied in Newtonian physics.

- Determine what fraction of the nuclei in an isotope has decayed after a given time has elapsed, based on the half life for the isotope.
- Differentiate between fission and fusion.
- Use conservation of mass number and charge of a nucleus after it has undergone a decay process.
- Explain time dilation in reference to stationary and moving observers.
- Describe the photoelectric effect and explain what observations provide evidence for the photon nature of light.
- Calculate the total energy of a moving particle in terms of its rest mass and speed.
- Determine the energy of vibration of an atom in terms of  $n$ ,  $h$ ,  $f$ .
- Explain electromagnetic radiation in terms of when photons are emitted as proposed by Max Planck.
- Use  $E = mc^2$  to determine the energy equivalent of a given mass.
- Calculate the energy released by an electron returning to its ground state from an energized state.
- Distinguish between the Bohr atom and Heisenberg's theory regarding electron orbit.
- Define: proton, atomic mass unit, atomic number, electron, neutron, isotopes, and mass number. Use these to solve nuclear problems.

## *World History and Geography to 1500 A.D. Objectives*

- WHI.1 The student will improve skills in historical research and geographical analysis by
- identifying, analyzing, and interpreting primary and secondary sources to make generalizations about events and life in world history to 1500 A.D.;
  - using maps, globes, artifacts, and pictures to analyze the physical and cultural landscapes of the world and interpret the past to 1500 A.D.;
  - identifying major geographic features important to the study of world history to 1500 A.D.;
  - identifying and comparing political boundaries with the location of civilizations, empires, and kingdoms from 4000 B.C. to 1500 A.D.;
  - analyzing trends in human migration and cultural interaction from prehistory to 1500 A.D.

Era I: Human Origins and Early Civilizations, Prehistory to 1000 B.C.

- WHI.2 The student will demonstrate knowledge of early development of humankind from the Paleolithic Era to the agricultural revolution by
- explaining the impact of geographic environment on hunter-gatherer societies;
  - listing characteristics of hunter-gatherer societies, including their use of tools and fire;
  - describing technological and social advancements that gave rise to stable communities;
  - explaining how archaeological discoveries are changing present-day knowledge of early peoples.

- WHI.3 The student will demonstrate knowledge of ancient river valley civilizations, including Egypt, Mesopotamia, the Indus River Valley, and China and the civilizations of the Hebrews, Phoenicians, and Kush, by
- locating these civilizations in time and place;
  - describing the development of social, political, and economic patterns, including slavery;
  - explaining the development of religious traditions;
  - describing the origins, beliefs, traditions, customs, and spread of Judaism;
  - explaining the development of language and writing.

Era II: Classical Civilizations and Rise of Religious Traditions, 1000 B.C. to 500 A.D.

- WHI.4 The student will demonstrate knowledge of the civilizations of Persia, India, and China in terms of chronology, geography, social structures, government, economy, religion, and contributions to later civilizations by
- describing Persia, with emphasis on the development of an imperial bureaucracy;
  - describing India, with emphasis on the Aryan migrations and the caste system;
  - describing the origins, beliefs, traditions, customs, and spread of Hinduism;
  - describing the origins, beliefs, traditions, customs, and spread of Buddhism;
  - describing China, with emphasis on the development of an empire and the construction of the Great Wall;
  - describing the impact of Confucianism, Taoism, and Buddhism.

- WHI.5 The student will demonstrate knowledge of ancient Greece in terms of its impact on Western civilization by
- assessing the influence of geography on Greek economic, social, and political development, including the impact of Greek commerce and colonies;
  - describing Greek mythology and religion;

- identifying the social structure and role of slavery, explaining the significance of citizenship and the development of democracy, and comparing the city-states of Athens and Sparta;
- evaluating the significance of the Persian and Peloponnesian Wars;
- characterizing life in Athens during the Golden Age of Pericles;
- citing contributions in drama, poetry, history, sculpture, architecture, science, mathematics, and philosophy, with emphasis on Socrates, Plato, and Aristotle;
- explaining the conquest of Greece by Macedonia and the spread of Hellenistic culture by Alexander the Great.

WHI.6 The student will demonstrate knowledge of ancient Rome from about 700 B.C. to 500 A.D. in terms of its impact on Western civilization by

- assessing the influence of geography on Roman economic, social, and political development;
- describing Roman mythology and religion;
- explaining the social structure and role of slavery, significance of citizenship, and the development of democratic features in the government of the Roman Republic;
- sequencing events leading to Roman military domination of the Mediterranean basin and Western Europe and the spread of Roman culture in these areas;
- assessing the impact of military conquests on the army, economy, and social structure of Rome;
- assessing the roles of Julius and Augustus Caesar in the collapse of the Republic and the rise of imperial monarchs;
- explaining the economic, social, and political impact of the Pax Romana;
- describing the origin, beliefs, traditions, customs, and spread of Christianity;
- explaining the development and significance of the Church in the late Roman Empire;
- listing contributions in art and architecture, technology and science, medicine, literature and history, language, religious institutions, and law;
- citing the reasons for the decline and fall of the Western Roman Empire.

Era III: Postclassical Civilizations, 500 to 1000 A.D.

WHI.7 The student will demonstrate knowledge of the Byzantine Empire and Russia from about 300 to 1000 A.D. by

- explaining the establishment of Constantinople as the capital of the Eastern Roman Empire;
- identifying Justinian and his contributions, including the codification of Roman law, and describing the expansion of the Byzantine Empire and economy;
- characterizing Byzantine art and architecture and the preservation of Greek and Roman traditions;
- explaining disputes that led to the split between the Roman Catholic Church and the Greek Orthodox Church;
- assessing the impact of Byzantine influence and trade on Russia and Eastern Europe.

WHI.8 The student will demonstrate knowledge of Islamic civilization from about 600 to 1000 A.D. by

- describing the origin, beliefs, traditions, customs, and spread of Islam;
- assessing the influence of geography on Islamic economic, social, and political development, including the impact of conquest and trade;
- identifying historical turning points that affected the spread and influence of Islamic civilization, with emphasis on the Sunni-Shi'a division and the Battle of Tours;
- citing cultural and scientific contributions and achievements of Islamic civilization.

WHI.9 The student will demonstrate knowledge of Western Europe during the Middle Ages from about 500 to 1000 A.D. in terms of its impact on Western civilization by

- sequencing events related to the spread and influence of Christianity and the Catholic Church throughout Europe;
- explaining the structure of feudal society and its economic, social, and political effects;
- explaining the rise of Frankish kings, the Age of Charlemagne, and the revival of the idea of the Roman Empire;
- sequencing events related to the invasions, settlements, and influence of migratory groups, including Angles, Saxons, Magyars, and Vikings.

Era IV: Regional Interactions, 1000 to 1500 A.D.

WHI.10 The student will demonstrate knowledge of civilizations and empires of the Eastern Hemisphere and their interactions through regional trade patterns by

- locating major trade routes;
- identifying technological advances and transfers, networks of economic interdependence, and cultural interactions;
- describing Japan, with emphasis on the impact of Shinto and Buddhist traditions and the influence of Chinese culture;
- describing east African kingdoms of Axum and Zimbabwe and west African civilizations of Ghana, Mali, and Songhai in terms of geography, society, economy, and religion.

WHI.11 The student will demonstrate knowledge of major civilizations of the Western Hemisphere, including the Mayan, Aztec, and Incan, by

- describing geographic relationship, with emphasis on patterns of development in terms of climate and physical features;
- describing cultural patterns and political and economic structures.

WHI.12 The student will demonstrate knowledge of social, economic, and political changes and cultural achievements in the late medieval period by

- describing the emergence of nation-states (England, France, Spain, and Russia) and distinctive political developments in each;
- explaining conflicts among Eurasian powers, including the Crusades, the Mongol conquests, and the fall of Constantinople;
- identifying patterns of crisis and recovery related to the Black Death;
- explaining the preservation and transfer to Western Europe of Greek, Roman, and Arabic philosophy, medicine, and science.

WHI.13 The student will demonstrate knowledge of developments leading to the Renaissance in Europe in terms of its impact on Western civilization by

- identifying the economic foundations of the Renaissance;
- sequencing events related to the rise of Italian city-states and their political development, including Machiavelli's theory of governing as described in *The Prince*;
- citing artistic, literary, and philosophical creativity, as contrasted with the medieval period, including Leonardo da Vinci, Michelangelo, and Petrarch;
- comparing the Italian and the Northern Renaissance, and citing the contributions of writers.

## ***World History and Geography: 1500 A.D. to the Present Objectives***

- WHII.1 The student will improve skills in historical research and geographical analysis by
- identifying, analyzing, and interpreting primary and secondary sources to make generalizations about events and life in world history since 1500 A.D.;
  - using maps, globes, artifacts, and pictures to analyze the physical and cultural landscapes of the world and to interpret the past since 1500 A.D.;
  - identifying geographic features important to the study of world history since 1500 A.D.;
  - identifying and comparing political boundaries with the location of civilizations, empires, and kingdoms from 1500 A.D. to the present;
  - analyzing trends in human migration and cultural interaction from 1500 A.D. to the present.
- WHII.2 The student will demonstrate an understanding of the political, cultural, and economic conditions in the world about 1500 A.D. by
- locating major states and empires;
  - describing artistic, literary, and intellectual ideas of the Renaissance;
  - describing the distribution of major religions;
  - analyzing major trade patterns;
  - citing major technological and scientific exchanges in the Eastern Hemisphere.
- Era V: Emergence of a Global Age, 1500 to 1650 A.D.
- WHII.3 The student will demonstrate knowledge of the Reformation in terms of its impact on Western civilization by
- explaining the effects of the theological, political, and economic differences that emerged, including the views and actions of Martin Luther, John Calvin, and Henry VIII;
  - describing the impact of religious conflicts, including the Inquisition, on society and government actions;
  - describing changing cultural values, traditions, and philosophies, and assessing the role of the printing press.
- WHII.4 The student will demonstrate knowledge of the impact of the European Age of Discovery and expansion into the Americas, Africa, and Asia by
- explaining the roles of explorers and conquistadors;
  - describing the influence of religion;
  - explaining migration, settlement patterns, cultural diffusion, and social classes in the colonized areas;
  - defining the Columbian Exchange;
  - explaining the triangular trade;
  - describing the impact of precious metal exports from the Americas.
- WHII.5 The student will demonstrate knowledge of the status and impact of global trade on regional civilizations of the world after 1500 A.D. by
- describing the location and development of the Ottoman Empire;
  - describing India, including the Mughal Empire and coastal trade;
  - describing East Asia, including China and the Japanese shogunate;
  - describing Africa and its increasing involvement in global trade;
  - describing the growth of European nations, including the Commercial Revolution and mercantilism.

Era VI: Age of Revolutions, 1650 to 1914 A.D.

WHII.6 The student will demonstrate knowledge of scientific, political, economic, and religious changes during the sixteenth, seventeenth, and eighteenth centuries by

- describing the Scientific Revolution and its effects;
- describing the Age of Absolutism, including the monarchies of Louis XIV, Frederick the Great, and Peter the Great;
- assessing the impacts of the English Civil War and the Glorious Revolution on democracy;
- explaining the political, religious, and social ideas of the Enlightenment and the ways in which they influenced the founders of the United States;
- describing the French Revolution;
- identifying the impact of the American and French Revolutions on Latin America;
- describing the expansion of the arts, philosophy, literature, and new technology.

WHII.7 The student will demonstrate knowledge of political and philosophical developments in Europe during the nineteenth century by

- assessing the impact of Napoleon and the Congress of Vienna, including changes in political boundaries in Europe after 1815;
- describing the influence of revolutions on the expansion of political rights in Europe;
- explaining events related to the unification of Italy and the role of Italian nationalists;
- explaining events related to the unification of Germany and the role of Bismarck.

WHII.8 The student will demonstrate knowledge of the effects of the Industrial Revolution during the nineteenth century by

- citing scientific, technological, and industrial developments and explaining how they brought about urbanization and social and environmental changes;
- explaining the emergence of capitalism as a dominant economic pattern, and subsequent development of socialism and communism;
- describing the evolution of the nature of work and the labor force, including its effects on families, the status of women and children, the slave trade, and the labor union movement;
- explaining the rise of industrial economies and their link to imperialism and nationalism;
- assessing the impact of European economic and military power on Asia and Africa, with emphasis on the competition for resources and the responses of colonized peoples.

Era VII: Era of Global Wars, 1914 to 1945

WHII.9 The student will demonstrate knowledge of the worldwide impact of World War I by

- explaining economic and political causes, major events, and identifying major leaders of the war, with emphasis on Woodrow Wilson and Kaiser Wilhelm II;
- explaining the outcomes and global effect of the war and the Treaty of Versailles;
- citing causes and consequences of the Russian Revolution.

WHII.10 The student will demonstrate knowledge of political, economic, social, and cultural developments during the Interwar Period by

- describing the League of Nations and the mandate system;
- citing causes and assessing the impact of worldwide depression in the 1930s;
- examining events related to the rise, aggression, and human costs of dictatorial regimes in the Soviet Union, Germany, Italy, and Japan, and identifying their major leaders, i.e., Joseph Stalin, Adolf Hitler, Benito Mussolini, Hirohito, and Hideki Tojo.

WHII.11 The student will demonstrate knowledge of the worldwide impact of World War II by

- explaining economic and political causes, major events, and identifying leaders of the war, with emphasis on Franklin D. Roosevelt, Harry Truman, Dwight D. Eisenhower, Douglas MacArthur, George Marshall, Winston Churchill, Joseph Stalin, Adolf Hitler, Hideki Tojo, and Hirohito;
- examining the Holocaust and other examples of genocide in the twentieth century;
- explaining the terms of the peace, the war crimes trials, the division of Europe, plans to rebuild Germany and Japan, and the creation of international cooperative organizations.

Era VIII: The Post War Period, 1945 to the Present

WHII.12 The student will demonstrate knowledge of major events and outcomes of the Cold War by

- explaining key events of the Cold War, including the competition between the American and Soviet economic and political systems and the causes of the collapse of communism in the Soviet Union and Eastern Europe;
- assessing the impact of nuclear weaponry on patterns of conflict and cooperation since 1945;
- describing conflicts and revolutionary movements in eastern Asia, including those in China and Vietnam, and their major leaders, i.e., Mao Tse-tung (Zedong), Chiang Kai-shek, and Ho Chi Minh.

WHII.13 The student will demonstrate knowledge of political, economic, social, and cultural aspects of independence movements and development efforts by

- describing the struggles for self-rule, including Gandhi's leadership in India;
- describing Africa's achievement of independence, including Kenyatta's leadership of Kenya;
- describing the end of the mandate system and the creation of states in the Middle East.

WHII.14 The student will demonstrate knowledge of the influence of Judaism, Christianity, Islam, Buddhism, and Hinduism in the contemporary world by

- describing their beliefs, sacred writings, traditions, and customs;
- locating the geographic distribution of religions in the contemporary world.

WHII.15 The student will demonstrate knowledge of cultural, economic, and social conditions in developed and developing nations of the contemporary world by

- identifying contemporary political issues, with emphasis on migrations of refugees and others, ethnic/religious conflicts, and the impact of technology, including chemical and biological technologies;
- assessing the impact of economic development and global population growth on the environment and society, including an understanding of the links between economic and political freedom;
- describing economic interdependence, including the rise of multinational corporations, international organizations, and trade agreements.

## *Modern Global Studies Objectives*

- MGS.1 The student will use maps, globes, photographs, and pictures in order to
- obtain geographical information and apply the concepts of location, scale, and orientation;
  - develop and refine his or her mental maps of world regions;
  - create and compare political, physical, and thematic maps;
  - analyze and explain how different cultures develop different perspectives on the world and its problems;
  - recognize different map projections and explain the concept of distortion.
- MGS.2 The student will analyze how selected physical and ecological processes shape the Earth's surface by
- identifying regional climatic patterns and weather phenomena and their effects on people and places;
  - describing how humans influence the environment and are influenced by it;
  - explaining how technology affects one's ability to modify the environment and adapt to it.
- MGS.3 The student will apply the concept of a region by
- explaining how characteristics of regions have led to regional labels;
  - explaining how regional landscapes reflect cultural characteristics of their inhabitants;
  - analyzing how cultural characteristics, including the world's major languages and religions, link or divide regions.
- MGS.4 The student will locate and analyze physical, economic, and cultural characteristics of world regions: Latin America and the Caribbean, Europe, United States and Canada, North Africa and Southwest Asia, Sub-Saharan Africa, Russia and Central Asia, South Asia, Southeast Asia, East Asia, Australia and the Pacific Islands, and Antarctica.
- MGS.5 The student will compare and contrast the distribution, growth rates, and characteristics of human population in terms of settlement patterns and the location of natural and capital resources.
- MGS.6 The student will analyze past and present trends in human migration and cultural interaction as they are influenced by social, economic, political, and environmental factors.
- MGS.7 The student will identify natural, human, and capital resources and explain their significance by
- showing patterns of economic activity and land use;
  - evaluating perspectives and consequences regarding the use of resources.
- MGS.8 The student will distinguish between developed and developing countries and relate the level of economic development to the standard of living and quality of life.
- MGS.9 The student will analyze the global patterns and networks of economic interdependence by
- identifying criteria that influence economic activities;
  - explaining comparative advantage and its relationship to international trade;
  - describing ways that economic and social interactions have changed over time;
  - describing and evaluating the formation of economic unions.

- MGS.10 The student will analyze how the forces of conflict and cooperation affect the division and control of the Earth's surface by
- explaining and analyzing reasons for the different spatial divisions at the local and regional levels;
  - explaining and analyzing the different spatial divisions at the national and international levels;
  - analyzing ways cooperation occurs to solve problems and settle disputes.
- MGS.11 The student will analyze the patterns of urban development by
- applying the concepts of site and situation to major cities in each region;
  - explaining how the functions of towns and cities have changed over time;
  - describing the unique influence of urban areas and some challenges they face.
- MGS.12 The student will apply geography to interpret the past, understand the present, and plan for the future by
- using geographic knowledge, skills, and perspectives to analyze problems and make decisions;
  - relating current events to the physical and human characteristics of places and regions.

## *Virginia and United States History Objectives*

### Skills

VUS.1 The student will demonstrate skills for historical and geographical analysis, including the ability to

- identify, analyze, and interpret primary and secondary source documents, records, and data, including artifacts, diaries, letters, photographs, journals, newspapers, historical accounts, and art to increase understanding of events and life in the United States;
- evaluate the authenticity, authority, and credibility of sources;
- formulate historical questions and defend findings based on inquiry and interpretation;
- develop perspectives of time and place, including the construction of maps and various time lines of events, periods, and personalities in American history;
- communicate findings orally and in analytical essays and/or comprehensive papers;
- develop skills in discussion, debate, and persuasive writing with respect to enduring issues and determine how divergent viewpoints have been addressed and reconciled;
- apply geographic skills and reference sources to understand how relationships between humans and their environment have changed over time;
- interpret the significance of excerpts from famous speeches and other documents.

### Early America: Early Claims, Early Conflicts

VUS.2 The student will describe how early European exploration and colonization resulted in cultural interactions among Europeans, Africans, and American Indians (First Americans).

VUS.3 The student will describe how the values and institutions of European economic life took root in the colonies and how slavery reshaped European and African life in the Americas.

### Revolution and the New Nation

VUS.4 The student will demonstrate knowledge of events and issues of the Revolutionary Period by

- analyzing how the political ideas of John Locke and those expressed in *Common Sense* helped shape the Declaration of Independence;
- describing the political differences among the colonists concerning separation from Britain;
- analyzing reasons for colonial victory in the Revolutionary War.

VUS.5 The student will demonstrate knowledge of the issues involved in the creation and ratification of the United States Constitution and how the principles of limited government, consent of the governed, and the social contract are embodied in it by

- explaining the origins of the Constitution, including the Articles of Confederation;
- identifying the major compromises necessary to produce the Constitution, and the roles of James Madison and George Washington;
- describing the conflict over ratification, including the Bill of Rights and the arguments of the Federalists and Anti-Federalists;
- examining the significance of the Virginia Declaration of Rights and the Virginia Statute for Religious Freedom in the framing of the Bill of Rights.

## Expansion and Reform: 1801 to 1860

VUS.6 The student will demonstrate knowledge of the major events during the first half of the nineteenth century by

- identifying the economic, political, and geographic factors that led to territorial expansion and its impact on the American Indians (First Americans);
- describing the key features of the Jacksonian Era, with emphasis on federal banking policies;
- describing the cultural, economic, and political issues that divided the nation, including slavery, the abolitionist and women's suffrage movements, and the role of the states in the Union.

## Civil War and Reconstruction: 1860 to 1877

VUS.7 The student will demonstrate knowledge of the Civil War and Reconstruction Era and its importance as a major turning point in American history by

- identifying the major events and the roles of key leaders of the Civil War Era, with emphasis on Abraham Lincoln, Ulysses S. Grant, Robert E. Lee, and Frederick Douglass;
- analyzing the significance of the Emancipation Proclamation and the principles outlined in Lincoln's Gettysburg Address;
- examining the political, economic, and social impact of the war and Reconstruction, including the adoption of the 13th, 14th, and 15th Amendments to the Constitution of the United States.

## Reshaping the Nation and the Emergence of Modern America: 1877 to 1930s

VUS.8 The student will demonstrate knowledge of how the nation grew and changed from the end of Reconstruction through the early twentieth century by

- explaining the relationship among territorial expansion, westward movement of the population, new immigration, growth of cities, and the admission of new states to the Union;
- describing the transformation of the American economy from a primarily agrarian to a modern industrial economy and identifying major inventions that improved life in the United States;
- analyzing prejudice and discrimination during this time period, with emphasis on "Jim Crow" and the responses of Booker T. Washington and W.E.B. Du Bois;
- identifying the impact of the Progressive Movement, including child labor and antitrust laws, the rise of labor unions, and the success of the women's suffrage movement.

VUS.9 The student will demonstrate knowledge of the emerging role of the United States in world affairs and key domestic events after 1890 by

- explaining the changing policies of the United States toward Latin America and Asia and the growing influence of the United States in foreign markets;
- evaluating United States involvement in World War I, including Wilson's Fourteen Points, the Treaty of Versailles, and the national debate over treaty ratification and the League of Nations;
- explaining the causes of the Great Depression, its impact on the American people, and the ways the New Deal addressed it.

## Conflict: The World at War: 1939 to 1945

VUS.10 The student will demonstrate knowledge of World War II by

- identifying the causes and events that led to American involvement in the war, including military assistance to Britain and the Japanese attack on Pearl Harbor;

- describing the major battles and turning points of the war in North Africa, Europe, and the Pacific, including Midway, Stalingrad, the Normandy landing (D-Day), and Truman's decision to use the atomic bomb to force the surrender of Japan;
- describing the role of all-minority military units, including the Tuskegee Airmen and Nisei regiments;
- describing the Geneva Convention and the treatment of prisoners of war during World War II;
- analyzing the Holocaust (Hitler's "final solution"), its impact on Jews and other groups, and postwar trials of war criminals.

VUS.11 The student will demonstrate knowledge of the effects of World War II on the home front by

- explaining how the United States mobilized its economic, human, and military resources;
- describing the contributions of women and minorities to the war effort;
- explaining the internment of Japanese Americans during the war;
- describing the role of media and communications in the war effort.

The United States since World War II

VUS.12 The student will demonstrate knowledge of United States foreign policy since World War II by

- describing outcomes of World War II, including political boundary changes, the formation of the United Nations, and the Marshall Plan;
- explaining the origins of the Cold War, and describing the Truman Doctrine and the policy of containment of communism, the American role in wars in Korea and Vietnam, and the role of the North Atlantic Treaty Organization (NATO) in Europe;
- explaining the role of America's military and veterans in defending freedom during the Cold War;
- explaining the collapse of communism and the end of the Cold War, including the role of Ronald Reagan.

VUS.13 The student will demonstrate knowledge of the Civil Rights movement of the 1950s and 1960s by

- identifying the importance of the *Brown v. Board of Education* decision, the roles of Thurgood Marshall and Oliver Hill, and how Virginia responded;
- describing the importance of the National Association for the Advancement of Colored People (NAACP), the 1963 March on Washington, the Civil Rights Act of 1964, and the Voting Rights Act of 1965.

VUS.14 The student will demonstrate knowledge of economic, social, cultural, and political developments in the contemporary United States by

- analyzing the effects of increased participation of women in the labor force;
- analyzing how changing patterns of immigration affect the diversity of the United States population, the reasons new immigrants choose to come to this country, and their contributions to contemporary America;
- explaining the media influence on contemporary American culture and how scientific and technological advances affect the workplace, health care, and education.

## *Virginia and United States Government Objectives*

GOVT.1 The student will demonstrate mastery of the social studies skills citizenship requires, including the ability to

- analyze primary and secondary source documents;
- create and interpret maps, diagrams, tables, charts, graphs, and spreadsheets;
- analyze political cartoons, political advertisements, pictures, and other graphic media;
- distinguish between relevant and irrelevant information;
- evaluate information for accuracy, separating fact from opinion;
- identify a problem and prioritize solutions;
- select and defend positions in writing, discussion, and debate.

GOVT.2 The student will demonstrate knowledge of the political philosophies that shaped the development of Virginia and United States constitutional government by

- describing the development of Athenian democracy and the Roman republic;
- explaining the influence of the Magna Carta, the English Petition of Rights, and the English Bill of Rights;
- examining the writings of Hobbes, Locke, and Montesquieu;
- explaining the guarantee of the rights of Englishmen set forth in the charters of the Virginia Company of London;
- analyzing the natural rights philosophies expressed in the Declaration of Independence.

GOVT.3 The student will demonstrate knowledge of the concepts of democracy by

- recognizing the fundamental worth and dignity of the individual;
- recognizing the equality of all citizens under the law;
- recognizing majority rule and minority rights;
- recognizing the necessity of compromise;
- recognizing the freedom of the individual.

GOVT.4 The student will demonstrate knowledge of the Constitution of the United States by

- examining the ratification debates and *The Federalist*;
- identifying the purposes for government stated in the Preamble;
- examining the fundamental principles upon which the Constitution of the United States is based, including the rule of law, consent of the governed, limited government, separation of powers, and federalism;
- illustrating the structure of the national government outlined in Article I, Article II, and Article III;
- describing the amendment process.

GOVT.5 The student will demonstrate knowledge of the federal system described in the Constitution of the United States by

- explaining the relationship of the state governments to the national government;
- describing the extent to which power is shared;
- identifying the powers denied state and national governments;
- examining the ongoing debate that focuses on the balance of power between state and national governments.

- GOVT.6The student will demonstrate knowledge of local, state, and national elections by
- describing the organization, role, and constituencies of political parties;
  - describing the nomination and election process;
  - examining campaign funding and spending;
  - analyzing the influence of media coverage, campaign advertising, and public opinion polls;
  - examining the impact of reapportionment and redistricting;
  - identifying how amendments extend the right to vote;
  - analyzing voter turnout.

- GOVT.7The student will demonstrate knowledge of the organization and powers of the national government by
- examining the legislative, executive, and judicial branches;
  - analyzing the relationship between the three branches in a system of checks and balances.

- GOVT.8The student will demonstrate knowledge of the organization and powers of the state and local governments described in the Constitution of Virginia by
- examining the legislative, executive, and judicial branches;
  - examining the structure and powers of local governments: county, city, and town;
  - analyzing the relationship among state and local governments.

- GOVT.9The student will demonstrate knowledge of the process by which public policy is made by
- examining different perspectives on the role of government;
  - explaining how local, state, and national governments formulate public policy;
  - describing the process by which policy is implemented by the bureaucracy at each level;
  - analyzing how individuals, interest groups, and the media influence public policy.

- GOVT.10The student will demonstrate knowledge of the operation of the federal judiciary by
- explaining the jurisdiction of the federal courts;
  - examining how John Marshall established the Supreme Court as an independent, co-equal branch of government through his opinions in *Marbury v. Madison*;
  - describing how the Supreme Court decides cases;
  - comparing the philosophies of judicial activism and judicial restraint.

- GOVT.11The student will demonstrate knowledge of civil liberties and civil rights by
- examining the Bill of Rights, with emphasis on First Amendment freedoms;
  - analyzing due process of law expressed in the 5th and 14th Amendments;
  - explaining selective incorporation of the Bill of Rights;
  - exploring the balance between individual liberties and the public interest;
  - explaining every citizen's right to be treated equally under the law.

- GOVT.12The student will demonstrate knowledge of the role of the United States in a changing world by
- describing the responsibilities of the national government for foreign policy and national security;
  - assessing the role played by national interest in shaping foreign policy and promoting world peace;
  - examining the relationship of Virginia and the United States to the global economy;
  - examining recent foreign policy and international trade initiatives since 1980.

- GOVT.13The student will demonstrate knowledge of how governments in Mexico, Great Britain, and the People's Republic of China compare with government in the United States by
- describing the distribution of governmental power;
  - explaining the relationship between the legislative and executive branches;
  - comparing the extent of participation in the political process.

- GOVT.14The student will demonstrate knowledge of economic systems by
- identifying the basic economic questions encountered by all economic systems;
  - comparing the characteristics of free market, command, and mixed economies, as described by Adam Smith and Karl Marx;
  - evaluating the impact of the government's role in the economy on individual economic freedoms;
  - explaining the relationship between economic freedom and political freedom;
  - examining productivity and the standard of living as measured by key economic indicators.

- GOVT.15The student will demonstrate knowledge of the United States market economy by
- assessing the importance of entrepreneurship, the profit motive, and economic independence to the promotion of economic growth;
  - comparing types of business organizations;
  - describing the factors of production;
  - explaining the interaction of supply and demand;
  - illustrating the circular flow of economic activity;
  - analyzing global economic trends, with emphasis on the impact of technological innovations.

- GOVT.16The student will demonstrate knowledge of the role of government in the Virginia and United States economies by
- analyzing the impact of fiscal and monetary policies on the economy;
  - describing the creation of public goods and services;
  - examining environmental issues, property rights, contracts, consumer rights, labor-management relations, and competition in the marketplace.

- GOVT.17The student will demonstrate knowledge of personal character traits that facilitate thoughtful and effective participation in civic life by
- practicing trustworthiness and honesty;
  - practicing courtesy and respect for the rights of others;
  - practicing responsibility, accountability, and self-reliance;
  - practicing respect for the law;
  - practicing patriotism.

GOVT.18 The student will understand that thoughtful and effective participation in civic life is characterized by

- obeying the law and paying taxes;
- serving as a juror;
- participating in the political process;
- performing public service;
- keeping informed about current issues;
- respecting differing opinions in a diverse society.