
Course Description**Subject: ALGEBRA 1****Grade: 8****Overview:**

Eighth grade algebra is a core academic course that meets everyday day for the entire year. The focus is on problem solving, evaluating equations and functions, and real life connections to math. Instruction includes daily warm-up activities, class notes and examples, daily homework, quizzes and tests. Emphasis is placed on recognizing the order of God's world which can be seen through math.

Primary Biblical Integration:

The order of the world created by God can be seen in mathematics.

Unit Description:

Solving Linear Equations
Graphing Linear Equations and Functions
Writing Linear Equations
Solving and Graphing Linear Inequalities
Systems of Linear Equations and Inequalities
Exponential Functions
Polynomials and Factoring
Quadratic equations and Functions

Student Materials:

Algebra 1 Concepts and Skills, Mc Dougal Littell Inc. Copyright 2001

Teacher Materials:

Algebra 1 Concepts and Skills, Mc Dougal Littell Inc. Copyright 2001, 0-618-07728-6

HEIGHTS CHRISTIAN JUNIOR HIGH SCHOOL

COURSE OUTLINE

| Teacher's Name: Stacy Rouwenhorst | | Subject: Algebra-8th grade | | # of Quarters: 4 | |
|--|---|---|---------------------------------------|--|----------------------------------|
| Text (if any): McDougal Littell Algebra 1 Concepts and Skills | | | Other Materials: McDougal Supplements | | |
| Recurring Themes, Principles, Skills or Concepts: | 1) The order of the world created by God | 2) Problem Solving | 3) Graphing | 4) Evaluation Equations, Inequalities, and Funcions | 5) Real life connections to Math |
| Unit Title & Expected Start Date | Theme | Biblical Application | | Key Concepts | |
| 1)a. Class outlines and rules (9/8) b. Connections to Algebra 9/14 | organization and discipline and (1,2,4,5) | Phil. 4.6 Accuracy/Honesty Lev. 19:36, Prov. 11:1 | | Rules, Classroom procedures, HW policy, Textbooks, etc. Variables, Exponents, Equations and Inequalities, Tables and Graphs | |
| 2) Real Numbers 10/6 | 1,2,4,5 | Gen 15:5 Rev. 5:11 Heb 11:12 | | Real number line, Absolute Value, Addition, subtrction, multiplication and division of real numbers, the distributive property. | |
| 3) Solving Linear Equations | 1,2,4,5 | Ratios (order of earth) | | Solving equations using addition, subtraction, multiplication, and division, solving equations with variables on both sides, decimal | |
| 4) Graphing Linear Equations and functions | all | Matt. 22:36 | | The coordinate plane, graphing lines, equations, slope-intercept form | |
| 5) Writing Linear Equations | 1,2,4,5 | | | Slope-intercept form, point-slope form, standard form | |
| 6) Solving and Graphing Linear Inequalities | all | Absolute Value - we always have a positive value to God | | Solving Inequalities using addition, subtraction, multiplicatoins and division. Multi-step inequalities, Absolute-value equations | |
| 7) Systems of Linear Equations and Inequalities | all | All humans are equal before God. Prov. 22:2, Gal 3:28 | | Linear Systems (by substitution and linear combinations) | |
| 8) Exponential Functions | all | | | Multiplications and division properties of Exponents, zero and negative exponents, exponential growth/decay functions | |
| 9) Polynomials and Factoring | all | | | Adding, Subtracting, and Multiplying Polynomials, Factoring Polynomials. | |
| 10) Quadratic Equations and Functions | all | | | Square roots, Quadratic Formula, the discriminant | |

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UNIT PLANNER

| Teacher's Name: Rouwenhorst | | Subject: Algebra 1 - 8th grade | | Period(s): 1 2 4 5 | |
|--|--------------------------|-----------------------------------|-----------------------------------|--------------------|--|
| Unit #: 1a | Dates - Starting: 10-Sep | Ending: 12-Sep | Total Instructional Days: 3 | | |
| Unit Title: Class Organization and Rules | | | | | |
| Theme: Organization and Discipline | | | | | |
| Biblical Application: Phil. 4:6-7 | | | | | |
| Key Concepts | Standards/Sub-Strands | Outcomes | Assessment | ESLRs | |
| 1) Rules (Discipline) | | How they act the rest of the year | Citizenship Grade | 4d | |
| 2) Assignments and Organizer | | How they act the rest of the year | Graded in 2nd quarter | 3b 2b | |
| 3) Classroom Procedures | | How they act the rest of the year | Citizenship and work habits grade | 2b | |
| 4) Textbooks | | How they act the rest of the year | HW assignment to cover books | 4b | |
| 5) | | | | | |
| Key Activities and Methods | | | | | |

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UNIT PLANNER

| Teacher's Name: Rouwenhorst | | Subject: Algebra 1 - 8th grade | | Period(s): 1 2 3 4 | |
|--|--------------------------|-------------------------------------|-------------------------------|--------------------|--|
| Unit #: 1b | Dates - Starting: 13-Oct | Ending: 29-Sep | Total Instructional Days: 8 | | |
| Unit Title: Connections to Algebra | | | | | |
| Theme: Problem Solving, Evaluating Variables, equations and inequalities | | | | | |
| Biblical Application: Prov. 11:1 | | | | | |
| Key Concepts | Standards/Sub-Strands | Outcomes | Assessment | ESLRs | |
| 1) Variables and Exponents | 15 2 | Notes and Homework | Prerequisite skills worksheet | 2ab 3a | |
| 2) Order of Operations and Equations and Inequalities | 25.2 5 | Homework | graded HW | 2ab 3a | |
| 3) Problem Solving | 5 15 | Note Worksheet and Homework | Graded HW, Mid ch. Quiz | 2ab 3a | |
| 4) Tables and Graphs | | Homework and create their own graph | Graded HW | 2ab 3a | |
| 5) Introduction to Functions | 15 16 18 | Homework | Graded HW Ch. Test | 2ab 3ab | |
| Key Activities and Methods: Graded HW and warm-ups. Used the whiteboard, overhead, and book to teach, Created note outlines to fill in. Tests and quizzes. | | | | | |

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UNIT PLANNER

| Teacher's Name: Rouwenhorst | | Subject: Algebra 1 - 8th grade | | Period(s): 1 2 3 4 | |
|---|--------------------------|-----------------------------------|----------------------------------|--------------------|--|
| Unit #: 2 | Dates - Starting: 24-Sep | Ending: 19-Oct | Total Instructional Days: 10 | | |
| Unit Title: Real Numbers | | | | | |
| Theme: The order of the World, Problem Solving, Real life connections | | | | | |
| Biblical Application: Gen. 15:5, Rev. 5:11, Heb. 11:12 | | | | | |
| Key Concepts | Standards/Sub-Strands | Outcomes | Assessment | ESLRs | |
| 1) The Real Number line and Absolute Value | 1,2,3,24,25 | Notes and Homework | Worksheets, Homework, quiz, Test | 3a | |
| 2) Adding, Subtracting, Multiplying and Dividing Real Numbers | 1,2,15,17 | "integer Wars" Homework and Notes | Worksheets, Homework, quiz, Test | 2b 3a | |
| 3) The distributive Property | 1,4 | Notes and Homework | Worksheets, Homework, quiz, Test | 3a 2b | |
| 4) Combining like terms | 4,15 | Notes and Homework | Worksheets, Homework, quiz, Test | 3a 3b | |
| 5) | | | | | |
| Key Activities and Methods | | | | | |

HEIGHTS CHRISTIAN JUNIOR HIGH SCHOOL

UNIT PLANNER

| Teacher's Name: Rouwenhorst | | Subject: Algebra 1 - 8th grade | | Period(s): 1,2,3 | | |
|--|---------------------------|--------------------------------|---------------------------|--------------------|-----------------------------|-------|
| Unit #: 3 | Dates - Starting: Ending: | | Total Instructional Days: | | | |
| Unit Title: Solving Linear Equations | | | | | | |
| Theme: The order of the world crated by God, Problem Solving, Evaluating equations | | | | | | |
| Biblical Application: Order of the Earth | | | | | | |
| Key Concepts | | Standards/Sub-Strands | | Outcomes | Assessment | ESLRs |
| 1) Solving Equations using addition, subtraction, multiplication, and division | | 5, 2, 15 | | Homework and Notes | Test, Pop quizzes, grade HW | 2a 3b |
| 2) Solving Multi-Step Equations | | 4, 5, 15 | | Homework and Notes | Test, Pop quizzes, grade HW | 2a 3b |
| 3) Solving Decimal Equations | | 5 | | Homework and Notes | Test, Pop quizzes, grade HW | 3d 2a |
| 4) Formulas | | 15 | | Homework and Notes | Test, Pop quizzes, grade HW | 2a 3b |
| 5) Ratios, Rates and Percents | | 15, 5 | | Homework and Notes | Test, Pop quizzes, grade HW | 2a 5e |
| Key Activities and Methods: Overhead exmples, Note taking, review game, Reviewing Homework and asking questions on it. | | | | | | |

HEIGHTS CHRISTIAN JUNIOR HIGH SCHOOL

UNIT PLANNER

| Teacher's Name: Rouwenhorst | | Subject: Algebra 1 - 8th grade | | Period(s): 1,2,3 | |
|--|-----------------------|--------------------------------|---|---------------------------|--|
| Unit #: 4 | Dates - Starting: | | Ending: | Total Instructional Days: | |
| Unit Title: Graphing Linear equations and functions | | | | | |
| Theme: Graphing, Evaluating Equations, Problem Solving | | | | | |
| Biblical Application: Matt. 22:36 | | | | | |
| Key Concepts | Standards/Sub-Strands | Outcomes | Assessment | ESLRs | |
| 1) The Coordinate Plane | | 6 Coordinate Plane Project | Homework, quizzes, Notes, Test, Project | 2b 5c | |
| 2) Graphing Linear Equations | 6, 7, 16, 17 | Howework and Notes | Homework, quizzes, Notes, Test, Project | 2ab 3ab | |
| 3) The Slope of a Line | 6, 7 | Howework and Notes | Homework, quizzes, Notes, Test, Project | 2ab 3ac | |
| 4) Direct Variation | | 6 Howework and Notes | Homework, quizzes, Notes, Test, Project | 2ab 3a | |
| 5) Functions and Relations | 16, 17, 18 | Howework and Notes | Homework, quizzes, Notes, Test, Project | 2ab 3a | |
| Key Activities and Methods: Questions on Homework, Examples and Notes on overhead, Notesheets to fill in, Bookwork | | | | | |

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UNIT PLANNER

| Teacher's Name: Rouwenhorst | | Subject: Algebra 1 - 8th grade | | Period(s): 1,2,3 | |
|---|---------------------------|--------------------------------|---------------------------|------------------|--|
| Unit #: 5 | Dates - Starting: Ending: | | Total Instructional Days: | | |
| Unit Title: Writing Linear Equations | | | | | |
| Theme: Order of the world, Problem Solving, graphing, Evaluating Equations | | | | | |
| Biblical Application: | | | | | |
| Key Concepts | Standards/Sub-Strands | Outcomes | Assessment | ESLRs | |
| 1) Slope-Intercept Form | | 7 Worksheet and Notes | Homework, Quiz, Tests | 2ab 3a | |
| 2) Point-slope form | 7, 8 | Worksheet and Notes | Homework, Quiz, Tests | 2ab 3a | |
| 3) Standard Form | | 7 Homework and Notes | Homework, Quiz, Tests | 2ab 3a | |
| 4) Modeling with Linear Equations | 7, 15 | Homework and Notes | Homework, Quiz, Tests | 2ab 3a | |
| 5) Perpendicular Lines | 7, 8 | Homework and Notes | Homework, Quiz, Tests | 2ab 3a | |
| Key Activities and Methods: Review Sheet, Notes and Examples on overhead, Warm-up activities on whiteboard, Book work | | | | | |

HEIGHTS CHRISTIAN JUNIOR HIGH SCHOOL

UNIT PLANNER

| Teacher's Name: Rouwenhorst | | Subject: Algebra 1 - 8th grade | | Period(s): 1,2,3 | | |
|--|-------------------|--------------------------------|---------|---------------------------|--------------------------|---------|
| Unit #: 6 | Dates - Starting: | | Ending: | Total Instructional Days: | | |
| Unit Title: Solving and Graphing Linear Inequalities | | | | | | |
| Theme: All Themes | | | | | | |
| Biblical Application: Our "absolute value" to God | | | | | | |
| Key Concepts | | Standards/Sub-Strands | | Outcomes | Assessment | ESLRs |
| 1) Solving Inequalities using addition, subtraction, multiplication, or division | | 3, 5 | | Homework and Notes | Homework, quizzes, tests | 2ab 3a |
| 2) Solving Compound Inequalities involving "and" or "or" | | 5, 15 | | Homework and Notes | Homework, quizzes, tests | 2ab 3a |
| 3) Solving Absolute value equations | | | | 3 Homework and Notes | Homework, quizzes, tests | 2ab 3a |
| 4) Graphing Linear Inequalities in 2 variables. | | | | 6 Worksheet and Graphs | Homework, quizzes, tests | 2ab 3ac |
| 5) | | | | | | |
| Key Activities and Methods: Overhead Notes and Examples, Review Game, Review sheet, Warm-ups on whiteboard, Book work, Reviewing homework. | | | | | | |

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UNIT PLANNER

| Teacher's Name: Rouwenhorst | | Subject: Algebra 1 - 8th grade | | Period(s): 1,2,3 | |
|--|---------------------------|--------------------------------|---------------------------|------------------|--|
| Unit #: 7 | Dates - Starting: Ending: | | Total Instructional Days: | | |
| Unit Title: Systems of Linear Equations and Inequalities | | | | | |
| Theme: All | | | | | |
| Biblical Application: Prov. 22:2 Gal. 3:28 | | | | | |
| Key Concepts | Standards/Sub-Strands | Outcomes | Assessment | ESLRs | |
| 1) Graphing Linear Systems | | 9 Homework and Notes | Homework, test, quizzes | 3a 2ab | |
| 2) Solving Linear Systems by Substitution | | 9 Homework and Notes | Homework, test, quizzes | 3a 2ab | |
| 3) Solving Linear Systems by Linear Combinations | | 9 Two Worksheets | Homework, test, quizzes | 3a 2ab | |
| 4) Linear Systems and Problem Solving | 9, 15 | Homework and Notes | Homework, test, quizzes | 3a 2ab | |
| 5) Systems of Linear Inequalities | | 9 Worksheet and Graphs | Homework, test, quizzes | 3a 2ab | |
| Key Activities and Methods: Whiteboard examples with different colors, overhead notes, warm-ups, review activity, book work, worksheets. | | | | | |

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UNIT PLANNER

| Teacher's Name: Rouwenhorst | | Subject: Algebra 1 - 8th grade | | Period(s): 1,2,3 | |
|--|---------------------------|--------------------------------|---------------------------|------------------|--|
| Unit #: 8 | Dates - Starting: Ending: | | Total Instructional Days: | | |
| Unit Title: Exponential Functions | | | | | |
| Theme: All | | | | | |
| Biblical Application: | | | | | |
| Key Concepts | Standards/Sub-Strands | Outcomes | Assessment | ESLRs | |
| 1) Multiplication and Division properties of exponents | | 2 Homework and Notes | Homework, quiz, test | 2ab 3a | |
| 2) Zero and Negative exponents | | 2 Homework and Notes | Homework, quiz, test | 2ab 3a | |
| 3) Graphs of Exponential functions | 16, 17 | Homework and Notes | Homework, quiz, test | 2ab 3a | |
| 4) Scientific Notation | | 2 Homework and Notes | Homework, quiz, test | 3d | |
| 5) Exponential growth and decay functions | | 16 Homework and Notes | Homework, quiz, test | 5e 4e | |
| Key Activities and Methods: Warm-ups, overhead example and notes, book checkpoints, Homework | | | | | |

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UNIT PLANNER

| Teacher's Name: Rouwenhorst | | Subject: Algebra 1 - 8th grade | | Period(s): 1,2,3 | |
|---|-----------------------|---|----------------------------|---------------------------|--|
| Unit #: 9 (CH. 10) | Dates - Starting: | | Ending: | Total Instructional Days: | |
| Unit Title: Polynomials and Factoring | | | | | |
| Theme: All | | | | | |
| Biblical Application: | | | | | |
| Key Concepts | Standards/Sub-Strands | Outcomes | Assessment | ESLRs | |
| 1) Adding and Subtracting Polynomials | | 10 Homework and Notes | Homework, quizzes and test | 3ab 2a | |
| 2) Multiplying Polynomials and special products | | 10 Notes with "Binomial Benny" and Homework | Homework, quizzes and test | 3ab 2a | |
| 3) Solving Quadratic equations in factored form | 14, 21 | Homework and Notes | Homework, quizzes and test | 3ab 2a | |
| 4) Factoring $x^2 + bx + c$ | | 11 Homework and Notes | Homework, quizzes and test | 3ab 2a | |
| 5) Factoring $ax^2 + bx + c$ | | 11 Notes with "Magic X" and Homework | Homework, quizzes and test | 3ab 2a | |
| Key Activities and Methods: Notes, drawing binomial benny, FOIL, Checkpoints, Warm-ups, Homework, Examples, Using "magic X", Fill-in-the-box game | | | | | |

HEIGHTS CHRISTIAN JUNIOR HIGH SCHOOL

UNIT PLANNER

| Teacher's Name: Rouwenhorst | | Subject: Algebra 1 - 8th grade | | Period(s): 1,2,3 | |
|--|-----------------------|--------------------------------|-----------------------------|---------------------------|--|
| Unit #: 10 (CH. 9,11, 12) | Dates - Starting: | | Ending: | Total Instructional Days: | |
| Unit Title: Quadratic Equations, Square Roots | | | | | |
| Theme: All | | | | | |
| Biblical Application: | | | | | |
| Key Concepts | Standards/Sub-Strands | Outcomes | Assessment | ESLRs | |
| 1) Square Roots and Solving Quadratic Equations | 14, 2 | Notes and Homework | Homework, quizzes and Tests | 3abd | |
| 2) Solving Quadratic Equations with the quadratic formula | 19, 20 | Notes and Homework | Homework, quizzes and Tests | 3ab 2a | |
| 3) The pythagorean Theorem | | Notes and Homework | Homework, quizzes and Tests | 5eb 3a | |
| 4) Proportions | | 20 Notes and Homework | Homework, quizzes and Tests | 3ab 2a | |
| 5) Simplifying Rations Expressions | 12, 13 | Notes and Homework | Homework, quizzes and Tests | 3ab | |
| Key Activities and Methods: Quadratic Formula shirt, examples, Review game, checkpoints, warm-ups, homework. | | | | | |

PACING GUIDE

Subject: Algebra 1

Grade: 8

Total number of standards: 25

| Quarter | Units Taught | Standards Taught | Standards Assessed |
|---------------------------|--|--|--|
| 1 | 1. Connections to Algebra 2. Real Numbers 3. Solving Linear Equations | 1.0 4.0 16.0 17.0 25.0 | 1.0 -10/22 25.0 -10/22 17.0 -10/22 |
| 2 | 4. Graphing Linear Equations 5. Writing Linear Equations | 5.0 6.0 7.0 8.0 18.0 | 4.0 – 12/5 6.0 – 12/20 7.0 -1/24 8.0 – 1/24 16.0 – 12/20 18.0 – 12/20 |
| 3 | 6. Solving and Graphing Inequalities 7. Systems of Linear Equations and Inequalities. | 2.0 3.0 6.0 9.0 | 3.0 -2/27 5.0 -2/27 6.0 -3/21 9.0 -3/21 |
| 4 | 8. Exponential Functions 9. Polynomials and Factoring 10. Quadratic Equations and Functions. | 10.0 11.0 14.0 20.0 22.0 | 2.0 – 4/14 10.0 – 5/5 11.0 -5/5 14.0 – 5/5 20.0 - 5/5 22.0 – 5/27 |
| Omitted Standards and why | | 15.0- The book didn't cover work problems. | 13.0, 19.0, 21.0- covered the last quarter, but not enough to assess. |

HEIGHTS CHRISTIAN JUNIOR HIGH SCHOOL

Mission Statement

"Our mission is to educate students to know Christ personally, excel academically, think biblically, and positively impact their community for Christ."

Expected Schoolwide Learning Results (ESLRs)

1. Biblical World View

Graduates of HCJH are expected to be individuals who . . .

- a) know how to study the Bible.
- b) recognize that all people are created in the image of the one true God.
- c) acknowledge the Bible as the infallible Word of God.
- d) use God's Word to discern truth.

2. Effective Communicators

Graduates of HCJH are expected to be effective communicators who . . .

- a) listen objectively and critically.
- b) understand and follow directions.
- c) write and speak clearly and accurately.
- d) express and support opinions using objective evidence.
- e) utilize various modalities effectively.
- f) can demonstrate a personal relationship with Jesus Christ verbally and in writing.

3. Proficient Learners

Graduates of HCJH are expected to be proficient learners who . . .

- a) demonstrate grade appropriate skills in reading, writing, and mathematics.
- b) have effective work habits and study skills.
- c) are self-directed and able to produce cooperatively and independently.
- d) can utilize technology.
- e) have a firm grasp of scripture and are able to apply it to life situations.

4. Personal Responsibility

Graduates of HCJH are expected to be responsible individuals who . . .

- a) show patriotism through respect for flag, country, leaders and laws.
- b) demonstrate self-control based on biblical standards.
- c) exhibit respect for others.
- d) accept the consequences and benefits of their actions.
- e) are aware of career opportunities.
- f) practice goal setting with a biblical perspective.
- g) are involved in serving the community.
- h) have a personal relationship with Jesus Christ.
- i) have the tools to share their faith.
- j) demonstrate an urgency to share their faith.

5. Problem Solvers

Graduates of HCJH are expected to be perceptive thinkers and problem solvers who . . .

- a) evaluate current topics using a biblical perspective.
- b) use available technology to obtain, access and integrate relevant information.
- c) think analytically and creatively.
- d) are well-informed and open-minded.
- e) apply academic learning to life.

6. Well-Rounded

Graduates of HCJH are expected to be well-rounded individuals who . . .

- a) have been exposed to a variety of elective opportunities and experiences.
- b) are challenged beyond academics through a variety of extracurricular activities.
- c) lead lives that are balanced intellectually, spiritually, physically and emotionally.
- d) develop an appreciation for teamwork during school activities.
- e) understand God's involvement in every area of their lives.

**Grade Eight
Algebra 1
Mathematics Content Standards**

Symbolic reasoning and calculations with symbols are central in algebra. Through the study of algebra, a student develops an understanding of the symbolic language of mathematics and the sciences. In addition, algebraic skills and concepts are developed and used in a wide variety of problem-solving situations.

1.0 Students identify and use the arithmetic properties of subsets of integers and rational, irrational, and real numbers, including closure properties for the four basic arithmetic operations where applicable:

1.1 Students use properties of numbers to demonstrate whether assertions are true or false.

2.0 Students understand and use such operations as taking the opposite, finding the reciprocal, taking a root, and raising to a fractional power. They understand and use the rules of exponents.

3.0 Students solve equations and inequalities involving absolute values.

4.0 Students simplify expressions before solving linear equations and inequalities in one variable, such as $3(2x-5) + 4(x-2) = 12$.

5.0 Students solve multi step problems, including word problems, involving linear equations and linear inequalities in one variable and provide justification for each step.

6.0 Students graph a linear equation and compute the x- and y- intercepts (e.g., graph $2x + 6y = 4$). They are also able to sketch the region defined by linear inequality (e.g., they sketch the region defined by $2x + 6y < 4$).

7.0 Students verify that a point lies on a line, given an equation of the line. Students are able to derive linear equations by using the point-slope formula.

8.0 Students understand the concepts of parallel lines and perpendicular lines and how those slopes are related. Students are able to find the equation of a line perpendicular to a given line that passes through a given point.

9.0 Students solve a system of two linear equations in two variables algebraically and are able to interpret the answer graphically. Students are able to solve a system of two linear inequalities in two variables and to sketch the solution sets.

10.0 Students add, subtract, multiply, and divide monomials and polynomials. Students solve multistep problems, including word problems, by using these techniques.

11.0 Students apply basic factoring techniques to second-and simple third-degree polynomials. These techniques include finding a common factor for all terms in a polynomial, recognizing the difference of two squares, and recognizing perfect squares of binomials.

12.0 Students simplify fractions with polynomials in the numerator and denominator by factoring both and reducing them to the lowest terms.

13.0 Students add, subtract, multiply, and divide rational expressions and functions. Students solve both computationally and conceptually challenging problems by using these techniques.

14.0 Students solve a quadratic equation by factoring or completing the square.

15.0 Students apply algebraic techniques to solve rate problems, work problems, and percent mixture problems.

16.0 Students understand the concepts of a relation and a function, determine whether a given relation defines a function, and give pertinent information about given relations and functions.

17.0 Students determine the domain of independent variables and the range of dependent variables defined by a graph, a set of ordered pairs, or a symbolic expression.

**Advanced II
Number Sense and Operations**

- Demonstrate understanding of the meaning and use of numbers, the various representations of numbers, number systems, and the relationships between and among numbers.
- Demonstrate understanding of the meaning of operations, the relationship between operations, and the practical settings in which a specific operation or set of operations is appropriate.

Patterns, Relationships, and Algebra

- Describe, complete, continue, and demonstrate understanding of patterns involving numbers, symbols, and geometric figures.
- Patterns with numbers include those found in lists, function tables, ratios and proportions, and matrices.
- Demonstrate understanding of algebraic principles through interaction with expressions, equations, algebraic notation, and other representations of mathematical relationships.

Data, Statistics, and Probability

- Describe, interpret, and make predictions based on the analysis of data presented in a variety of ways, including graphs, plots, tables, and lists.
- Demonstrate an understanding of probability concepts through interaction with simple events, compound events, and experimental probability.

Geometry and Measurement

- Demonstrate understanding of the characteristics and properties of plane and solid figures, coordinate geometry, and spatial reasoning.
- Demonstrate understanding of the meaning and use of various measurement systems, the tools of measurement, and the integral role of estimation in measurement.

18.0 Students determine whether a relation defined by a graph, a set of ordered pairs, or a symbolic expression is a function and justify the conclusion.

19.0 Students know the quadratic formula and are familiar with its proof by completing the square.

20.0 Students use the quadratic formula to find the roots of a second-degree polynomial and to solve quadratic equations.

21.0 Students graph quadratic functions and know that their roots are the x- intercepts.

22.0 Students use the quadratic formula or factoring techniques or both to determine whether the graph of a quadratic function will intersect the x-axis in zero, one, or two points.

23.0 Students apply quadratic equations to physical problems, such as the motion of an object under the force of gravity.

24.0 Students use and know simple aspects of a logical argument:

24.1 Students explain the difference between inductive and deductive reasoning and identify and provide examples of each.

24.2 Students identify the hypothesis and conclusion in logical deduction. 24.3 Students use counterexamples to show that an assertion is false and recognize that a single counterexample is sufficient to refute an assertion.

25.0 Students use properties of the number system to judge the validity of results, to justify each step of a procedure, and to prove or disprove statements:

25.1 Students use properties of numbers to construct simple, valid arguments (direct and indirect) for, or formulate counterexamples to, claimed assertions.

25.2 Students judge the validity of an argument according to whether the properties of the real number system and the order of operations have been applied correctly at each step.

25.3 Given a specific algebraic statement involving linear, quadratic, or absolute value expressions or equations or inequalities, students determine whether the statement is true sometimes, always, or never.

Process

Communication and Representation

- Demonstrate an understanding of the symbols and terms utilized in mathematics, and correctly interpret alternative representations of numbers, expressions, and data.

Estimation

- Apply estimation strategies in problem solving and determine the reasonableness of results.

Mathematical Connections

- Demonstrate an understanding of the interrelatedness of mathematical concepts, procedures, and processes both among different mathematical topics and with other content areas.

Reasoning and Problem Solving

- Demonstrate the ability to apply inductive, deductive, or spatial reasoning and to make valid inferences and draw valid conclusions.
- Demonstrate the ability to apply strategies to solve conventional and nonroutine problems.

Mathematics Procedures

Computation with Decimals

Computation with Fractions

Computation with Integers

Process

Computation in Context

- Demonstrate the ability to solve everyday problems requiring addition, subtraction, multiplication, and division.
- Computation with Symbolic Notation
Demonstrate the ability to solve addition, subtraction, multiplication, and division problems represented by the symbols and notation of arithmetic.