GHS Course Syllabus

General Course Information

Course Title: Accelerated Algebra 2 Year: 2015-2016

Department: Math Room #: 112 Periods Taught: 3, 4, 6, 7

Resources: Online edition of Algebra 2: Kanold, Burger, Dixon, Larson, Leinwand; Houghton Mifflin Harcort ISBN 978-0-544-38591-7 Available at my.hrw.com

Course Description:
Building on their work with linear, quadratic, and exponential functions, students extend their repertoire of functions to include polynomial, rational, and radical functions. Students work closely with the expressions that define the functions, and continue to expand and hone their abilities to model situations and to solve equations, including solving quadratic equations over the set of complex numbers and solving exponential equations using the properties of logarithms. The 4 critical areas of focus are: Polynomial, rational and radical relationships, Trigonometry functions, modeling with functions, and inferences and conclusions from data. The Mathematical Practice Standards apply throughout the course and, together with the content standards, prescribe that students experience mathematics as a coherent, useful, and logical subject that makes use of their ability to make sense of problem situations. Accelerated Algebra 2 is more rigorous than Algebra 2.

Faculty Name: *Connie Abel (BS Mathematics, MEd.)*

Office Hours: Mrs. Abel is available before school, during first lunch, and after school. Appointments recommended.

Introduction Accelerated Algebra 2 is for students who are ready for higher expectations, and would like to take Pre-Calculus next year. Students should already have **mastered** properties of negative numbers, fractions, exponents, radicals, solving one and two-step equations, algebraic simplification to gather like terms, plotting two-dimensional coordinates, and graphing linear equations.

Students who finish the course with a grade of A or B will be recommended for Pre-Calculus. Students with a course grade of C will be recommended for Technical Mathematics or Statistics and will be able to take Pre-Calculus following Technical Math. Students with a course grade of D or F will be recommended to repeat the course.

Level changes Occasionally students wish to drop Accelerated Algebra 2 and finish the year with (non-accelerated level) Algebra 2. Students who change their status in this way will continue to have the same schedule and classroom. Mrs. Abel will differentiate the curriculum so that (non-accelerated) Algebra 2 students will receive the same instruction but reduced rigor/expectations in tests. **NOTE: Students who wish to make a level change must do so before the end of the first quarter.**

Grading

Homework / formative assessments – 10% Tests / summative assessments-- 90%	Overall Averages	Workload
Grade scales regard C as proficient on unit standards, B as mastery and A as exceeding. D and F indicate failure to meet standards. Incompletes/No-grades may be given at teacher discretion.	A 90-100% B 80-89% C 70-79% D 60-69% F below 60% I incomplete NG no grade	In addition to course hours in the classroom, students will be expected to spend 30 to 60 minutes outside of class for homework completion for every class meeting.
To pass Accelerated Algebra 2, students must demonstrate proficiency in the skills listed on the last page of this document. These skills will be assessed in unit tests. In addition, they must either pass the state test in mathematics or pass two work samples each from a different mathematical strand. Work samples will be given as part of unit assessments.		

Note to Parents:

Email at any time for grade updates, questions, concerns or comments: abelc@hsd.k12.or.us and assignment details will be posted on www.schoology.com

Students will need a graphing calculator, and we recommend TI-82, TI-83, TI 84. Students will be allowed to borrow a calculator during the class period ONLY in exchange for the student's ID badge. Students without a calculator who do not have their ID will be encouraged to find a friend to share.

Note: If your child has a TI-89, TI-92 Casio-300, or any other model of calculator that has **symbolic solution capabilities**, please be aware that such calculators are **not allowed** on Accelerated Algebra 2 tests. Your student may borrow a TI-84 from the teacher for the test period.

Students who do not have adequate internet capabilities at home will be able to use Glencoe computers and/or chrome-books before and after school in the Glencoe Library daily, during Learning Lab (3:30-4:30 pm T, W, Th), or in room 112 every day during first lunch. Students may also choose to use the computers at the public library.

This course is offered with optional dual credit for Math 95 through PCC. Details, requirements and deadlines will be discussed in class.

Course Schedule

(details of standards follow below)

QUARTER 1
- Unit 1: Functions
- Unit 2: Quadratic Functions, Equations, and Relations

QUARTER 2
- Unit 3: Polynomial Functions, Expressions, and Equations
- Unit 4: Rational Functions, Expressions, and Equations

QUARTER 3
- Unit 5: Radical Functions, Expressions, and Equations
- Unit 6: Exponential and Logarithmic Functions and Equations

QUARTER 4
- Unit 6: Exponential and Logarithmic Functions and Equations (continue)
- Unit 7: Trigonometric Functions
- Unit 8: Probability & Statistics

Course Objectives:

Students will learn to model, graph and solve linear, quadratic, radical, rational and exponential equations using symbolic, numeric and graphical methods. Students will learn the graphical properties of the following families of functions: quadratic, polynomial, radical, rational, exponential, logarithmic and trigonometric. Students will be introduced to functions, inverses, domain and range, along with standard notation for each. Students will learn compound and conditional probability, and unit circle trigonometry. See a complete list of standards below.

Make-up Work Policy:

Make-up work is from students with excused absences, who are allowed one more day than the number of days absent to complete and submit any assigned make-up work. Students in need of a make-up test will be allowed the same grace period. On time make-up work receives full credit.

Late Work Policy:

The majority of learning takes place not in the classroom, but during homework practice. Students who do their homework promptly have better success as well as better retention of concepts. Students without completed homework do not receive much-needed feedback on their efforts.

Oregon Department of Education defines nine essential skills for graduation. Essential Skill number 9 is "Demonstrate personal management and teamwork skills" which includes the bullet point, "Plan, organize and complete assigned tasks accurately and on time." Because homework is required practice, I do not accept late work.

Re-take tests

Retake tests are by teacher discretion only and are reserved for students who have not yet met required proficiencies. Habitual retakes will be discouraged. Students wishing to retake a test will develop a detailed, individualized plan with the teacher for learning the missing proficiencies, follow through in a time-specified manner, and complete a student-reflection on what is learned by these activities. PCC recognizes grades ONLY from the first attempt at each test.

Cheating: *Cheating / plagiarism in not tolerated and will be subject to disciplinary action*.

Classroom Conduct: *All students need to come to class with calculator and supplies.* ***Graph paper is required for homework.*** *If for any reason, a student comes without a calculator, (s)he may borrow one from the teacher for the period* ***in exchange for a student identification card.*** *All students are expected to participate in all classroom investigations, discussion and practice problems.*

We follow the student-parent handbook regarding dress code, electronic devices and tardy policy.

COURSE STANDARDS

QUARTER 1

Mathematical Practices

- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics. *Modeling standards indicated by a star symbol (★).*
- Use appropriate tools strategically.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

Linear Equations, Inequalities and Functions

- **A.CED.1**: Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.
- **A.CED.4**: Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law V = IR to highlight resistance R.
- **A.SSE.1**: Interpret expressions that represent a quantity in terms of its context.★
  a. Interpret parts of an expression, such as terms, factors, and coefficients.
  b. Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret P(1+r)n as the product of P and a factor not depending on P.*
- **F.IF.6**: Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
- **F.IF.7**: Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.★
  c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.
- **F.BF.3**: Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.
- **S.IC.1**: Understand statistics as a process for making inferences about population parameters based on a random sample from that population.

Systems of Linear Equations and Inequalities

- **A.REI.11**: Explain why the *x*-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are **linear**, polynomial, rational, absolute value, exponential, and logarithmic functions.
- **A.CED.2**: Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
- **A.CED.3**: Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.*

- **Quadratic Functions**
  - **F.IF.4**: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.★
  - **F.IF.8**: Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.
  - **A.SSE.1**: Interpret expressions that represent a quantity in terms of its context.★
    a. Interpret parts of an expression, such as terms, factors, and coefficients.
    b. Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret P(1+r)n as the product of P and a factor not depending on P.*
  - **A.SSE.2**: Use the structure of an expression to identify ways to rewrite it. For example, see x4 – y4 as (x2)2 – (y2)2, thus recognizing it as a difference of squares that can be factored as (x2 – y2)(x2 + y2).
  - **F.BF.3**: Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.
  - **N.CN.1**: Know there is a complex number *i* such that *i*2 = −1, and every complex number has the form *a* + *bi* with *a* and *b* real.
  - **N.CN.2**: Use the relation *i*2 = –1 and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.
  - **N.CN.7**: Solve quadratic equations with real coefficients that have complex solutions.
  - **A.CED.1**: Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.

QUARTER 2

- **Mathematical Practices**
  - Make sense of problems and persevere in solving them.
  - Reason abstractly and quantitatively.
  - Construct viable arguments and critique the reasoning of others.
  - Model with mathematics. *Modeling standards indicated by a star symbol (★).*
  - Use appropriate tools strategically.
  - Attend to precision.
  - Look for and make use of structure.
  - Look for and express regularity in repeated reasoning.

- **Quadratic Functions**, *continued from Quarter 1*
  - **F.IF.4**: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.★
  - **F.IF.8**: Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.
  - **A.SSE.1**: Interpret expressions that represent a quantity in terms of its context.★
    a. Interpret parts of an expression, such as terms, factors, and coefficients.
    b. Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret* $P(1+r)^n$ *as the product of P and a factor not depending on P.*
  - **A.SSE.2**: Use the structure of an expression to identify ways to rewrite it. For example, see x4 – y4 as (x2)2 – (y2)2, thus recognizing it as a difference of squares that can be factored as (x2 – y2)(x2 + y2).
  - **F.BF.3**: Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.
  - **N.CN.1**: Know there is a complex number *i* such that *i*2 = −1, and every complex number has the form *a* + *bi* with *a* and *b* real.

- **N.CN.2**: Use the relation $i2 = –1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.
- **N.CN.7**: Solve quadratic equations with real coefficients that have complex solutions.
- **N.CN.8**: (+) Extend polynomial identities to the complex numbers. *For example, rewrite x2 + 4 as (x + 2i)(x – 2i).*
- **A.CED.1**: Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.

Polynomial Functions

- **F.IF.8**: Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.
- **A.SSE.2**: Use the structure of an expression to identify ways to rewrite it. For example, see x4 – y4 as (x2)2 – (y2)2, thus recognizing it as a difference of squares that can be factored as (x2 – y2)(x2 + y2).
- **A.APR.1**: Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.
- **A.APR.2**: Know and apply the Remainder Theorem: For a polynomial p(x) and a number a, the remainder on division by x – a is p(a), so p(a) = 0 if and only if (x – a) is a factor of p(x).
- **A.APR.3**: Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.
- **A.APR.6**: Rewrite simple rational expressions in different forms; write a(x)/b(x) in the form q(x) + r(x)/b(x), where a(x), b(x), q(x), and r(x) are polynomials with the degree of r(x) less than the degree of b(x), using inspection, long division, or, for the more complicated examples, a computer algebra system.
- **F.BF.1:** Write a function that describes a relationship between two quantities.*
    b. Combine standard function types using arithmetic operations. For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.
- **A.SSE.1**: Interpret expressions that represent a quantity in terms of its context.★
    a. Interpret parts of an expression, such as terms, factors, and coefficients.
    b. Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret P(1+r)n as the product of P and a factor not depending on P.*
- **A.SSE.2**: Use the structure of an expression to identify ways to rewrite it. For example, see x4 – y4 as (x2)2 – (y2)2, thus recognizing it as a difference of squares that can be factored as (x2 – y2)(x2 + y2).
- **N.CN.9**: (+) Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.
- **F.IF.7**: Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.★
    c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.
- **F.IF.4**: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.★
- **F.IF.9**: Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.*

Statistics (Inferences and Conclusions from Data)

- **S.IC.1**: Understand statistics as a process for making inferences about population parameters based on a random sample from that population.
- **S.IC.2**: Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. *For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model?*
- **S.IC.3**: Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.
- **S.IC.4**: Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.
- **S.IC.5**: Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.

- **S.IC.6**: Evaluate reports based on data.
- **S.MD.6**: (+) Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).
- **S.MD.7**: (+) Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).
- **S.ID.4**: Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.
- **A.APR.5**: (+) Know and apply the Binomial Theorem for the expansion of (x + y)n in powers of x and y for a positive integer n, where x and y are any numbers, with coefficients determined for example by Pascal's Triangle.

QUARTER 3

- **Mathematical Practices**
  - Make sense of problems and persevere in solving them.
  - Reason abstractly and quantitatively.
  - Construct viable arguments and critique the reasoning of others.
  - Model with mathematics. *Modeling standards indicated by a star symbol (★).*
  - Use appropriate tools strategically.
  - Attend to precision.
  - Look for and make use of structure.
  - Look for and express regularity in repeated reasoning.

- **Powers, Roots and Radicals**
  - **F.BF.4**: Find inverse functions.
    a. Solve an equation of the form $f(x) = c$ for a simple function f that has an inverse and write an expression for the inverse. *For example, $f(x) = 2x3$ or $f(x) = (x+1)/(x-1)$ for $x \neq 1$.*
  - **F.IF.5**: Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.*★
  - **A.REI.2**: Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.

- **Exponential and Logarithmic Functions**
  - **A.SSE.1**: Interpret expressions that represent a quantity in terms of its context.★
    a. Interpret parts of an expression, such as terms, factors, and coefficients.
    b. Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret P(1+r)n as the product of P and a factor not depending on P.*
  - **F.IF.5**: Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.*★
  - **F.IF.7**: Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.★
    b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.
    e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.
  - **A.CED.1**: Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.
  - **A.SSE.4**: Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. For example, calculate mortgage payments.

QUARTER 4

- **Mathematical Practices**
  - Make sense of problems and persevere in solving them.
  - Reason abstractly and quantitatively.
  - Construct viable arguments and critique the reasoning of others.
  - Model with mathematics. *Modeling standards indicated by a star symbol (★).*

- Use appropriate tools strategically.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

Rational Functions

- **A.SSE.1**: Interpret expressions that represent a quantity in terms of its context.★
  a. Interpret parts of an expression, such as terms, factors, and coefficients.
  b. Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret $P(1+r)^n$ as the product of P and a factor not depending on P.*
- **F.IF.5**: Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.*★
- **A.APR.7**: (+) Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.
- **A.REI.2**: Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.
- **A.CED.1**: Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.
- **A.APR.4**: Prove polynomial identities and use them to describe numerical relationships. For example, the polynomial identity (x2 + y2)2 = (x2 – y2)2 + (2xy)2 can be used to generate Pythagorean triples.
- **A.REI.11**: Explain why the *x*-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.

Trigonometry

- **F.TF.1:** Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.
- **F.TF.2**: Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.
- **F.TF.5**: Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.
- **F.TF.8**: Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it to find sin (θ), cos (θ), or tan (θ), given sin (θ), cos (θ), or tan (θ), and the quadrant of the angle.

ESSENTIAL SKILLS

Successful completion of this course indicates that a student has demonstrated the Essential Skills that are **checked below**.

		Read and interpret a variety of texts at different levels of difficulty (2012)
		Write clearly and accurately (2013)
		Listen actively, speak clearly, and present publicly
✓		Apply mathematical reasoning in a variety of settings (2014)
		Use technology to learn, live, and work
✓		Think critically and analytically
		Demonstrate civic and community engagement
		Demonstrate global literacy
✓		Demonstrate personal management and teamwork skills