Fundamentals of College Algebra - Cover

Content Area: **Mathematics**
Course(s): **Mathematics**
Time Period: **Sample Time Period**
Length: **Full Year**
Status: **Not Published**

Title Page, Table of Contents, Statement of purpose

Fundamentals of College Algebra

Sayreville War Memorial High School

5 Credits

Full Year

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Written by: Cordes, Cynthia and Gutschmidt, Amanda

Date Curriculum Approved/ Revised: March 2021

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Statement of Purpose

Summary of the Course

This course is designed to prepare students for general education science and mathematics college courses. Topics include concepts of algebra, algebraic functions and graphs, exponential and logarithmic functions and graphs, inequalities, and systems of equations. Applications using graphing calculators, real-life examples, and excel projects are emphasized.

In order to demonstrate a cohesive and complete implementation plan the following general suggestions are provided:

- The use of various formative assessments are encouraged in order to provide an ongoing method of

determining the current level of understanding the students have of the material presented.

- Homework, when assigned should be relevant and reflective of the current teaching taking place in the classroom.
- Organizational strategies should be in place that allow the students the ability to take the information gained in the classroom and put in in terms that are relevant to them.
- Instruction should be differentiated to allow students the best opportunity to learn.
    - Assessments should be varied and assess topics of instruction delivered in class.
    - Modifications to the curriculum should be included that address students with Individualized Educational Plans (IEP), English Language Learners (ELL), and those requiring other modifications (504 plans).

Unit 0: Calculator Arithmetic

Content Area: **Mathematics**
Course(s): **Mathematics**
Time Period: **1st Semester**
Length: **11 days**
Status: **Not Published**

Summary of the Unit

This unit will cover a brief review of the summer packet assignment, which reviews topics learned in Algebra 1 and Algebra 2. It will also cover important functions in a graphing calculator that the students will need throughout the course.

Enduring Understandings

- Perform Order of operations
- Understand Rational numbers
- Simplify and evaluate algebraic expressions
- Translate verbal and algebraic expressions
- Perform general functions of a graphing calculator
- Special numbers and compound interest in a graphing calculator
- Understand scientific notation
- Use the graph and table of values function in a graphing calculator

Essential Questions

- Why is PEMDAS so important? And what is important in graphing calculator to ensure correct PEMDAS is used?
- What type of information can be gained when using a graphing calculator to graph an equation?

Summative Assessment and/or Summative Criteria

- Students will take formal assessments in the form of tests and quizzes to review concepts learned in the unit.
- Students will demonstrate mastery through various assessment criteria included in the unit such as do nows, exit slips, classwork assignments, projects etc.

Resources

The resources used for this course are not limited to the ones suggested below:

- Functions and Change (A Modeling Approach to College Algebra) textbook
- College Prep Algebra textbook
- Teacher's Pay Teachers and other online resources for examples/activities
- Graphing calculators

Unit Plan

Topic/Selection	Timeframe	General Objectives	Instructional Activities	Benchmarks/Assessments	Standards
Real Numbers and Integers	1 day	Perform operations using real numbers and integers	Review real number system Review how to perform functions such as add, subtract, multiply and divide.	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.A-REI.A.1
Operations with Rational Numbers and Exponents	1 day	Perform operations with using rational numbers and order of operations	Review rational numbers Review order of operations Review exponents	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.A-REI.A.1
Simplify algebraic expressions	1 day	Simplify algebraic expressions	Review combining like terms Review common mathematic	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.A-CED.A.1 MA.A-SSE.A.1a

			equations		
Translate algebraic and verbal expressions	1 day	Translate verbal expressions into algebraic expressions. Write algebraic expressions as verbal expressions	Review key mathematical terms and phrases	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.A-CED.A.1 MA.A-SSE.A.1a
Assess	1 day	Students demonstrate mastery of topics and concepts presented	Chapter review using varied teacher created/chosen materials and tasks	End of Section Test	MA.A-REI.A.1 MA.A-CED.A.1 MA.A-SSE.A.1a
Typing mathematical expressions in a graphing calculator	1 day	Simplify mathematical expressions using a graphing calculator	Show where general functions are on the graphing calculator	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	TECH.8.1.12.A.CS 2 TECH.8.1.12.A.CS1
Use more advanced functions such as *e* and pi, and compound interest	1 day	Solve mathematical equations using a graphing calculator	Show where more advanced functions of the calculator are found. Show students how to solve compound interest problems using graphing calculator	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	TECH.8.1.12.A.CS2 TECH.8.1.12.A.CS1
scientific notation and use excel worksheets	1 day	Interpret scientific notation from a graphing	Describe the difference between E*n* and E-*n*	Classwork assigned including real world application problems	TECH.8.1.12.A.CS2

		calculator Use an excel worksheet for when a graphing calculator is not available	Show how to input values into an excel worksheet	Teacher chosen/ created worksheets/activities	TECH.8.1.12.A.CS1 TECH.8.1.12.A.4
Graphing and table of values in a calculator	1 day	Use y= to graph an equation and interpret the equation with the table of values	Show how to input an equation using y= Show how to view/zoom a graph Show how to access use a table of values	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	TECH.8.1.12.A.CS2 TECH.8.1.12.A.CS1 TECH.8.1.12.A.4
Review and Assess	2 days	Students demonstrate mastery of topics and concepts presented	Chapter review using varied teacher created/chosen materials and tasks	End of Unit Test	TECH.8.1.12.A.CS2 TECH.8.1.12.A.CS1 TECH.8.1.12.A.4

Suggested Modifications for Special Education, ELL and Gifted Students

Modifications are on as as needed basis as per a students IEP.

IEP Modifications

Monday - Friday: Preferential seating, extended time, extra help, and other modifications are in place.

Depending upon the student in class, the following modifications will be used:

1. Refocus student to task or lesson
2. Monitoring comprehension

3. Repeating material for clarification
4. Extra time on test/quizzes
5. Study guides given out for those in need
6. Verbal praise
7. Reduce the workload
8. Eye contact
9. Encourage extra help
10. Visual clues
11. Additional Time for processing
12. Alternate Fashion Tests
13. Retaking of Tests
14. Material Read to Student
15. ** Mandatory calculator use.

Suggested Technological Innovations/Use

- Graphing calculator
- Chromebook for excel worksheets
- The use of Online Textbook Resources, Kahoot, Quia, Peardeck or other types of interactive software is encouraged.
- Teachers are encouraged to use electronic assessments to determine mastery of concepts taught.
- Instructional technology should be used to present and assess lessons such as: PowerPoint, Smart Notebook, etc.

Cross Curricular/21st Century Connections

9.1 21st Century Life and Career Skills: All students will demonstrate the creative, critical thinking, collaboration, and problem-solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures.

9.2 21st Century Life and Career Skills: Personal Financial Literacy: All students will develop skills and strategies that promote personal and financial responsibility related to financial planning, savings, investment, and charitable giving in the global economy.

9.3 21st Century Life and Career Skills: Career Awareness, Exploration, and Preparation: All students will

apply knowledge about and engage in the process of career awareness, exploration, and preparation in order to navigate the globally competitive work environment of the information age.

Unit 1: Functions

Content Area: **Mathematics**
Course(s): **Mathematics**
Time Period: **1st Semester**
Length: **14 days**
Status: **Not Published**

Summary of the Unit

This unit will cover understanding, interpreting, and solving functions. The functions will be given in multiple forms such as formulas, tables, graphs, and verbal descriptions.

Enduring Understandings

- Identify domain and range
- Determine if a relation is a function
- Evaluate functions
- Interpret functions in different forms (tables, graphs, verbal descriptions)
- Solve word problems involving functions

Essential Questions

- What is a function?
- What are the different methods that can be used to determine if a relation is a function?

Summative Assessment and/or Summative Criteria

- Students will take formal assessments in the form of tests and quizzes to review concepts learned in the unit.
- Students will demonstrate mastery through various assessment criteria included in the unit such as do nows, exit slips, classwork assignments, projects etc.

Resources

The resources used for this course are not limited to the ones suggested below:

- Functions and Change (A Modeling Approach to College Algebra) textbook

- College Prep Algebra textbook
- Teacher's Pay Teachers and other online resources for examples/activities
- Graphing calculators

Unit Plan

Topic/Selection	Timeframe	General Objectives	Instructional Activities	Benchmarks/Assessments	Standards
Relations, Functions, and Graphs	1.5 days	Identify domain and range Determine if the relation is a function Use function notation and evaluate functions	Define a relation, domain, and range Define a function Vertical Line Test Review how to substitute numbers in for a variable	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.F-IF.A.1 MA.F-IF.A.2
Functions Given by Formulas	1.5 days	Solve functions with one or more variables	Show notation for functions Solve a function for a specific variable.	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.F-IF.A.1 MA.F-IF.A.2
Functions Given by Tables	2 days	Interpret and evaluate functions given by tables	Explain in words meaning of tables Use tables to find missing values and future values	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.F-IF.B.4
Review and Assess	2 days	Students demonstrate mastery of topics and concepts presented	Chapter review using varied teacher created/chosen materials and tasks	Quiz	MA.F-IF.A.1 MA.F-IF.A.2

					MA.F-IF.B.4
Functions Given by Graphs	2.5 days	Interpret and evaluate functions given by graphs	Explain in words meaning of graphs Use graphs to find missing values and future values	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.F-IF.B.4 MA.F-IF.B.5
Functions Given by Words	2.5 days	Transform verbal descriptions to algebraic formulas and evaluate them	Review mathematical terms such as add (+), times (x), etc. Rewrite verbal descriptions as functions	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.F-IF.C.9
Review and Assess	2 days	Students demonstrate mastery of topics and concepts presented	Chapter review using varied teacher created/chosen materials and tasks	End of Unit Test	MA.F-IF.B.4 MA.F-IF.B.5 MA.F-IF.C.9

Suggested Modifications for Special Education, ELL and Gifted Students

Modifications are on as as needed basis as per a students IEP.

IEP Modifications

Monday - Friday: Preferential seating, extended time, extra help, and other modifications are in place.

Depending upon the student in class, the following modifications will be used:

1. Refocus student to task or lesson
2. Monitoring comprehension
3. Repeating material for clarification

4. Extra time on test/quizzes
5. Study guides given out for those in need
6. Verbal praise
7. Reduce the workload
8. Eye contact
9. Encourage extra help
10. Visual clues
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12. Alternate Fashion Tests
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Suggested Technological Innovations/Use

- Graphing calculator
- Chromebook for excel worksheets
- The use of Online Textbook Resources, Kahoot, Quia, Peardeck or other types of interactive software is encouraged.
- Teachers are encouraged to use electronic assessments to determine mastery of concepts taught.
- Instructional technology should be used to present and assess lessons such as: PowerPoint, Smart Notebook, etc.

Cross Curricular/21st Century Connections

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9.2 21st Century Life and Career Skills: Personal Financial Literacy: All students will develop skills and strategies that promote personal and financial responsibility related to financial planning, savings, investment, and charitable giving in the global economy.

9.3 21st Century Life and Career Skills: Career Awareness, Exploration, and Preparation: All students will apply knowledge about and engage in the process of career awareness, exploration, and preparation in order to

navigate the globally competitive work environment of the information age.

Unit 2: Graphical and Tabular Analysis

Content Area: **Mathematics**
Course(s): **Mathematics**
Time Period: **1st Semester**
Length: **35 days**
Status: **Not Published**

Summary of the Unit

This unit will cover tables and graphs of linear equations, nonlinear equations, and inequalities. It will also cover solving equations and inequalities by graphing and algebraic methods including factoring.

Enduring Understandings

- Create graphs by hand and with a graphing calculator
- Solve linear equations in standard and nonstandard form
- Sketch and solve linear inequalities
- Solve nonlinear equations
- Factor polynomials
- Solve polynomials by factoring

Essential Questions

- Based on a graph, what key information of a function can you determine?
- What key information can a table of values provide you for when you graph by hand?
- What does an inequality represent related to a real-life example?
- When factoring a polynomial, what key information can you determine?

Summative Assessment and/or Summative Criteria

- Students will take formal assessments in the form of tests and quizzes to review concepts learned in the unit.
- Students will demonstrate mastery through various assessment criteria included in the unit such as do nows, exit slips, classwork assignments, projects etc.

Resources

The resources used for this course are not limited to the ones suggested below:

- Functions and Change (A Modeling Approach to College Algebra) textbook
- College Prep Algebra textbook
- Teacher's Pay Teachers and other online resources for examples/activities
- Graphing calculators

Unit Plan

Topic/Selection	Timeframe	General Objectives	Instructional Activities	Benchmarks/Assessments	Standards
Tables and Trends	2 days	Create a table of values using formulas on a graphing calculator	Review how to find tables on a graphing calculator Optimize with a table of values	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	TECH.8.1.12.A.CS1 TECH.8.1.12.A.CS2 MA.A-REI.D.10
Graphs	2 days	Create graphs by hand Create graphs using a graphing calculator	Explain process of using a table of values to create a graph by hand Demonstrate on a graphing calculator how to trace the graph, choose a viewing window, and get limiting values	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	TECH.8.1.12.A.CS1 TECH.8.1.12.A.CS2 MA.A-REI.D.10
Review and Assess	2 days	Students demonstrate mastery of topics and concepts presented	Chapter review using varied teacher created/chosen materials and tasks	Quiz	TECH.8.1.12.A.CS1 TECH.8.1.12.A.CS2 MA.A-REI.D.10
Solving Linear Equations	1 day	Solve a linear	Define linear	Classwork assigned including real world	MA.A-REI.B.3

		equation in standard form and nonstandard form	equation Determine standard form vs nonstandard form Demonstrate solving a linear equation	application problems Teacher chosen/ created worksheets/activities	
Equations that Reduce to Linear Form	1 day	Solve linear equations that involve symbols of grouping, fractions, and decimals	Demonstrate more advanced linear equations Demonstrate distributive property	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.A-REI.B.3
Solving Linear Equations	2 days	Solve real-life linear equations	Demonstrate solving real-life examples using skills previously learned and a graphing calculator	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.A-REI.B.3
Linear Inequalities	1 day	Sketch the graphs of inequalities and solve.	Explain open and closed circles for an inequality Demonstrate graphing and solving linear inequalities	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.A-REI.B.3
Review and Assess	2 days	Students demonstrate mastery of topics and concepts presented	Chapter review using varied teacher created/chosen materials and tasks	Quiz	MA.A-REI.B.3
Solving Nonlinear	2 days	Use a graphing	Define nonlinear	Classwork assigned including real world	MA.A-REI.D.11

Equations		calculator to solve nonlinear equations	equation Demonstrate graphing nonlinear equations in a graphing calculator	application problems Teacher chosen/ created worksheets/activities	
Inequalities	3 days	Use a graphing calculator to represent and solve real life examples involving inequalities	Demonstrate on a graphing calculator how to represent inequalities	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.A-REI.B.3 MA.A-REI.D.11
Optimization	1 day	Use a formula to optimize a function	Determine maxima and minima of a graph Determine zeros of a graph	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.F-IF.B.4
Review and Assess	2 days	Students demonstrate mastery of topics and concepts presented	Chapter review using varied teacher created/chosen materials and tasks	Quiz	MA.A-REI.B.3 MA.A-REI.D.11 MA.F-IF.B.4
Factoring Polynomials with Common Factors	2 days	Find the greatest common factor of two or more expressions Factor out the greatest common monomial factor from polynomials	Define greatest common factor Define what it means to factor out Demonstrate factoring methods	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.A-SSE.A.2

		Factor polynomials by grouping			
Factoring Trinomials	2 days	Factor trinomials of the form x^2+bx+c Factor trinomials in two variables Factor trinomials completely	Find factors of numbers Demonstrate finding factors of c that add to equal b	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.A-SSE.B.3a
More about Factoring Trinomials	1 day	Factor trinomials of the form ax^2+bx+c Factor trinomials in two variables Factor trinomials completely	Demonstrate finding factors of a*c that add to equal b	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.A-SSE.B.3a
Factoring Polynomials with Special Forms	2 days	Factor the difference of two squares Factor a polynomial completely Identify and factor perfect square	Define difference of two squares, perfect square trinomials, and sum or difference of cubes. Define formulas for different of two squares, perfect square trinomials, and	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.A-SSE.A.2 MA.A-SSE.B.3a

		trinomials Factor the sum or difference of two cubes	sum and difference of cubes Demonstrate how to use formulas to factor		
Solving Polynomial Equations by Factoring	3 days	Use the Zero-Factor Property to solve equations Solve quadratic equations by factoring Solve higher-degree polynomial equations by factoring	Define zero-factor property and quadratic equation Explain guidelines for solving quadratic equations	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.A-SSE.B.3a
Review and Assess	2 days	Students demonstrate mastery of topics and concepts presented	Chapter review using varied teacher created/chosen materials and tasks	Test	MA.A-SSE.A.2 MA.A-SSE.B.3a

Suggested Modifications for Special Education, ELL and Gifted Students

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IEP Modifications

Monday - Friday: Preferential seating, extended time, extra help, and other modifications are in place.

Depending upon the student in class, the following modifications will be used:

1. Refocus student to task or lesson
2. Monitoring comprehension
3. Repeating material for clarification
4. Extra time on test/quizzes
5. Study guides given out for those in need
6. Verbal praise
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8. Eye contact
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Suggested Technological Innovations/Use

- Graphing calculator
- Chromebook for excel worksheets
- The use of Online Textbook Resources, Kahoot, Quia, Peardeck or other types of interactive software is encouraged.
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Cross Curricular/21st Century Connections

9.1 21st Century Life and Career Skills: All students will demonstrate the creative, critical thinking, collaboration, and problem-solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures.

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Unit 3: Straight Lines and Linear Functions

Content Area: **Mathematics**
Course(s): **Mathematics**
Time Period: **1st Semester**
Length: **21 days**
Status: **Not Published**

Summary of the Unit

This unit will explore linear equations and functions in different ways including systems of equations. It will cover graphing, solving, regression lines, and modeling real-life situations.

Enduring Understandings

- Determine slope
- Derive linear equations and functions
- Solve linear equations and functions graphically and algebraically
- Model linear equations and functions

Essential Questions

- What does slope represent on a graph?
- What key pieces of information do you need to derive linear equations from data?
- What can a regression line be used for in real-life examples?
- When solving a system of two equations, what are three methods that can be used? Will you get the same answer?

Summative Assessment and/or Summative Criteria

- Students will take formal assessments in the form of tests and quizzes to review concepts learned in the unit.
- Students will demonstrate mastery through various assessment criteria included in the unit such as do nows, exit slips, classwork assignments, projects etc.

Resources

The resources used for this course are not limited to the ones suggested below:

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- College Prep Algebra textbook
- Teacher's Pay Teachers and other online resources for examples/activities
- Graphing calculators

Unit Plan

Topic/Selection	Timeframe	General Objectives	Instructional Activities	Benchmarks/Assessments	Standards
Slope of Linear Equations	1 day	Determine the slope of a line through two points	Review change in y and change in x. Show how to find slope using the formula Explain slope in reference to a roof	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.A-CED.A.2
Linear Functions	2 days	Determine the relationship between linear functions and straight lines Derive a linear equation from data	Use knowledge of slopes and y-intercepts to determine equations of linear functions Explore linear equations in real-life examples	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.S-ID.B.6a MA.F-BF.A.1c
Modeling data with Linear Functions	2 days	Test data for linearity Use linear models to derive future data points	Use the graphing calculator to graph linear functions Graph Discrete Data	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.S-ID.C.7 MA.F-BF.A.1c
Linear Regression	2 days	Use a regression line to approximate data	Determine a regression line using slope and	Classwork assigned including real world application problems	MA.S-

			trends Use the regression line to make predictions in real life scenarios	Teacher chosen/ created worksheets/activities	ID.B.6a MA.F-BF.A.1c
Review and Assess	2 days	Students demonstrate mastery of topics and concepts presented	Chapter review using varied teacher created/chosen materials and tasks	Test	MA.A-CED.A.2 MA.S-ID.C.7 MA.S-ID.B.6a MA.F-BF.A.1c
Solving Systems of Equations by Graphing and Substitution	2 days	Determine whether ordered pairs are solutions of systems of equations Solve systems of equations graphically Use the method of substitution to solve systems of equations algebraically	Define a system of equations, a solution, and solving the system of equations Determine whether specific points are solutions algebraically Show graphing two equations and finding the intersection as a solution Explain the substitution method	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.A-REI.C.6
Solving Systems of Equations by Elimination	1 day	Solve systems of linear equations algebraically using the method of elimination	Explain the elimination method Define no-solution case and many solutions case	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.A-REI.C.6

		Solve systems with no solution or infinitely many solutions	Determine the number of solutions through elimination method		
Systems of Equations	2 days	Solve systems of equations involving real life examples by graphing and algebraically	Apply skills of solving systems of equations	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.A-REI.C.6
Review and Assess	2 days	Students demonstrate mastery of topics and concepts presented	Chapter review using varied teacher created/chosen materials and tasks	Quiz	MA.A-REI.C.6
Linear Systems in Three Variables	3 days	Solve systems of linear equations in row-echelon form using back-substitution Solve systems of linear equations using the method of Gaussian elimination.	Define row-echelon form, back-substitution, row operations, and Method of Gaussian Demonstrate solving systems of three variables using each method	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.A-REI.C.6
Review and Assess	2 days	Students demonstrate mastery of topics and concepts presented	Chapter review using varied teacher created/chosen materials and tasks	Quiz	MA.A-REI.C.6

Suggested Modifications for Special Education, ELL and Gifted Students

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Unit 4: Exponential Functions

Content Area: **Mathematics**
Course(s): **Mathematics**
Time Period: **2nd Semester**
Length: **28 days**
Status: **Not Published**

Summary of the Unit

This unit will cover topics of exponential and logarithmic functions. It will include evaluating, solving, re-writing, and applying the functions to real-life examples.

Enduring Understandings

- Evaluate and graph exponential functions
- Form composite functions
- Find inverse functions
- Apply exponential functions to growth and decay and percent growth and decay
- Evaluate, graph, and solve logarithmic functions
- Apply logarithmic functions to real life examples

Essential Questions

- How can you determine if a function is exponential?
- How can exponential growth and decay be used in real-life examples?
- How can a regression line help determine data?
- How are logarithms used in real-life examples?

Summative Assessment and/or Summative Criteria

- Students will take formal assessments in the form of tests and quizzes to review concepts learned in the unit.
- Students will demonstrate mastery through various assessment criteria included in the unit such as do nows, exit slips, classwork assignments, projects etc.

Resources

The resources used for this course are not limited to the ones suggested below:

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- College Prep Algebra textbook
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- Graphing calculators

Unit Plan

Topic/Selection	Timeframe	General Objectives	Instructional Activities	Benchmarks/Assessments	Standards
Exponential Functions	2 days	Evaluate and graph exponential functions Evaluate natural base *e* and graph natural exponential functions	Define exponential functions, exponential functions with base *a,* asymptote, natural base, natural exponential function Explore rules of exponential functions and use them to evaluate and graph Introduce the natural base	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.F-LE.A.4 MA.F-IF.C.7e MA.F-BF.B.4a
Composite and Inverse Functions	2 days	Form composite functions and find the domains of composite functions Find inverse functions	Define, composition, composite function, inverse function, one-to-one Explore domains	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.F-LE.A.4 MA.F-IF.C.7e MA.F-BF.B.4a

		algebraically Compare the graph of a function with the graph of its inverse	Review horizontal line test Explain finding an inverse		
Review and Assess	2 days	Students demonstrate mastery of topics and concepts presented	Chapter review using varied teacher created/chosen materials and tasks	Quiz	MA.F-LE.A.4 MA.F-IF.C.7e MA.F-BF.B.4a
Exponential Growth and Decay	2 days	Use exponential growth and decay in real life situations	Use knowledge of a exponential functions to determine growth and decay Show growth and decay on a graphing calculator	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	TECH.8.1.12.CS1 TECH.8.1.12.CS2 MA.F-IF.C.8b
Constant Percentage Change	2 days	Solve percent growth and percent decay equations	Explain percent growth and decay equations Use percent in real life examples	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.A-REI.D.11
Modeling Exponential Data	2 days	Recognize exponential data Construct an exponential model	Use prior knowledge of linear equations and exponential equations to recognize exponential data Explore exponential models using a graphing calculator	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	TECH.8.1.12.CS1 TECH.8.1.12.CS2 MA.A-REI.D.11
Modeling	2 days	Use an	Define	Classwork assigned	

Nearly Exponential Data		exponential regression line to approximate data	exponential regression Explore real life examples through approximation and graphing calculators	including real world application problems Teacher chosen/ created worksheets/activities	TECH.8.1.12.CS1 TECH.8.1.12.CS2 MA.S-ID.B.6a
Review and Assess	2 days	Students demonstrate mastery of topics and concepts presented	Chapter review using varied teacher created/chosen materials and tasks	Quiz	MA.F-LE.A.4 MA.F-IF.C.7e MA.F-BF.B.4a TECH.8.1.12.CS1 TECH.8.1.12.CS2 MA.F-IF.C.8b MA.A-REI.D.11 MA.S-ID.B.6a
Logarithmic Functions	2 days	Evaluate and graph logarithmic functions and natural logarithmic functions Use the change-of-base formula to evaluate logarithms	Define logarithm of x with base a, logarithmic function with base a, common logarithmic function, and natural logarithmic function Explore properties of logarithms and natural logarithms Practice graphing logarithmic functions	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.F-LE.A.4 MA.F-IF.C.7e MA.F-BF.B.4a

			Explain change of base formula		
Logarithmic Functions	2 days	Solve real life examples involving logarithmic functions	Use prior knowledge of logarithmic functions to solve real life examples	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.F-LE.A.4 MA.F-IF.C.7e MA.F-BF.B.4a
Properties of logarithms	3 days	Use the properties of logarithms to evaluate logarithms Rewrite, expand, or condense logarithmic expressions	Explore properties of logarithms Use properties of logarithms to expand and condense expressions	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.F-LE.A.4 MA.F-IF.C.7e MA.F-BF.B.4a
Solving Exponential and Logarithmic Equations	3 days	Use one-to-one properties and inverse properties to solve exponential and logarithmic equations	Explore one-to-one properties and inverse properties Apply properties to solve exponential and logarithmic equations	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.F-LE.A.4 MA.F-IF.C.7e MA.F-BF.B.4a
Review and Assess	2 days	Students demonstrate mastery of topics and concepts presented	Chapter review using varied teacher created/chosen materials and tasks	Test	MA.F-LE.A.4 MA.F-IF.C.7e MA.F-BF.B.4a

Suggested Modifications for Special Education, ELL and Gifted Students

Modifications are on as as needed basis as per a students IEP.

IEP Modifications

Monday - Friday: Preferential seating, extended time, extra help, and other modifications are in place.

Depending upon the student in class, the following modifications will be used:

1. Refocus student to task or lesson
2. Monitoring comprehension
3. Repeating material for clarification
4. Extra time on test/quizzes
5. Study guides given out for those in need
6. Verbal praise
7. Reduce the workload
8. Eye contact
9. Encourage extra help
10. Visual clues
11. Additional Time for processing
12. Alternate Fashion Tests
13. Retaking of Tests
14. Material Read to Student
15. ** Mandatory calculator use.

Suggested Technological Innovations/Use

- Graphing calculator
- Chromebook for excel worksheets
- The use of Online Textbook Resources, Kahoot, Quia, Peardeck or other types of interactive software is encouraged.
- Teachers are encouraged to use electronic assessments to determine mastery of concepts taught.
- Instructional technology should be used to present and assess lessons such as: PowerPoint, Smart Notebook, etc.

Cross Curricular/21st Century Connections

9.1 21st Century Life and Career Skills: All students will demonstrate the creative, critical thinking, collaboration, and problem-solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures.

9.2 21st Century Life and Career Skills: Personal Financial Literacy: All students will develop skills and strategies that promote personal and financial responsibility related to financial planning, savings, investment, and charitable giving in the global economy.

9.3 21st Century Life and Career Skills: Career Awareness, Exploration, and Preparation: All students will apply knowledge about and engage in the process of career awareness, exploration, and preparation in order to navigate the globally competitive work environment of the information age.

Unit 5: A Survey of Other Common Functions

Content Area: **Mathematics**
Course(s): **Mathematics**
Time Period: **2nd Semester**
Length: **61 days**
Status: **Not Published**

Summary of the Unit

The unit will cover radical exponents, rational exponents, radical expressions, rational expression, power functions, radical equations, complex numbers, quadratic equations, quadratic and rational inequalities, and high degree polynomials. It will include solving, graphing, simplifying, adding, subtracting, multiplying, and dividing if each type.

Enduring Understandings

- Use the rules of exponents to evaluate or simplify expressions with rational exponents
- Use the product and Quotient Rules for Radicals to simplify radical expressions
- Use the distributive property to add and subtract like radicals
- Use the distributive property or the FOIL method to multiply radical expressions
- Solve a radical equation by raising each side to the nth power
- Add, subtract, and multiply complex numbers
- Use complex conjugates to find the quotient of two complex numbers
- Solve quadratic equations by factoring and the square root property
- Use the quadratic formula to solve quadratic equations
- Solve quadratic equations by completing the square
- Write an equation of a parabola given the vertex and a point on the graph
- Use test intervals to solve quadratic and rational inequalities
- Add and subtract polynomials using a horizontal or vertical format
- Multiply polynomials using a horizontal or vertical format
- Use long division to divide polynomials by polynomials
- Multiply rational expressions and simplify
- Simplify the rational expressions
- Use synthetic division to divide and factor polynomials
- Divide rational expressions and simplify
- Add or subtract rational expressions and simplify
- Solve rational equations
- Simplify the complex fractions

Essential Questions

- What is the difference between radical, rational, and power functions?
- What prior knowledge can be used for radical and power functions?
- What can a power regression help determine?
- What does a complex number represent?

- When solving a quadratic equation, what methods can be used?
- What key information can be found from a quadratic equation?
- What is a quadratic regression?
- What is the difference between long division and synthetic division?
- What are restrictions for rational functions and complex fractions?

Summative Assessment and/or Summative Criteria

- Students will take formal assessments in the form of tests and quizzes to review concepts learned in the unit.
- Students will demonstrate mastery through various assessment criteria included in the unit such as do nows, exit slips, classwork assignments, projects etc.

Resources

The resources used for this course are not limited to the ones suggested below:

- Functions and Change (A Modeling Approach to College Algebra) textbook
- College Prep Algebra textbook
- Teacher's Pay Teachers and other online resources for examples/activities
- Graphing calculators

Unit Plan

Topic/Selection	Timeframe	General Objectives	Instructional Activities	Benchmarks/Assessments	Standards
Radicals and Rational Exponents	2 days	Determine the nth roots of numbers and evaluate radical expressions Use the rules of exponents to evaluate or simplify	Define nth root of a, square root, cube root, principal nth root of a, radical, index, radicand, rational exponents Explore properties of nth	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.N-RN.A.1 MA.N-RN.A.2

		expressions with rational exponents Evaluate radical functions and find the domains of radical functions	roots, inverse, and rules of exponents Use knowledge of domain to find domains of a radical function		
Simplifying Radical Expressions	2 days	Use the product and Quotient Rules for Radicals to simplify radical expressions Use rationalization techniques to simplify radical expressions	Explore product and quotient rules Practice simplifying radical expressions	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.N-RN.A.1 MA.N-RN.A.2
Adding and Subtracting Rational Expressions	2 days	Use the distributive property to add and subtract like radicals	Define like radicals Apply method of combining like terms to add and subtract radicals	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.N-RN.A.1 MA.N-RN.A.2
Multiplying and Dividing Radical Expressions	2 days	Use the distributive property or the FOIL method to multiply radical	Review distributive property and FOIL Define	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.N-RN.A.1 MA.N-RN.A.2

		expressions Determine the products of conjugates Simplify quotients involving radicals by rationalizing the denominators	conjugates		
Power Functions	2 days	Solve real life examples using power functions	Apply knowledge of power functions to word problems	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.A-REI.A.2
Review and Assess	2 days	Students demonstrate mastery of topics and concepts presented	Chapter review using varied teacher created/chosen materials and tasks	Quiz	MA.N-RN.A.1 MA.N-RN.A.2
Radical Equations and Applications	2 days	Solve a radical equation by raising each side to the nth power Solve application problems involving radical equations	Define raising a side to a power Apply steps of solving an equation to radical equations	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.A-REI.A.2
Modeling data with power functions	2 days	Use a graphing calculator to model power	Use prior knowledge to model power	Classwork assigned including real world application problems	MA.A-REI.A.2 MA.A-REI.D.11

		functions	functions Define power regression Explore real life examples through approximation and graphing calculators	Teacher chosen/ created worksheets/activities	TECH.8.1.12.CS1 TECH.8.1.12.CS2
Complex Numbers	2 days	Perform operations on numbers in *i*-form Add, subtract, and multiply complex numbers Use complex conjugates to find the quotient of two complex numbers	Define *i*-form, complex number, real part, imaginary part, standard form, pure imaginary number, complex conjugates	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.N-CN.A.1 MA.N-CN.A.2 MA.N-CN.A.3
Review and Assess	2 days	Students demonstrate mastery of topics and concepts presented	Chapter review using varied teacher created/chosen materials and tasks	Test	TECH.8.1.12.CS1 TECH.8.1.12.CS2 MA.N-RN.A.1 MA.N-RN.A.2 MA.A-REI.A.2 MA.A-REI.D.11 MA.N-CN.A.1 MA.N-CN.A.2 MA.N-CN.A.3

Solving Quadratic Equations	1 day	Solve quadratic equations by factoring and the square root property Use substitution to solve equations of quadratic form	Define double or repeated solution, extracting square roots, and quadratic form	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.A-REI.B.4b MA.N-CN.C.7
The Quadratic Formula	1 day	Use the quadratic formula to solve quadratic equations Determine the types of solutions of quadratic equations using the discriminant	Define quadratic formula, discriminant, reverse of zero-factor property	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.A-CED.A.4 MA.F-BF.B.4a
Quadratic Functions	2 days	Use a graphing calculator to model quadratic functions	Use prior knowledge to model quadratic functions Define quadratic regression Explore real life examples through approximation and graphing calculators	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	TECH.8.1.12.CS1 TECH.8.1.12.CS2 MA.F-IF.C.7a
Review and Assess	2 days	Students demonstrate mastery of	Chapter review using varied teacher	Quiz	

		topics and concepts presented	created/chosen materials and tasks		TECH.8.1.12.CS1 TECH.8.1.12.CS2 MA.F-IF.C.7a
Completing the Square	3 days	Rewrite quadratic expressions in completed square form Solve quadratic equations by completing the square	Define completing the square	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.A-CED.A.4 MA.F-BF.B.4a
Graphs of Quadratic Functions	2 days	Determine the vertices or parabolas and sketch parabolas Write an equation of a parabola given the vertex and a point on the graph	Define parabola, standard form, vertex, and axis Review graphing using a table of values	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.F-IF.C.7a
Applications of Quadratic Equations	2 days	Use quadratic equations to solve application problems	Apply knowledge of quadratic equations to solve real life examples	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.F-IF.C.7a
Quadratic and Rational Inequalities	2 days	Use test intervals to solve quadratic and rational inequalities	Define zeros, test intervals, and critical numbers	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.F-IF.C.7a
Review and Assess	2 days	Students demonstrate mastery of	Chapter review using varied teacher	Test	MA.F-IF.C.7a

		topics and concepts presented	created/chosen materials and tasks		MA.A-CED.A.4 MA.F-BF.B.4a
Adding and subtracting polynomials	2 days	Identify the degrees and leading coefficients of polynomials Add and subtract polynomials using a horizontal or vertical format	Define polynomial in x, degree n, leading coefficient, and constant term Review properties of adding and subtracting	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.A-SSE.A.2
Multiplying Polynomials (Special Products)	1 day	Find products with monomial multipliers Multiply binomials using the distributive property and the FOIL method Multiply polynomials using a horizontal or vertical format Identify and use special binomial products	Review FOIL Define sum and difference of two terms and square of a binomial	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.A-APR.A.1 MA.A-SSE.A.2
Dividing Polynomials	3 days	Divide polynomials	Define dividend, divisor, quotient,	Classwork assigned including real world	MA.A-APR.D.6

and Synthetic Division		by monomials and write in simplest form Use long division to divide polynomials by polynomials Use synthetic division to divide and factor polynomials	and remainder	application problems Teacher chosen/ created worksheets/activities	
Review and Assess	2 days	Students demonstrate mastery of topics and concepts presented	Chapter review using varied teacher created/chosen materials and tasks	Quiz	MA.A-APR.A.1 MA.A-APR.D.6 MA.A-SSE.A.2
Rational Expressions and Functions	1 day	Find the domain of a rational function Simplify the rational expressions	Define rational expression, domain, and rational function	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.A-APR.D.6
Multiplying and Dividing Rational Expressions	2 days	Multiply rational expressions and simplify Divide rational expressions and simplify	Review keep, change, flip method	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.A-APR.D.7
Adding and Subtracting Rational	2 days	Add or subtract rational	Define least common multiple and	Classwork assigned including real world	MA.A-APR.D.6

Expressions		expressions with like denominators, and simplify Add or subtract rational expressions with unlike denominators, and simplify	least common denominator	application problems Teacher chosen/ created worksheets/activities	MA.A-APR.D.7
Higher Degree Polynomials and Rational Functions	2 days	Use a graphing calculator to model higher degree polynomials and rational functions	Use prior knowledge to model higher degree polynomials and rational functions Define poles and asymptotes Explore real life examples through approximation and graphing calculators	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	TECH.8.1.12.CS1 TECH.8.1.12.CS2 MA.A-REI.D.11
Review and Assess	2 days	Students demonstrate mastery of topics and concepts presented	Chapter review using varied teacher created/chosen materials and tasks	Quiz	MA.A-APR.D.6 MA.A-REI.D.11 MA.A-APR.D.7 TECH.8.1.12.CS1 TECH.8.1.12.CS2
Complex Fractions	2 days	Simplify the complex fractions using rules for dividing rational expressions	Define complex fraction Review and expand on keep, change, flip	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.A-APR.D.6 MA.A-APR.D.7

		Simplify complex fractions that have a sum or difference in the numerator and/or denominator			
Solving Rational Equations	3 days	Solve rational equations containing constant denominators Solve rational equations containing variable denominators	Define constant and variable denominators	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.A-REI.A.2
Review and Assess	2 days	Students demonstrate mastery of topics and concepts presented	Chapter review using varied teacher created/chosen materials and tasks	Quiz	MA.A-REI.A.2 MA.A-APR.D.6 MA.A-APR.D.7

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