# **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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Statement of Purpose

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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.

- $\circ\,$  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**

Mathematics
Mathematics
1st Semester
11 days
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 Obiectives	Instructional Activities	Benchmarks/Assessments	Standards
Real Numbers and Integers	1 day	Perform operations using real numbers and	Review real number system	Classwork assigned including real world application problems	MA.A-REI.A.1
		integers	Review how to perform functions such as add, subtract, multiply and divide.	Teacher chosen/ created worksheets/activities	
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	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.A-REI.A.1
			Review exponents		
Simplify algebraic	1 day	Simplify algebraic	Review combining like	Classwork assigned including real world application problems	MA.A-CED.A.1
expressions		expressions	terms Review common mathematic	Teacher chosen/ created worksheets/activities	MA.A-SSE.A.1a

			equations		
Translate algebraic and verbal expressions	1 day	Translate verbal expressions into algebraic expressions.	Review key mathematical terms and phrases	Classwork assigned including real world application problems	MA.A-CED.A.1
		Write algebraic expressions as verbal expressions		Teacher chosen/ created worksheets/activities	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 <i>e</i> 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 $En$ and $E-n$	Classwork assigned including real world application problems	TECH.8.1.12.A.CS2

		calculator			TECH.8.1.12.A.CS1
		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.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	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
Daview and	2 days	Ctudouta	Show how to access use a table of values	End of Unit Tost	
Assess	2 days	demonstrate mastery of topics and concepts presented	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 21<sup>st</sup> 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 21<sup>st</sup> 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

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

#### Unit Plan

					MA.F- IF.B.4
Functions Giver by Graphs	2.5 days	Interpret and evaluate functions given by graphs	Explain in words meaning of graphs	Classwork assigned including real world application problems	MA.F- IF.B.4 MA.F- IF.B.5
			Use graphs to find missing values and future values	Teacher chosen/ created worksheets/activities	
Functions Giver 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
- 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 21<sup>st</sup> 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 21<sup>st</sup> 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 21<sup>st</sup> 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

<b>Topic/Selection</b>	Timeframe	General	Instructional	Benchmarks/Assessments	Standards
		Objectives	Activities		
Tables and Trends	2 days	Create a table of values using	Review how to find tables on a graphing	Classwork assigned including real world application problems	TECH.8.1.12.A.CS
		a graphing calculator	calculator	Teacher chosen/ created	MA.A-REI.D.10
			Optimize with a table of values	worksheets/activities	
Graphs	2 days	Create	Explain process	Classwork assigned	
		graphs by hand	of using a table of values to create a graph	application problems	TECH.8.1.12.A.CS 1
			by hand		TECH.8.1.12.A.CS2
		Create graphs using		Teacher chosen/ created worksheets/activities	MA.A-REI.D.10
		a graphing calculator	Demonstrate on a graphing calculator how		
			to trace the graph, choose a		
			viewing window, and get limiting values		
Review and	2 days	Students	Chapter review	Quiz	
Assess		demonstrate mastery of topics and	using varied teacher created/chosen		TECH.8.1.12.A.CS 1
		concepts presented	materials and tasks		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	application problems Teacher chosen/ created sworksheets/activities	
			Demonstrate solving a linear equation		
Equations that Reduce to Linear Form	1 day	Solve linear equations that involve symbols of grouping, fractions,	Demonstrate more advanced linear equations	Classwork assigned including real world application problems	MA.A-REI.B.3
		and decimals	distributive property	worksheets/activities	
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	Classwork assigned including real world application problems	MA.A-REI.B.3
			Demonstrate graphing and solving linear inequalities	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-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	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	Define greatest common factor Define what it means to factor out	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.A-SSE.A.2
		Factor out the greatest common monomial factor from polynomials	Demonstrate factoring methods		

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

		trinomials Factor the sum or difference of	sum and difference of cubes Demonstrate		
		two cubes	how to use formulas to factor		
Solving Polynomial Equations by Factoring	3 days	Use the Zero-Factor Property to solve equations	Define zero- factor property and quadratic equation	Classwork assigned including real world application problems	MA.A-SSE.B.3a
		Solve quadratic equations by factoring	Explain guidelines for solving quadratic equations	Teacher chosen/ created worksheets/activities	
		Solve higher- degree polynomial equations by factoring			
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

#### **IEP Modifications**

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- 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 21<sup>st</sup> 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

# <u>Unit</u> 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.	Classwork assigned including real world application problems	MA.A- CED.A.2
			Show how to find slope using the formula	Teacher chosen/ created worksheets/activities	
			Explain slope in reference to a roof		
Linear Functions	2 days	Determine the relationship between linear functions and straight lines	Use knowledge of slopes and y- intercepts to determine equations of linear functions	Classwork assigned including real world application problems	MA.S- ID.B.6a MA.F- BF.A.1c
		Derive a linear equation from data	Explore linear equations in real- life examples	Teacher chosen/ created worksheets/activities	
Modeling data with Linear Functions	2 days	Test data for linearity	Use the graphing calculator to graph linear functions	Classwork assigned including real world application problems	MA.S- ID.C.7
		Use linear models to derive future data points	Graph Discrete Data	Teacher chosen/ created worksheets/activities	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		ID.B.6a
			Use the regression line to make predictions in real life scenarios	Teacher chosen/ created worksheets/activities	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	Define a system of equations, a solution, and solving the system of equations	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.A- REI.C.6
		Solve systems of equations graphically	Determine whether specific points are solutions algebraically	worksheets, derivities	
		Use the method of substitution to solve systems of equations algebraically	Show graphing two equations and finding the intersection as a solution		
			Explain the substitution method		
Solving Systems of Equations by Elimination	1 day	Solve systems of linear equations algebraically using the method of	Explain the elimination method Define no-solution	Classwork assigned including real world application problems	MA.A- REI.C.6
		elimination	case and many solutions case	Teacher chosen/ created worksheets/activities	

		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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#### Suggested Technological Innovations/Use

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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:

- 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

# <u>Unit Plan</u>

Topic/Selection	Timeframe	General Objectives	Instructional Activities	Benchmarks/Assessments	Standards
Exponential Functions	2 days	Evaluate and graph exponential functions	Define exponential functions, exponential functions with	Classwork assigned including real world application problems	MA.F-LE.A.4 MA.F-IF.C.7e
		Evaluate natural base <i>e</i> and graph natural exponential functions	base <i>a</i> , asymptote, natural base, natural exponential function	Teacher chosen/ created worksheets/activities	MA.F-BF.B.4a
			Explore rules of exponential functions and use them to evaluate and graph		
			Introduce the natural base		
Composite and Inverse Functions	2 days	Form composite functions and	Define, composition, composite	Classwork assigned including real world application problems	MA.F-LE.A.4
		domains of composite functions	function, inverse function, one-to- one	Teacher chosen/ created worksheets/activities	MA.F-IF.C.7e
		Find inverse functions	Explore domains		μν <u>α τ.1 -</u> D1 .D.τα

		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
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	MA.F-BF.B.4a TECH.8.1.12.CS 1 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	Classwork assigned including real world application problems	MA.A-REI.D.11
Modeling Exponential Data	2 days	Recognize exponential data Construct an exponential model	Use percent in real life examples Use prior knowledge of linear equations and exponential equations to recognize exponential data Explore exponential models using a graphing calculator	Teacher chosen/ created worksheets/activities 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	MA.F-LE.A.4 MA.F-IF.C.7e
				Teacher chosen/ created worksheets/activities	MA.F-BF.B.4a
Properties of logarithms	3 days	Use the properties of logarithms to evaluate	Explore properties of logarithms	Classwork assigned including real world application problems	MA.F-LE.A.4
		logarithms Rewrite, expand, or condense logarithmic	Use properties of logarithms to expand and condense expressions	Teacher chosen/ created worksheets/activities	MA.F-IF.C.7e
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

#### **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 21<sup>st</sup> 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 21<sup>st</sup> 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 21<sup>st</sup> 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	Define nth root of a, square root, cube root, principal nth root of a, radical, index, radicand, rational exponents	Classwork assigned including real world application problems Teacher chosen/ created worksheets/activities	MA.N-RN.A.1 MA.N-RN.A.2
		Use the rules of exponents			
		to evaluate or simplify	Explore properties of nth		

		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	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
		Use rationalization techniques to simplify radical expressions			
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	Classwork assigned including real world application problems Teacher chosen/ created	MA.N-RN.A.1 MA.N-RN.A.2

		expressions	conjugates		
		Determine the			
		products of			
		conjugates			
		Simplify			
		quotients			
		involving			
		radicals by			
		rationalizing			
		the			
		denominators			
Power	2 days	Solve real life	Apply	Classwork assigned	MA.A-REI.A.2
Functions		examples	knowledge of	including real world	
		using power	power functions	application problems	
		lunctions	nrohloms		
			problems		
				Teacher chosen/ created	
				worksheets/activities	
Review and	2 days	Students	Chapter review	Quiz	MA.N-RN.A.1
Assess		demonstrate	using varied		
		mastery of	teacher		
		topics and	created/chosen		MAN-RNA2
		concepts	materials and		WIA.IN-ININ.A.2
		presented	lasks		
Radical	2 days	Solve a	Define raising a	Classwork assigned	MA.A-REI.A.2
Equations and		radical	side to a power	including real world	
Applications		equation by		application problems	
		raising each			
		side to the nth	Apply steps of		
		power	solving an	Teacher chosen/ created	
			equation to	worksheets/activities	
			radical equations		
		Solve			
		application			
		problems			
		involving			
		radical			
		equations	 		
Modeling data	2 days	Use a	Use prior	Classwork assigned	MA.A-REI.A.2
with power		graphing	knowledge to	including real world	
runctions		calculator to	model power	application problems	
		moder power			

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

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	722022		mastery of	teacher		

		topics and	created/chosen		TECH.8.1.12.CS1
		concepts presented	materials and tasks		TECH.8.1.12.CS2
					MA.F-IF.C.7a
Completing the Square	3 days	Rewrite quadratic expressions in completed square form	Define completing the square	Classwork assigned including real world application problems	MA.A-CED.A.4 MA.F-BF.B.4a
				Teacher chosen/ created worksheets/activities	
		Solve quadratic equations by completing the square			
Graphs of Quadratic Functions	2 days	Determine the vertices or parabolas and sketch parabolas	Define parabola, standard form, vertex, and axis	Classwork assigned including real world application problems	MA.F-IF.C.7a
		Write an equation of a parabola given the vertex and a point on the graph	Review graphing using a table of values	Teacher chosen/ created worksheets/activities	
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	created/chosen		MA.A-CED.A.4
		concepts presented	materials and tasks		MA.F-BF.B.4a
Adding and subtracting polynomials	2 days	Identify the degrees and leading coefficients of polynomials	Define polynomial in x, degree n, leading coefficient, and constant term	Classwork assigned including real world application problems	MA.A-SSE.A.2
		Add and subtract polynomials using a horizontal or vertical format	Review properties of adding and subtracting	Teacher chosen/ created worksheets/activities	
Multiplying Polynomials (Special	1 day	Find products with monomial	Review FOIL	Classwork assigned including real world application problems	MA.A-APR.A.1
Products)		Multiply binomials using the distributive property and the FOIL method	Define sum and difference of two terms and square of a binomial	Teacher chosen/ created worksheets/activities	MA.A-SSE.A.2
		Multiply polynomials using a horizontal or vertical format			
		Identify and use special binomial products			
Dividing Polynomials	3 days	Divide polynomials	Define dividend, divisor, quotient,	Classwork assigned including real world	MA.A-APR.D.6

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

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	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
			Explore real life examples through approximation and graphing calculators		
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
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

		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	Define constant and variable denominators	Classwork assigned including real world application problems Teacher chosen/ created	MA.A-REI.A.2
		Solve rational equations containing variable denominators		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-REI.A.2 MA.A-APR.D.6 MA.A-APR.D.7

#### **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 21<sup>st</sup> 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 21<sup>st</sup> 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 21<sup>st</sup> 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.