CTECS Mathematics Department

Algebra 1 Curriculum

Rev. 3/26

Contents

Vision of a Graduate

The Vision of a Graduate (VoG) at the Connecticut Technical Education and Career System (CTECS) embodies our commitment to preparing students for success in Connecticut's workforce.

Developed in collaboration with students, parents, staff, and employers, the VoG ensures that CTECS students are not only job-ready but also equipped to lead, innovate, and adapt in a dynamic world.

As educators, we are dedicated to developing these qualities by providing a comprehensive education that empowers our students to achieve their fullest potential and make meaningful contributions to society.

A Problem Solver	Work Ready
Problem solvers tackle challenges by identifying root causes of issues, brainstorming solutions, implementing effective strategies, and demonstrating adaptability. ➔ Engage students with open-ended, creative thinking tasks that require both conventional and innovative solutions. ➔ Facilitate group discussions and collaborative projects. ➔ Use real-world scenarios and hands-on activities. ➔ Highlight the importance of effort, persistence, and continuous learning. ➔ Provide regular feedback and encourage reflection.	*To be work-ready includes a combination of technical expertise, soft skills, and personal qualities that ensure a graduate can effectively contribute to the workplace from day one.* ➔ Set high standards for punctuality, responsibility, professionalism, and task completion. ➔ Use project-based learning and collaborative assignments. ➔ Emphasize clear written and verbal communication. ➔ Offer practical exercises like mock interviews and resume workshops. ➔ Integrate technology and teach digital literacy.
Respectful	Skilled Socially

Graduates who embody respectfulness emphasize the importance of treating others with dignity, valuing diversity, and fostering an inclusive and positive environment, both personally and professionally.

- Demonstrate personal, interpersonal, and professional skills.
- Show respect for diversity.
- Model respect through active listening and empathy.
- Set clear expectations for respectful interactions.
- Promote collaboration and group discussions.
- Celebrate respectful behavior.
- Address disrespect promptly and constructively.

Graduates who are skilled socially are equipped to navigate social environments, build relationships, and contribute positively to their communities and workplaces.

- Show awareness of global responsibility to others and the environment.
- Participate in community involvement.
- Design cooperative group projects and team activities
- Set expectations for respect and give regular feedback.
- Facilitate discussions on inclusivity, kindness, and respect.
- Model positive interactions and recognize strong social skills.

A Critical Thinker

Critical thinkers approach problems systematically by analyzing, evaluating, and synthesizing information to make well-informed decisions and contribute to innovative solutions.

- Encourage critical thinking individually and collaboratively.
- Design lessons that challenge assumptions and explore diverse viewpoints.
- Use open-ended questions, rigorous activities, and cross-curricular projects.
- Integrate project-based learning and real-world problem-solving.
- Offer reflective opportunities like journaling and discussions.
- Cultivate an environment that values curiosity and

An Effective Communicator

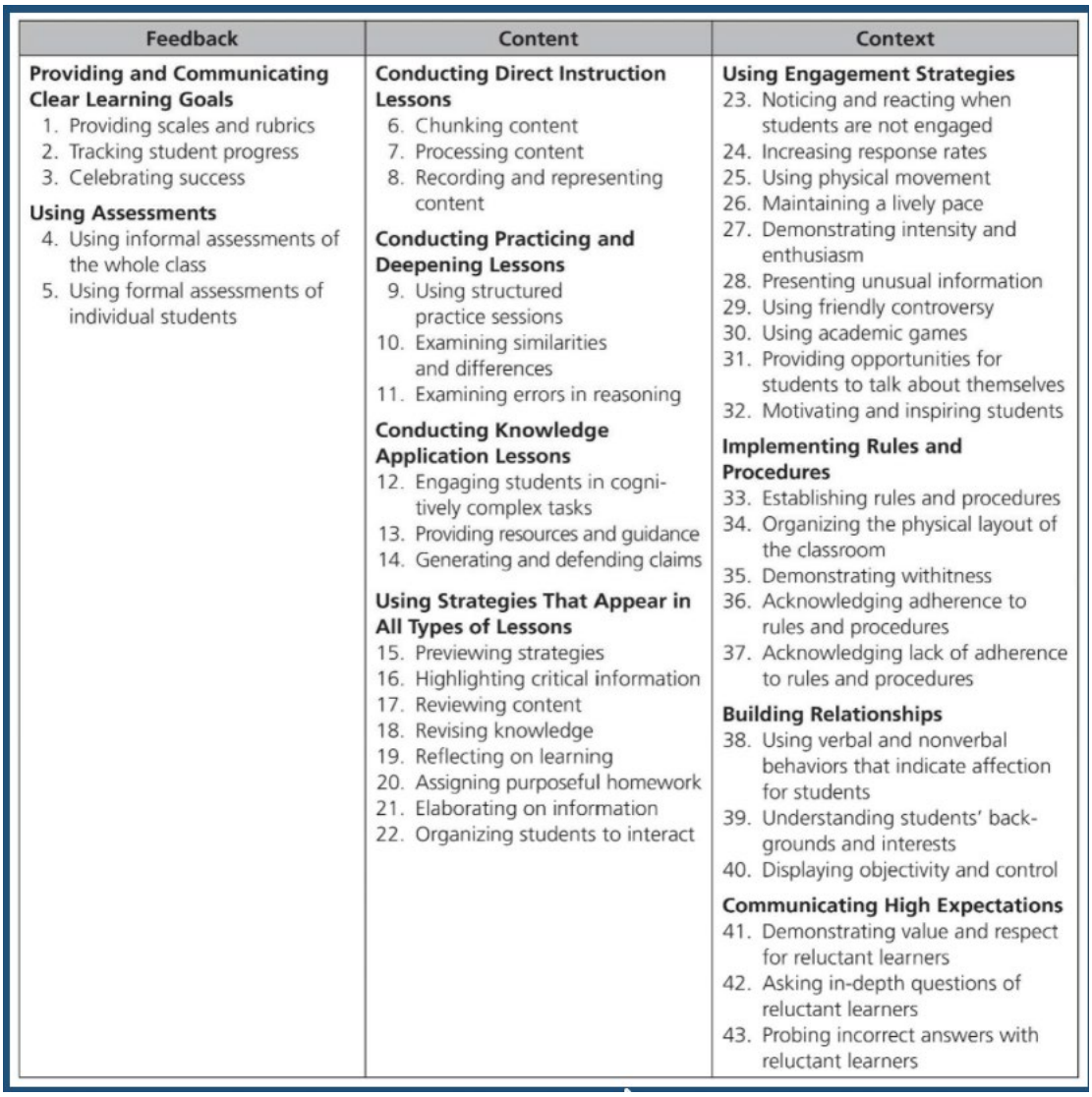
Effective communicators convey ideas, information, and emotions accurately and persuasively, fostering understanding and collaboration.

- Communicate effectively using oral, written, visual, artistic, and technical modes.
- Include group discussions, presentations, and peer reviews.
- Promote active listening and thoughtful responses.
- Offer clear guidelines and constructive feedback.
- Stress clear, respectful, and purposeful communication.

inquiry.	

CTECS Instructional Model

CTECS uses the Marzano Compendium to guide research-based instructional strategies that differentiate learning and promote access, engagement, and success for all students. Teachers apply these strategies to support diverse learners (including multilingual learners, students with disabilities, and students with varied academic or technical backgrounds) through scaffolds, modeling, guided practice, and multiple ways to participate and show understanding. This approach ensures every student can work toward proficiency in the Priority Standards and the competencies outlined in the CTECS Vision of a Graduate.



Feedback	Content	Context
Providing and Communicating Clear Learning Goals 1. Providing scales and rubrics 2. Tracking student progress 3. Celebrating success **Using Assessments** 4. Using informal assessments of the whole class 5. Using formal assessments of individual students	**Conducting Direct Instruction Lessons** 6. Chunking content 7. Processing content 8. Recording and representing content **Conducting Practicing and Deepening Lessons** 9. Using structured practice sessions 10. Examining similarities and differences 11. Examining errors in reasoning **Conducting Knowledge Application Lessons** 12. Engaging students in cognitively complex tasks 13. Providing resources and guidance 14. Generating and defending claims **Using Strategies That Appear in All Types of Lessons** 15. Previewing strategies 16. Highlighting critical information 17. Reviewing content 18. Revising knowledge 19. Reflecting on learning 20. Assigning purposeful homework 21. Elaborating on information 22. Organizing students to interact	**Using Engagement Strategies** 23. Noticing and reacting when students are not engaged 24. Increasing response rates 25. Using physical movement 26. Maintaining a lively pace 27. Demonstrating intensity and enthusiasm 28. Presenting unusual information 29. Using friendly controversy 30. Using academic games 31. Providing opportunities for students to talk about themselves 32. Motivating and inspiring students **Implementing Rules and Procedures** 33. Establishing rules and procedures 34. Organizing the physical layout of the classroom 35. Demonstrating withitness 36. Acknowledging adherence to rules and procedures 37. Acknowledging lack of adherence to rules and procedures **Building Relationships** 38. Using verbal and nonverbal behaviors that indicate affection for students 39. Understanding students' backgrounds and interests 40. Displaying objectivity and control **Communicating High Expectations** 41. Demonstrating value and respect for reluctant learners 42. Asking in-depth questions of reluctant learners 43. Probing incorrect answers with reluctant learners

Curriculum Introduction

The Algebra 1 curriculum is designed to transform students into **effective collaborators, technology users, critical thinkers, and problem solvers**. By engaging in **argumentative discourse and mathematical reasoning**, students learn to model and solve complex expressions and equations within authentic, real-world contexts.

Instructional Framework

The curriculum leverages a research-based instructional plan consisting of three distinct phases to ensure student success in acquisition, meaning, and transfer:

- **Launching:** Students focus on a "big concept," exploring patterns and making predictions to spark curiosity.
- **Exploring and Developing:** Through guided questions and collaborative workstations, students dive deep into investigations and provide evidence-based reasoning.
- **Practice and Reflection:** Students engage in group or independent practice, reflecting on their initial hypotheses and lesson outcomes.

Course Map

The Algebra 1 course is designed to build a progression of mathematical skills, starting with foundational expressions and culminating in the study of quadratic functions. The following map outlines the curriculum based on the provided unit documents and pacing guide.

Unit 1: Expressions

- **Duration:** 1 week
- **Focus:** Students learn to **write and evaluate numerical and algebraic expressions**. They apply the Distributive Property and work with absolute value expressions.
- **Key Topics:** Order of operations, properties of real numbers, and combining like terms.

Unit 2: Linear Equations and Inequalities

- **Duration:** 3–4 weeks
- **Focus:** This unit covers **solving one-variable linear equations** and proportions, as well as rearranging formulas to highlight specific quantities. Students also write, solve, and graph **linear inequalities** in one and two variables.
- **Key Topics:** Variables on both sides, multi-step equations, and set-builder notation.

Unit 3: Functions

- **Duration:** 3 weeks

- **Focus:** Students represent relations using **ordered pairs, tables, mappings, and graphs** to determine if they are functions. This unit introduces **function notation** and finding function values.
- **Key Topics:** Independent and dependent variables, **domain and range** (discrete and continuous), and identifying linear vs. nonlinear functions.

Unit 4: Linear Functions

- **Duration:** 3 weeks
- **Focus:** The focus shifts to **graphing linear, piecewise-defined, step, and absolute value functions**. Students calculate the **rate of change and slope** and identify the effects of transformations on graphs.
- **Key Topics:** Intercepts, slope-intercept form, standard form, point-slope form, and arithmetic sequences.

Unit 5: Systems of Linear Equations

- **Duration:** 3 weeks
- **Focus:** Students solve systems of equations using diverse methods, including **graphing, substitution, and elimination**. They also represent and graph the solution sets for **systems of linear inequalities**.
- **Key Topics:** Breakeven points, viable vs. non-viable solutions, and using technology for approximations.

Unit 4a: Laws of Exponents

- **Pacing Placement:** Follows Systems of Equations.
- **Focus:** Mastering the rules governing exponents.
- **Key Topics:** Product, Quotient, and Power Rules; **negative and zero exponents**.

Unit 6: Working with Polynomials

- **Duration:** 1 week
- **Focus:** Students perform operations on polynomials, including **adding, subtracting, and multiplying**. They also explore the relationship between polynomials and **special products**.

- **Key Topics:** Monomials, binomials, trinomials, and the difference of two squares.

Unit 7: Quadratic Functions and Equations

- **Duration:** 3 weeks
- **Focus:** This unit covers **graphing quadratic functions** and their transformations, as well as solving quadratic equations using various methods. Students also learn to solve **systems of linear and quadratic equations**.
- **Key Topics: Vertex form, axis of symmetry**, zeros/roots, maximum and minimum values, and **completing the square**.

Assessments

- The course includes periodic unit tests and performance tasks for each module.
- A **Midterm Assessment** is administered after Unit 2b (Graphing), and a **Final Exam** concludes the course after Unit 4b (Polynomials/Quadratics).

Instructional Approach

The Algebra 1 instructional approach is designed to foster student success in **acquisition, meaning, and transfer** by leveraging rigorous learning activities centered on **collaboration and argumentative discourse**. This research-based framework is structured around a three-phase instructional plan:

1. The Three-Phase Instructional Plan

- **Launch:** Teachers provide opportunities for students to focus on a **"big concept"** by exploring patterns, making predictions, and developing hypotheses. This phase often utilizes **Math Talk routines** and collaborative grouping to spark curiosity and stimulate engagement.
- **Exploration and Development:** Students engage in deep exploration of their hypotheses through **guided questions**, collaborative workstations, or direct instruction. During this phase,

students are encouraged to provide **evidence-based writing** and share their findings with the class.

- **Practice and Reflection:** Students participate in group or independent practice. This stage includes **reflecting on initial questions or hypotheses** and performing lesson reflections through tools like exit tickets or journal entries.

2. Collaborative & Argumentative Discourse

A central tenet of the approach is transforming students into effective collaborators and critical thinkers through reasoning.

- **Think-Pair-Share:** This routine is used extensively to allow students to individually process information, such as studying a graph or expression, before discussing observations with a partner or small group.
- **Graphic Organizers:** Students use organizers to record what they **"notice and wonder,"** helping them generate their own strategies and assumptions for solving problems in authentic contexts.
- **Peer Evaluation:** Students often share their mathematical models with the class to collect feedback based on **proficiency scales**.

3. Differentiation and Intervention

To ensure all students achieve mastery, the curriculum provides specific strategies for different learner needs:

- **Tiered Assignments:** Significant tasks are often categorized into **Approaching Level** (for students below the desired level), **On Level**, and **Beyond Level** (for high-performing students).
- **Intervention for Non-Mastery:** Strategies include **scaffolding**, reteaching that addresses multiple intelligences, daily math reviews, and the use of graphic organizers.
- **Support for ELL Students:** Support includes connecting math to primary language and culture, creating **visual reference charts**, increasing repetition, and allowing for additional processing time.

4. Technology Integration

The curriculum integrates various digital resources to support investigation and experimentation. Key tools include **Desmos** and **TI-84 calculators** for graphing and modeling for adaptive learning using IXL., and interactive platforms like Khan Academy and Google Suite applications. These tools are used to help students visualize relationships, such as how parameters affect quadratic functions.

Vertical Alignment

The vertical alignment for the Algebra 1 curriculum is designed to move students from **foundational arithmetic concepts** to **complex mathematical modeling**, ensuring each unit provides the necessary skills for the next. This progression is anchored in the transition from middle school standards to high school proficiency.

1. Building from Middle School (8th Grade Transition)

The curriculum begins by bridging the gap from 8th-grade mathematics. **Unit 3 (Functions)**, for example, explicitly incorporates **Supporting Standards from Grade 8** (e.g., 8.F.A.1, 8.F.A.2), which focus on understanding functions as rules that assign inputs to outputs and comparing properties of functions in different representations. Similarly, **Unit 2** addresses 8th-grade standards for solving linear equations in one variable (8. EE.C.7).

2. Foundational Logic: Expressions to Equations

- **Unit 1 (Expressions):** Sets the groundwork by teaching students to **interpret the structure of expressions**, such as identifying terms, factors, and coefficients.
- **Unit 2 (Linear Equations and Inequalities):** Builds directly on Unit 1 by applying those expression-handling skills to **solve one-variable equations** and rearrange formulas to highlight quantities of interest.

3. Transitioning to Relationships and Functions

Once students master one-variable equations, the curriculum shifts toward **relationships between two varying quantities**:

- **Units 3 & 4 (Functions and Linear Functions):** These units move from general relations to specific **linear models**. Students learn to represent these relationships through graphs, tables, and mappings, focusing on **rate of change (slope)** and transformations.

- **Unit 5 (Systems of Linear Equations):** This represents a jump in vertical complexity, where students move from analyzing a single relationship to **comparing two linear models** simultaneously to find "breakeven points".

4. Advanced Structural and Non-Linear Modeling

The final units prepare students for higher-level mathematics (such as Algebra 2 or Geometry) by introducing more abstract structures:

- **Unit 6 (Working with Polynomials):** Students are introduced to a system **analogous to integers**, learning that polynomials are closed under addition, subtraction, and multiplication.
- **Unit 7 (Quadratic Functions and Equations):** This is the culmination of the course, where students use the skills from all previous units to **model real-world non-linear relationships**. They learn to identify key features of parabolas—such as vertices, zeros, and intercepts—to resolve complex contextual issues.

5. Consistency in Skills (Acquisition to Transfer)
Throughout the entire curriculum, a consistent vertical strategy is employed: students move from **acquisition** (learning a skill) to **meaning** (understanding the "Big Idea") to **transfer** (applying the skill to an authentic situation). This is supported by **SAT-aligned priority standards** that appear repeatedly across the units to ensure college

Vocabulary

Vocabulary instruction in the Algebra 1 curriculum is an integrated process designed to support **argumentative discourse** and mathematical reasoning. Rather than isolated memorization, vocabulary is taught as a tool for students to "interpret real-world problems" and "make sense of authentic situations".
Core Instructional Strategies

- **Daily Review and Support:** Every unit explicitly includes **daily vocabulary review** as a primary strategy for supporting English Language Learners (ELL) and students requiring intervention.
- **Visual and Structural Scaffolding:** Teachers are encouraged to create **visual reference charts**, such as picture or word webs, to help students connect primary language and culture to mathematical terms.
- **Graphic Organizers:** Students use graphic organizers to record what they "notice and wonder," which includes identifying and applying key terms like **independent and dependent variables** or **domain and range**.
- **Defining Variables:** A critical component of vocabulary instruction involves having students "define appropriate quantities" for descriptive modeling, ensuring they understand the meaning of the terms they use in equations.

Resources

The Algebra 1 curriculum is supported by a blend of digital tools, instructional resources, and assessment platforms that enhance learning and engagement. Tools like Desmos and GeoGebra help students visualize complex concepts, while platforms such as McGraw Hill Reveal Math, Google Classroom, Khan Academy, and IXL provide organization, practice, and immediate feedback. In addition, McGraw Hill Reveal Math offers integrated resources such as interactive lessons, dynamic visual models, formative and summative assessments, and differentiated instruction. Together, these resources support conceptual understanding, promote student engagement, and prepare learners for advanced mathematics and real-world applications

Assessments

The Algebra 1 assessment process incorporates a continuous cycle of formative and summative measures to ensure mastery of advanced functions and their properties. Formative assessment occurs daily through collaborative "Math Talk" routines, notice and wonder observations recorded in graphic organizers, and Think-Pair-Share tasks where students orally describe function features and

share assumptions. Students also participate in evidence-based writing to explain mathematical choices and provide formal written justifications for solution steps, which allows for ongoing monitoring of their conceptual understanding. Summative assessment is structured through mid-unit quizzes and comprehensive unit tests following dedicated review periods for each of the eight instructional units. This evaluative process culminates in major benchmarks, including a Midterm Exam at the end of the second quarter and a Final Exam at the conclusion of the 160-day program

CTECS Mathematics Department Philosophy

The Mathematics Department at the Connecticut Technical Education and Career System (CTECS) is committed to delivering a rigorous and relevant math education that prepares students for both their technical trade programs and postsecondary opportunities. The department emphasizes real-world application, helping students connect mathematical concepts to industry practices while building strong problem-solving and critical thinking skills.

The department fosters an inclusive learning environment that supports all students through vertically aligned curricula, differentiated instruction, and data-informed practices. By prioritizing both conceptual understanding and procedural fluency, and integrating technology and industry-aligned resources, CTECS aims to develop confident, mathematically literate graduates ready for college, careers, and lifelong learning.

CTECS Mathematics Curriculum

Algebra Unit 1 (Expressions)

Purpose of the Unit:
1) Students write and evaluate numerical and algebraic expressions.

2) Students simplify expressions using the Distributive Property.
3) Students evaluate absolute value expressions.

Name of the Unit: Expressions	**Length of the Unit:** 1 Week

Common Core State Standards Addressed in this unit:		
CCSS (priority (P) and supporting standards (s)**)**	**CELP** (Emphasize standards in **bold)**	**Standards for Mathematical Practice** (Emphasize practices in **bold)**
CCSS.Math.Content.HSN.Q.A.2 • ***SUPPORTING STANDARD*** Define appropriate quantities for the purpose of descriptive modeling. *(s)*	**1, 2, 3, 4, 5, 6, 7, 8, 9, 10** CELP 1- 10 (see the full description of each standard here)	• **Make sense of problems and persevere in solving them.** • **Reason abstractly and quantitatively.** • **Construct viable arguments and critique the reasoning of others.** • **Model with mathematics.** • **Use appropriate tools strategically.** • **Attend to precision.** • **Look for and make use of structure.** • **Look for and express regularity in repeated reasoning.** MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)
CCSS.Math.Content.HSN.Q.A.3 • ***SUPPORTING STANDARD*** Choose a level of accuracy appropriate to limitations on	CELP 1- 10 (see the full description of each standard here)	MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)

measurement when reporting quantities. *(s)*		
CCSS.MATH.CONTENT.HSA.SSE.A.1.A • ***PRIORITY STANDARD*** • ***SAT ALIGNED*** **Interpret parts of an expression, such as terms, factors, and coefficients. (P)**	CELP 1- 10 (see the full description of each standard here)	MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)
CCSS.MATH.CONTENT.HSA.SSE.A.1.B • ***PRIORITY STANDARD*** • ***SAT ALIGNED*** **Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret P(1 + r)^n as the product of P and a factor not depending on P*. (P)**	CELP 1- 10 (see the full description of each standard here)	MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)
CCSS.MATH.CONTENT.HSA.SSE.A.2 • ***SUPPORTING STANDARD*** Use the structure of an expression to identify ways to rewrite it. *For example, see $X^4 - Y^4$ as $(X^2)^2 - (Y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(X^2 - Y^2)(X^2 + Y^2)$. (s)*	CELP 1- 10 (see the full description of each standard here)	MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)

Big Ideas:
(can be broad [interdisciplinary], topical [content focused] or both)

(Big ideas helps students make connections among disciplines or units of study within a content area)
(What is the value or benefit of learning the concepts in this goal)

- Understanding how writing, modeling, and solving expressions allow us to interpret real-world problems to understand and make sense of authentic situations.

Essential Questions:

(engaging, open-ended questions to spark student interest and sharply focus instruction and assessment)

- How can mathematical expressions be represented and evaluated? ***(See: Reveal Math, Algebra 1, Mod. 1)***

Interdisciplinary Knowledge Transfer (from prior to future courses):

Learners will become effective collaborators, technology users, critical thinkers, and problem solvers. They will develop these skills through the application of argumentative discourse and reasoning to model and solve expressions in contextual situations.

Concepts	Skills	Marzano's Taxonomy
Nouns or noun phrases (Teachable Ideas)	**Verbs (What students are able to do)** Align with **I know** and **I can** statements	**Levels and category for learning**
CCSS.Math.Content.HSN.Q.A.2 • Expression ○ Complex Expressions • Term • Factor • Coefficients • Difference of squares	• Draw an appropriate representation of the data given the units • Write an appropriate viewing window to model given data • Solve problems with a given number of decimal places and choose the appropriate number of decimal places to record your answer. • Choose an appropriate domain and range based on a real-life situation. • Test reasonableness of coordinates in real-life situations. • Write or point to the coefficient of a variable in an expression • Write or point to the power of a polynomial expression • Tell why an expression is a quadratic expression	• Level 2: Comprehend-Sym • Level 2: Comprehend-Sym • Level 1: Retrieval-Ex • Level 1: Retrieval-Recog • Level 4: Knowledge Util-Experiment • Level 1: Retrieval-Recog • Level 1: Retrieval-Recog • Level 1: Retrieval-Recall

	• Explain the meaning of a fractional exponent • Determine the root of the rational exponential expression • Represent an expression with a rational exponent, given a real-life situation • Write or describe a real-life situation, given a rational exponential expression • Determine and write the factors of complicated expressions • Explain the order of operations • Identify the individual factors of complicated monomial expression • Demonstrate the use of the distributive, associative and/or commutative properties to explain the meaning of complicated monomial expressions • Solve situational problems using expressions • Write a (complicated) expression from a real-world scenario • Demonstrate and explain how to factor a difference of squares • Take a factored form of an expression and write a simplified expression	• Level 2: Comprehend-Integrating • Level 1: Retrieval-Ex • Level 2: Comprehend-Sym • Level 2: Comprehend-Integrating • Level 2: Comprehend-Integrating • Level 1: Retrieval-Recall • Level 1: Retrieval-Recall • Level 2: Comprehend-Integrating • Level 1: Retrieval-Ex • Level 2: Comprehend-Sym • Level 1: Retrieval-Ex • Level 1: Retrieval-Ex
Refer to the links below: Depth of Knowledge LA Depth of Knowledge Math/Science	**Refer to the links below:** Depth of Knowledge LA Depth of Knowledge Math/Science **Algebra 1 Unpacked Standards-CCSS**	**Refer to the links below:** Depth of Knowledge LA Depth of Knowledge Math/Science

Key vocabulary/terms:
absolute value, accuracy, additive identity, additive inverses, algebraic expression, base, closed, coefficient, constant term, define a variable, descriptive modeling, equivalent expressions, evaluate, exponent, like terms, metric, multiplicative identity, multiplicative inverses, numerical expression, reciprocals, simplest form, term, variable, variable term.

Evidence of Teaching and Learning

How will we know when students are learning?
What strategies/interventions/modifications/ will be applied for non-mastery?
How will we enrich students who are proficient?

Unit Assessments,Performance Indicators, and Scoring Rubrics /Proficiency Scales
The unit performance indicators are taught and formatively assessed through all units

	Unit 1
Assessment Links:	**Module 1: Expressions Summative Assessments** ***(See: Reveal Math, Algebra 1, Mod/Unit 1)*** **Module Test Expressions** **On Level Assessments (Form A)** **Differentiated Assessments (Form B=AL "Approaching Level")** **Differentiated Assessments (Form C=BL "Beyond Level")**
Rubric Links:	**Answers: Module Test** ***Teachers Only** **On Level Assessments (Form A)** **Differentiated Assessments (Form B=AL "Approaching Level")** **Differentiated Assessments (Form C=BL "Beyond Level")**

	See: Proficiency Scale Alignment
Performance Task (PT) Links: **PT Rubric Links:**	**Module 1: Performance Task (Expressions)** ***(See: Reveal Math, Algebra 1, Mod/Unit 1)*** **Module 3: Performance Task Rubric Expressions** ****Teachers Only*** ***(See: Reveal Math, Algebra 1, Mod/Unit 1)***
See: Proficiency Scale Alignment	

Learning Plan

Students' success at acquisition, meaning, and transfer depends on…

Leveraging instructional lesson plan elements that engage students in interesting and rigorous learning activities that centers on collaboration and argumentative discourse. The latter aligns with an instructional plan that includes the phases of (1) Launching, Exploring and Developing, and Practice and Reflection. Formative evaluations are embedded throughout all three of these phases.

Tech. resources to consider:
Reveal Math, Smart Board, PowerPoints, Google Suite, IXL, Khan Academy

Code	Learning Events (Engaging students)
Launch:	Provide an opportunity for students to focus on the big concept. Explore patterns, what do they observe and wonder, make

	predictions and hypotheses. Math talks routines/ (Collaborative grouping and sharing out) Formative assessment check- (warm-up check, observations, student discourse and engagement, anecdotal notes)
Exploration and Development:	Apply guided questions and activities for students to dive deep into exploration of their hypothesis. Collaborative or whole class grouping/direct instruction/math workstations are applied. Testing, providing evidence-based writing, and sharing out can be incorporated here as well. Formative assessment check (observations, student discourse and engagement, anecdotal notes, conferencing).
Practice and Reflection:	Group or independent practice opportunities. Can include student reflection on initial question/hypothesis and lesson reflection. Formative assessment check (Exit ticket, observations, student discourse and engagement, anecdotal notes, written argumentative reflection)

FRAME Learning Intention (at the end):

I can write, model, and solve expressions to interpret real-world problems to understand and make meaning of authentic situations.

Success Criteria: I know I am successful because...	Significant Tasks/Learning Progressions
1. I can write and evaluate numerical and algebraic expressions.	**Launch/Ignite task 1: Join the Club** ***(See: Reveal Math, Algebra 1, Unit 1)*** **Timeline:** 1 Day (Launch to stimulate engagement)

Refer to the following links below: **FRAME Template Example** **FRAME model Infographic**	DOK 2-3 Teachers present the given information, or have a volunteer read it aloud. **Collaborative Activity Summary** Have students work in pairs or small groups to complete the task. Use this activity at the beginning of the module *Expressions*. This activity will help students gain experience in making observations and generating their own strategies to answer questions. **WHY:** ● CCSS Content Standard(s): HSA.SSE.1, HSA.SSE.2 **HOW:** ● (Think-pair-share) Students will work to study and compare the number of chess players who won a match on a given day. They will use a graphic organizer to write their observations and what they wonder before sharing with peers in their group. ● Question? What do you observe/wonder? What questions can you ask? What do you notice about the questions/observations between you and your peer(s)? ● (Whole Class discussion) Using an organizer, generate class questions to address and assumptions to explore. ● (Group discussion and written response to the following) How can you answer your question? What strategies can you use? What assumptions, if any, will you make? Why are you making these assumptions? Why are assumptions important in this context? ● (Work independently) Apply a strategy to answer the question and explain your reasoning in the provided organizer.

	• (Group discussion) Share your strategy and answer with others in your group pair of students, or the entire class. Did each pair of students use correct mathematical reasoning to answer their question? How are the strategies similar and different? EXTENSION (**Differentiation**): How many of the 3 individuals who were sick on Monday had won matches against other schools? • **Use these questions to guide you:** What do you notice? What questions can you ask? How can you answer your questions? What assumptions will you make? **Assessment:** Observations, Student Responses, Exit-Ticket, Journal Entry. What did you like/did not like about today's lesson? What experience(s) did you gain about making observations and generating strategies to answer questions. **Material/Resources:** • Reveal Math Mod/Unit1 Launch activity and teacher notes • (OneNote Notebook or Hard Copy activity form) • SmartBoard CSDE -Algebra 1 Curriculum
2. I can write and evaluate numerical and algebraic expressions.	**Significant task 3: *Patterns and Variable Expressions (See Patterns and Variable) from McDougal Littell, Explorations and Projects, 2003. (Activity Exemplar)*** **Timeline**: 1 days DOK 2-3 **Collaborative Activity Summary:** Have students work in pairs, small groups, or individually to complete the task. Use this activity as a possible activity/exploration for students to demonstrate their understanding of *Expression and mathematical modeling*.

Refer to the following links below: **FRAME Template Example** **FRAME model Infographic**	Students will gain experience in collecting, organizing, analyzing, and representing data, and generate strategies to explore and make connections relating to modeling with mathematics. This activity should be presented to students before or after learning how to solve various expressions. **WHY:** ● CCSS Content Standard(s): HSA.SSE.1, HSA.SSE.2 **HOW:** ● (Group discussion) Students will discuss and assign group members as leader, scribe, time-keeper,...) ● (Think-pair-share) Students will think creatively to create and apply expressions that represent patterns in relationships. They can use a graphic organizer to write down their plan, answers to questions, and any challenges they may encounter. They will share and discuss this information with their peers. The group will decide on a plan to move forward. ● Question? Which plan works best for accomplishing your task and why? ● (Group discussion and written response to the following) Did you discuss ideas together? How did you agree on which strategies to apply? How do you know your answers are correct? ● (Cooperative Group work) Work together in your group and use your questions to construct your table. ● (Whole class sharing and peer evaluation) Share your presentation with the class and collect feedback. (provide a proficiency scale to support feedback) ● Question?

	Did the mathematical model accurately represent the situation? Is the table accurate and correctly aligned with correct domains and ranges? Based on the proficiency scale rating, what rating level would you give to this project. EXTENSION (**Differentiation)**: Dive deeper in understanding and have students compare two situations simultaneously (for example the construction of triangles vs. squares), or ask students to complete an error analysis between two given mathematical models. Apply similar questions from above to guide student responses. ● <u>(Group discussion and write response to the following)</u> How did you answer your questions? What strategies did you use? How do you know your answers are correct? **Assessment:** Observations, Student Responses, Peer Evaluations, Exit-Ticket, Journal Entry. What did you like/did not like about the performance task? What experience(s) did you gain about collecting, organizing, and representing linear relationships? How would you evaluate your contribution to the group? **Material/Resources:** ● About 30 Toothpicks (or straightedge items) ● Computer/Internet Access/Desmos ● (OneNote Notebook or Hard Copy activity form) ● SmartBoard ● Calculators ● Proficiency Scale Level Rubric ***Patterns and Variable***. CSDE -Algebra 1 Curriculum
Differentiation/Intervention Strategies	

Non-mastery (Provide items for struggling learners)	**Enrichment** (Provide items for high performing students)	**ELL** (Provide items to support ELL students)
● Reteach addressing multiple intelligence ● Scaffolding ● Graphic organizers ● Small group or independent direct study ● Varied guided questions ● Tiered assignments ● Daily math review	● Tiered assignments ● Extend or deepen concept learning ● Increased rigor ● More argumentative writing	● Scaffolding (simplify task with structured guidance) ● Connect to primary language and culture ● Create reference charts (picture or word web) ● Increase processing time ● Daily vocabulary review ● Varied guided questions ● Increase repetition

Teacher notes:

- identify specific content or skills which often are misunderstood, confusing, or incorrect assumptions students might have with the content of the course/unit
- explicitly targeted to significant tasks/assessments
- include process standards to reinforce/foster in the instructional practice of the course/unit
- suggested resources/activities to support the course/unit

CTECS Mathematics Curriculum

Algebra 1 Unit 2 (Linear Equations and Inequalities)

Purpose of the Unit:
1) Students solve linear equations in one variable. 2) Students solve proportions. 3) Students use formulas to solve real world problems. 4) Students create linear equations in slope-intercept, point-slope, and standard forms. 5) Students write and solve linear inequalities. 6) Students graph linear inequalities in two variables. 7) Students apply linear inequalities in problem-solving situations.

Name of the Unit: Linear Equations and Inequalities	**Length of the Unit:** 3-4 Weeks

Common Core State Standards Addressed in this unit:		
CCSS (priority (P) and supporting standards (s)**)**	**CELP** (Emphasize standards in **bold)**	**Standards for Mathematical Practice** (Emphasize practices in **bold)**
CCSS.MATH.CONTENT.HSF.IF.A.3 Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.	**1, 2, 3, 4, 5, 6, 7, 8, 9, 10**	• **Make sense of problems and persevere in solving them.** • **Reason abstractly and quantitatively.** • **Construct viable arguments and critique the reasoning of others.** • **Model with mathematics.**

For example, the Fibonacci sequence is defined recursively by f(0) = f(1) = 1, f(n+1) = f(n) + f(n-1) for n ≥ 1. (s)	CELP 1- 10 (see the full description of each standard here)	• **Use appropriate tools strategically.** • **Attend to precision.** • **Look for and make use of structure.** • **Look for and express regularity in repeated reasoning.** MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)
CCSS.MATH.CONTENT.8.EE.C.7 **Solve linear equations in one variable. (P)**	CELP 1- 10 (see the full description of each standard here)	MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)
CCSS.MATH.CONTENT.8.EE.C.7.A **Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form = , = , or = results (where and are different numbers. (P)**	CELP 1- 10 (see the full description of each standard here)	MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)
CCSS.MATH.CONTENT.8.EE.C.7.B **Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. (P)**	CELP 1- 10 (see the full description of each standard here)	MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)
CCSS.MATH.CONTENT.HSA.CED.A.1	CELP 1- 10 (see the full description of each standard here)	MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)

Create equations and inequalities in one variable and use them to solve problems. ***Include equations arising from linear and quadratic functions, and simple rational and exponential functions*. (P)**		
CCSS.MATH.CONTENT.HSA.CED.A.3 **Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.** ***For example, represent inequalities describing nutritional and cost constraints on combinations of different foods. (P)***	CELP 1- 10 (see the full description of each standard here)	MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)
CCSS.MATH.CONTENT.HSA.CED.A.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law V = IR to highlight resistance R.*(s)	CELP 1- 10 (see the full description of each standard here)	MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)
CCSS.MATH.CONTENT.HSA.REI.A.1 Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption	CELP 1- 10 (see the full description of each standard here)	MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)

that the original equation has a solution. Construct a viable argument to justify a solution method. (s)		
CCSS.MATH.CONTENT.HSA.REI.B.3 **Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. (P)**	CELP 1- 10 (see the full description of each standard here)	MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)

Big Ideas:

(can be broad [interdisciplinary], topical [content focused] or both)
(Big ideas helps students make connections among disciplines or units of study within a content area)
(What is the value or benefit of learning the concepts in this goal)

- Understanding how solving linear equations and proportions in one variable allows us to interpret real world problems.
- Understanding how to create linear equations and/or inequalities to represent constraints or relationships between quantities.
- Understanding how solving inequalities allows us to solve real world problems.

Essential Questions:

(engaging, open-ended questions to spark student interest and sharply focus instruction and assessment)

- How can writing and solving equations help you solve problems in the real world? ***(See: Reveal Math, Algebra 1, Mod. 2)***
- How can creating equations and/or inequalities in different forms help you solve problems in the real world? ***(See: Reveal Math, Algebra 1, Mod. 5)***
- How can writing and solving inequalities help you solve problems in the real world? ***(See: Reveal Math, Algebra 1, Mod. 6)***

Interdisciplinary Knowledge Transfer (from prior to future courses):

Learners will become effective collaborators, technology users, critical thinkers,and problem solvers. They will develop these skills through the application of argumentative discourse and reasoning to model and solve expressions in contextual situations.

Concepts	Skills	Marzano's Taxonomy
Nouns or noun phrases (Need to know)	**Verbs (Able to do at the desired)** Align with **I know** and **I can** statements	**Levels and category for learning**

• Sequences
• Functions
	• Write a variable expression that represents a given sequence
	
	• Use a variable expression representation of sequence to write the sequence using function notation
		• Level 2: Comprehension
		  ○ Symbolizing
		
		• Level 2: Comprehension
		  ○ Symbolizing

• Linear Equations • Variable	• Solve equations	• Level 1: Retrieval ○ Executing

• One Solution
• No Solution
• Infinitely many Solutions
	• Transform a linear equation to a simpler form to solve
	
	• Interpret solutions to equations (e.g., one, none, infinitely many)
		• Level 4: Knowledge Utilization
		  ○ Problem-Solving
		
		• Level 2: Comprehension
		  ○ Integrating
		• Level 3: Analysis
		  ○ Classifying
		• Level 5: Metacognition
		  ○ Monitoring Accuracy

• Transform
• Distributive Property
• Rational
	• Solve linear equations with:
	  ○ rational coefficients
	  ○ distributive property
	  ○ collecting and combining like terms
	  ○ one-step and multi-step equations
		• Level 4: Knowledge Utilization
		  ○ Problem-Solving

• Exponential Equation • Quadratic Equation • Linear Inequality • Linear Model	• Write linear and exponential equations in one variable from real world situation • Write linear inequalities in one variable from real world situation	• Level 2: Comprehension ○ Symbolizing

	● Explain solution sets for one variable inequalities	● Level 2: Comprehension ○ Integrating
● Coordinate Plane ● Constraints ● Domain ● Set	● Given a real life situation: ○ write the domain in set notation ● Given a set of constraints: ○ describe the domain using set notation	● Level 2: Comprehension ○ Symbolizing ● Level 2: Comprehension ○ Symbolizing
● Formulas ● Quantity of Interest ● Equations	● Rewrite formulas for a specified variable ● Perform and explain the order of operations to rewrite a formula for the specified variable ● Write the standard formula, for a real-life situation, that will need rearranging to highlight the quantity of interest	● Level 2: Comprehension ○ Integrating ● Level 2: Comprehension ○ Integrating ● Level 2: Comprehension ○ Symbolizing
● Equations ● Equality of Numbers ● Solution	● Solve a simple equation using appropriate steps ● Recognize correct inverse operations ● Use the correct inverse operations ● Use order of operations to solve equations ● Demonstrate or prove why an answer is correct ● Recognize and use the appropriate properties of addition and multiplication to justify steps in solving equations ● Given a problem situation, represent it with an equation ● Given an equation, write a scenario to represent it	● Level 4: Knowledge Utilization ○ Problem Solving ● Level 1: Retrieval ○ Recognizing ● Level 1: Retrieval ○ Executing ● Level 4: Knowledge Utilization ○ Problem Solving ● Level 2: Comprehension ○ Integrating ● Level 4: Knowledge Utilization ○ Problem Solving ● Level 2: Comprehension ○ Symbolizing ● Level 3: Analysis ○ Generalizing
● Linear Equations	● Solve linear equations of one	● Level 4: Knowledge

● Inequalities ● Variable ● Coefficients ● Letters	designated variable, including those with letters as coefficients ● Utilize the four properties of equality to maintain the balance of an equation ● Apply the properties of numbers ● Solve inequalities of one variable and explain the steps ● Model the solution set of inequalities on a number line ● Given a story, or real-world situation, I can model it as a linear equation or an inequality ● Given an equation, or inequality, develop a representative story	Utilization ○ Problem Solving ● Level 4: Knowledge Utilization ○ Decision Making ● Level 2: Comprehension ○ Integrating ● Level 4: Knowledge Utilization ○ Problem Solving ● Level 2: Comprehension ○ Symbolizing ● Level 2: Comprehension ○ Symbolizing ● Level 3: Analysis ○ Generalizing
● Units ● Problems ● Solutions ● Multi-Step Problems ● Formulas ● Scales ● Graphs	● Convert between units of measure ● Predict the unit of a solution based on the units given in the problem ● Describe an appropriate scale needed to graph a given data set ● Build and label a graph appropriately based on the data given ● Solve a real world problem using appropriate units of measure	● Level 1: Retrieval ○ Executing ● Level 3: Analysis ○ Specifying ● Level 2: Comprehension ○ Symbolizing ● Level 4: Knowledge Utilization ○ Decision Making ● Level 4: Knowledge Utilization ○ Problem Solving

• Slope • Y-intercept • Variables • Slope-intercept form • Graph • Units	• Explain the meaning of the slope and y-intercept in relation to the two variables, given an equation in slope-intercept form and related graph with variables and units	• Level 2: Comprehension ○ Integrating
Refer to the links below: Depth of Knowledge LA Depth of Knowledge Math/Science	**Refer to the links below:** Depth of Knowledge LA Depth of Knowledge Math/Science **Algebra 1 Unpacked Standards-CCSS**	**Refer to the links below:** Depth of Knowledge LA Depth of Knowledge Math/Science

Key vocabulary/terms:
constraint, dimensional analysis, equation, equivalent equations, formula, identity, literal; equation, multi-step equation, proportion, solution, solve an equation, coefficient, slope-intercept form, point slope form, standard form, boundary closed half-plane, compound inequality, half-plane, inequality, intersection, open half-plane, set-builder notation, union

Evidence of Teaching and Learning
How will we know when students are learning? **What strategies/interventions/modifications/ will be applied for non-mastery?** **How will we enrich students who are proficient?**

Unit Assessments, Performance Indicators, and Scoring Rubrics /Proficiency Scales ***The unit performance indicators are taught and formatively assessed through all units***	
	Unit 2

Assessment Links: **Rubric Links:**	**Module 2: Equations in One Variable Summative Assessments** ***(See: Reveal Math, Algebra 1, Mod/Unit 2)*** **Module Test Equations** **On Level Assessments (Form A)** **Differentiated Assessments (Form B=AL "Approaching Level")** **Differentiated Assessments (Form C=BL "Beyond Level")** **Answers: Module Test** ***Teachers Only** **On Level Assessments (Form A)** **Differentiated Assessments (Form B=AL "Approaching Level")** **Differentiated Assessments (Form C=BL "Beyond Level")** **See: Proficiency Scale Alignment**
Performance Task (PT) Links: **PT Rubric Links:**	**Module 2: Performance Task (Equations in One Variable)** ***(See: Reveal Math, Algebra 1, Mod/Unit 2)*** **Module 2: Performance Task Rubric (Equations in One Variable)** ***Teachers Only*** ***(See: Reveal Math, Algebra 1, Mod/Unit 2)***
	See: Proficiency Scale Alignment

Assessment Links: **Rubric Links:**	**Module 5: Creating Linear Equations Summative Assessments** ***(See: Reveal Math, Algebra 1, Mod/Unit 5)*** **Module Test Equations** **On Level Assessments (Form A)** **Differentiated Assessments (Form B=AL "Approaching Level")** **Differentiated Assessments (Form C=BL "Beyond Level")** **Answers: Module Test** ***Teachers Only** **On Level Assessments (Form A)** **Differentiated Assessments (Form B=AL "Approaching Level")** **Differentiated Assessments (Form C=BL "Beyond Level")** **See: Proficiency Scale Alignment**
Performance Task (PT) Links: **PT Rubric Links:**	**Module 5: Performance Task (Creating Linear Equations)** ***(See: Reveal Math, Algebra 1, Mod/Unit 5)*** **Module 5: Performance Task Rubric (Creating Linear Equations)** ***Teachers Only*** ***(See: Reveal Math, Algebra 1, Mod/Unit 5)***
	See: Proficiency Scale Alignment

Assessment Links: **Rubric Links:**	**Module 6: Linear Inequalities Summative Assessments** ***(See: Reveal Math, Algebra 1, Mod/Unit 6)*** **Module Test Equations** **On Level Assessments (Form A)** **Differentiated Assessments (Form B=AL "Approaching Level")** **Differentiated Assessments (Form C=BL "Beyond Level")** **Answers: Module Test** ***Teachers Only** **On Level Assessments (Form A)** **Differentiated Assessments (Form B=AL "Approaching Level")** **Differentiated Assessments (Form C=BL "Beyond Level")** **See: Proficiency Scale Alignment**
Performance Task (PT) Links: **PT Rubric Links:**	**Module 6: Performance Task (Linear Inequalities)** ***(See: Reveal Math, Algebra 1, Mod/Unit 6)*** **Module 6: Performance Task Rubric (Creating Linear Equations)** ***Teachers Only*** ***(See: Reveal Math, Algebra 1, Mod/Unit 6***
See: Proficiency Scale Alignment	

Learning Plan

Students' success at acquisition, meaning, and transfer depends on…

Leveraging instructional lesson plan elements that engage students in interesting and rigorous learning activities that centers on collaboration and argumentative discourse. The latter aligns with an instructional plan that includes the phases of (1) Launching, Exploring and Developing, and Practice and Reflection. Formative evaluations are embedded throughout all three of these phases.

Tech. resources to consider:
Reveal Math, Smart Board, PowerPoints, , Google Suite, Gizmos, Khan Academy, Desmos, TI-84 Calculator,

Code	Learning Events (Engaging students)
Launch:	Provide an opportunity for students to focus on the big concept. Explore patterns, what do they observe and wonder, make predictions and hypotheses. Math talks routines/ (collaborative grouping and sharing out) Formative assessment check- (warm-up check, observations, student discourse and engagement, anecdotal notes)
Exploration and Development:	Apply guided questions and activities for students to dive deep into exploration of their hypothesis. Collaborative or whole class grouping/direct instruction/math workstations are applied. Testing, providing evidence-based writing, and sharing out can be incorporated here as well. Formative assessment check (observations, student discourse and engagement, anecdotal notes, conferencing).
Practice and Reflection:	Group or independent practice opportunities. Can include student reflection on initial question/hypothesis and lesson reflection. Formative assessment check (Exit ticket, observations, student discourse and engagement, anecdotal notes, written argumentative reflection)

FRAME Learning Intention (at the end):

I can write and solve equations to solve problems in the real world.

Success Criteria: **I know I am successful because...**	**Significant Tasks/Learning Progressions**
1. I can solve linear equations in one variable. **Refer to the following links below:** **FRAME Template Example** **FRAME model Infographic**	**Launch/Ignite task 1: Mind Your a's and b's** ***(See: Reveal Math, Algebra 1, Unit 2)*** **Timeline:** 1 Day (Launch Mind Your a's and b's) Teachers present the given information, or have a volunteer read it aloud. **Collaborative Activity Summary** Have students work in pairs or small groups to complete the task. Use this activity at the beginning of the module Equations in One Variable. This activity is intended to help students gain experience in making observations and generating their own strategies to answer questions to stimulate engagement. DOK 3 **WHY:** ● CCSS Content Standard(s): HSA.CED.A.1 **HOW:** ● (Think-pair-share) Students will work to study and compare three expressions. They will use a graphic organizer to write their observations and what they wonder before sharing with peers in their group. ● Question? What do you observe/wonder? What questions can you ask? What do you notice about the questions/observations between you and your peer(s)? ● (Whole Class discussion)

	Using an organizer, generate class questions to address and assumptions to explore. ● <u>(Group discussion and written response to the following)</u> How can you answer your question? What strategies can you use? What assumptions, if any, will you make? Why are you making these assumptions? Why are assumptions important in this context? ● <u>(Work independently)</u> Apply a strategy to answer the question and explain your reasoning in the provided organizer. ● <u>(Group discussion)</u> Share your strategy and answer with others in your group pair of students, or the entire class. Did each pair of students use correct mathematical reasoning to answer their question? How are the strategies similar and different? EXTENSION (**Differentiation**): You'll note that in the Extension, *a-b* has been replaced by *a+b*. Encourage students to make a guess about a and *b* before solving. ● **Use these questions to guide you:** What do you notice? What questions can you ask? How can you answer your questions? What assumptions will you make? **Assessment:** Observations, Student Responses, Exit-Ticket, Journal Entry. What did you like/did not like about today's lesson? What experience(s) did you gain about making observations and generating strategies to answer questions. **Material/Resources:** Resource: Reveal Math ● Resource: CT Model Curriculum ● Unit 2 Algebra 1 Lesson Activities

	○ Materials Note: Click link above and see Investigations 2, 3, 4, and 6 Resource: ALEKS Homework Assignments ● Unit 2: Linear Equations and Inequalities (CED.A.1) ● Unit 2: Linear Equations and Inequalities (CED.A.3) ● Unit 2: Linear Equations and Inequalities (CED.A.4) Resource: Gizmos ● Absolute Value Equations and Inequalities ● Arithmetic Sequences ● Compound Interest ● Exploring Linear Inequalities in One Variable ● Exponential Growth and Decay ● Geometric Sequences ● Modeling and Solving Two-Step Equations ● Quadratic Inequalities ● Solving Linear Inequalities in One Variable ● Solving Two-Step Equations
2. 1. I can solve linear equations in one variable **Refer to the following links below:** **FRAME Template Example** **FRAME model Infographic**	**Significant task 3: Equations in One Variable** **Approaching Level:** Creating Equations **On Level:** Printing Tickets **Beyond Level:** Pythagoran Triples **Timeline**: 1 day DOK 2-3 Note 1: "Approaching Level" tasks are for students who are performing below the desired performance level. Note 2: "On Level" tasks are for students who are performing at the desired performance level. Note 3: "Beyond Level" tasks are for students who are performing above the desired performance level. **WHY:** ● CCSS Content Standard(s): HSA.CED.A.1 **HOW:** ● (Group discussion) Students will discuss and assign group members as leader, scribe, time-keeper,...)

	• (Think-pair-share) Students will think creatively to create and compare expressions that represent relationships. They can use a graphic organizer to write down their plan, answers to questions, and any challenges they may encounter. They will share and discuss this information with their peers. The group will decide on a plan to move forward. • Question? Which plan works best for accomplishing your task and why? • (Group discussion and written response to the following) Did you discuss ideas together? How did you agree on which strategies to apply? How do you know your answers are correct? • (Cooperative Group work) Work together in your group and use your questions to construct your table. • (Whole class sharing and peer evaluation) Share your presentation with the class and collect feedback. (provide a proficiency scale to support feedback) • Question? Did the mathematical model accurately represent the situation? Is the table accurate and correctly aligned with correct domains and ranges? Based on the proficiency scale rating, what rating level would you give to this project. EXTENSION (**Differentiation**): Dive deeper in understanding with the **Creating Equations** activity by having students *Apprentice* level tasks add MP3 and MP7 but, because of the guidance within the task, do so at a comparatively modest level. *Expert* tasks aim to cover the full range of practices. Apply similar questions from above to guide student responses. • (Group discussion and write response to the following)

	How did you answer your questions? What strategies did you use? How do you know your answers are correct? **Assessment:** Observations, Student Responses, Peer Evaluations, Exit-Ticket, Journal Entry. What did you like/did not like about the performance task? What experience(s) did you gain about collecting, organizing, and representing linear relationships? How would you evaluate your contribution to the group? **Material/Resources:** ● Computer/Internet Access/Desmos ● (OneNote Notebook or Hard Copy activity form) ● SmartBoard ● Calculators ● Proficiency Scale Level Rubric CSDE -Algebra 1 Curriculum

Differentiation/Intervention Strategies

Non-mastery (Provide items for struggling learners)	**Enrichment** (Provide items for high performing students)	**ELL** (Provide items to support ELL students)
● Reteach addressing multiple intelligence ● Scaffolding ● Graphic organizers ● Small group or independent direct study ● Varied guided questions ● Tiered assignments ● Daily math review	● Tiered assignments ● Extend or deepen concept learning ● Increased rigor ● More argumentative writing	● Scaffolding (simplify task with structured guidance) ● Connect to primary language and culture ● Create reference charts (picture or word web) ● Increase processing time ● Daily vocabulary review ● Varied guided questions ● Increase repetition

Teacher notes:

- identify specific content or skills which often are misunderstood, confusing, or incorrect assumptions students might have with the content of the course/unit
- explicitly targeted to significant tasks/assessments
- include process standards to reinforce/foster in the instructional practice of the course/unit
- suggested resources/activities to support the course/unit

CTECS Mathematics Curriculum

Algebra 1 Unit 3 (Functions)

Purpose of the Unit:
1) Students represent relations, and determine whether a relation is a function. 2) Students use function notation, and find function values. 3) Students graph linear and nonlinear functions, and identify their attributes. 4) Students represent relations with graphs, ordered pairs, tables, and mappings. 5) Students determine whether a relation is a function and find function values. 6) Students identify linear and nonlinear functions and continuous and discrete functions. 7) Students identify intercepts of functions and solve equations by graphing. 8) Students identify symmetry, extrema, and end behavior of functions 9) Students sketch graphs of functions and compare two or more functions.

Name of the Unit: Functions	**Length of the Unit:** 3 Weeks

Common Core State Standards Addressed in this unit:

CCSS (priority (P) and supporting standards (s)**)**	**CELP** **(**Emphasize standards in **bold)**	**Standards for Mathematical Practice** **(**Emphasize practices in **bold)**
CCSS.Math.Content.8.F.A.1 • ***SUPPORTING STANDARD*** Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.	**1, 2, 3, 4, 5, 6, 7, 8, 9, 10** CELP 1- 10 (see the full description of each standard here)	• **Make sense of problems and persevere in solving them.** • **Reason abstractly and quantitatively.** • **Construct viable arguments and critique the reasoning of others.** • **Model with mathematics.** • **Use appropriate tools strategically.** • **Attend to precision.** • **Look for and make use of structure.** • **Look for and express regularity in repeated reasoning.** MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)
CCSS.Math.Content.8.F.A.2 • ***SUPPORTING STANDARD*** Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change*.	**1, 2, 3, 4, 5, 6, 7, 8, 9, 10** CELP 1- 10 (see the full description of each standard here)	• **Make sense of problems and persevere in solving them.** • **Reason abstractly and quantitatively.** • **Construct viable arguments and critique the reasoning of others.** • **Model with mathematics.** • **Use appropriate tools strategically.** • **Attend to precision.** • **Look for and make use of structure.** • **Look for and express regularity in repeated reasoning.** MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)

CCSS.Math.Content.8.F.B.5 • ***SUPPORTING STANDARD*** Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.	**1, 2, 3, 4, 5, 6, 7, 8, 9, 10** CELP 1- 10 (see the full description of each standard here)	• **Make sense of problems and persevere in solving them.** • **Reason abstractly and quantitatively.** • **Construct viable arguments and critique the reasoning of others.** • **Model with mathematics.** • **Use appropriate tools strategically.** • **Attend to precision.** • **Look for and make use of structure.** • **Look for and express regularity in repeated reasoning.** MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)
CCSS.Math.Content.HSA.REI.D.10 • ***SUPPORTING STANDARD*** Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).	**1, 2, 3, 4, 5, 6, 7, 8, 9, 10** CELP 1- 10 (see the full description of each standard here)	• **Make sense of problems and persevere in solving them.** • **Reason abstractly and quantitatively.** • **Construct viable arguments and critique the reasoning of others.** • **Model with mathematics.** • **Use appropriate tools strategically.** • **Attend to precision.** • **Look for and make use of structure.** • **Look for and express regularity in repeated reasoning.** MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)
CCSS.Math.Content.HSF.IF.A.1 • ***PRIORITY STANDARD*** • ***SAT ALIGNED***	**1, 2, 3, 4, 5, 6, 7, 8, 9, 10**	• **Make sense of problems and persevere in solving them.** • **Reason abstractly and quantitatively.** • **Construct viable arguments**

Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If *f* is a function and *x* is an element of its domain, then *f*(*x*) denotes the output of *f* corresponding to the input *x*. The graph of *f* is the graph of the equation *y* = *f*(*x*).	CELP 1- 10 (see the full description of each standard here)	**and critique the reasoning of others.** • **Model with mathematics.** • **Use appropriate tools strategically.** • **Attend to precision.** • **Look for and make use of structure.** • **Look for and express regularity in repeated reasoning.** MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)
CCSS.Math.Content.HSF.IF.A.2 • ***PRIORITY STANDARD*** • ***SAT ALIGNED*** **Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.**	**1, 2, 3, 4, 5, 6, 7, 8, 9, 10** CELP 1- 10 (see the full description of each standard here)	• **Make sense of problems and persevere in solving them.** • **Reason abstractly and quantitatively.** • **Construct viable arguments and critique the reasoning of others.** • **Model with mathematics.** • **Use appropriate tools strategically.** • **Attend to precision.** • **Look for and make use of structure.** • **Look for and express regularity in repeated reasoning.** MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)

CCSS.Math.Content.HSF.IF.B.4 • ***PRIORITY STANDARD*** • ***SAT ALIGNED*** **For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.****	**1, 2, 3, 4, 5, 6, 7, 8, 9, 10** CELP 1- 10 (see the full description of each standard here)	• **Make sense of problems and persevere in solving them.** • **Reason abstractly and quantitatively.** • **Construct viable arguments and critique the reasoning of others.** • **Model with mathematics.** • **Use appropriate tools strategically.** • **Attend to precision.** • **Look for and make use of structure.** • **Look for and express regularity in repeated reasoning.** MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)
CCSS.Math.Content.HSF.IF.B.5 • ***SUPPORTING STANDARD*** Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.**	**1, 2, 3, 4, 5, 6, 7, 8, 9, 10** CELP 1- 10 (see the full description of each standard here)	• **Make sense of problems and persevere in solving them.** • **Reason abstractly and quantitatively.** • **Construct viable arguments and critique the reasoning of others.** • **Model with mathematics.** • **Use appropriate tools strategically.** • **Attend to precision.** • **Look for and make use of structure.** • **Look for and express regularity in repeated reasoning.** MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)

CCSS.MATH.CONTENT.HSF.IF.C.7 • ***PRIORITY STANDARD*** • ***SAT ALIGNED*** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.*	**1, 2, 3, 4, 5, 6, 7, 8, 9, 10** CELP 1- 10 (see the full description of each standard here)	• **Make sense of problems and persevere in solving them.** • **Reason abstractly and quantitatively.** • **Construct viable arguments and critique the reasoning of others.** • **Model with mathematics.** • **Use appropriate tools strategically.** • **Attend to precision.** • **Look for and make use of structure.** • **Look for and express regularity in repeated reasoning.** MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)
CCSS.Math.Content.HSF.IF.C.7.b • ***PRIORITY STANDARD*** • ***SAT ALIGNED*** Graph square root, cube root, and piecewise-defined functions,	**1, 2, 3, 4, 5, 6, 7, 8, 9, 10**	• **Make sense of problems and persevere in solving them.** • **Reason abstractly and quantitatively.** • **Construct viable arguments and critique the reasoning of others.** • **Model with mathematics.** • **Use appropriate tools strategically.** • **Attend to precision.** • **Look for and make use of structure.**

including step functions and absolute value functions.	CELP 1- 10 (see the full description of each standard here)	• **Look for and express regularity in repeated reasoning.** MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)
CCSS.Math.Content.HSF.IF.C.9 • ***PRIORITY STANDARD*** • ***SAT ALIGNED*** Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum*.	**1, 2, 3, 4, 5, 6, 7, 8, 9, 10** CELP 1- 10 (see the full description of each standard here)	• **Make sense of problems and persevere in solving them.** • **Reason abstractly and quantitatively.** • **Construct viable arguments and critique the reasoning of others.** • **Model with mathematics.** • **Use appropriate tools strategically.** • **Attend to precision.** • **Look for and make use of structure.** • **Look for and express regularity in repeated reasoning.** MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)

Big Ideas:
(can be broad [interdisciplinary], topical [content focused] or both) **(Big ideas helps students make connections among disciplines or units of study within a content area)** **(What is the value or benefit of learning the concepts in this goal)** • Functions are a mathematical way to describe relationships between two quantities that vary.
Essential Questions:
(Engaging, open-ended questions to spark student interest and sharply focus instruction and assessment)

- *Why are representations of relations and functions useful?* ***(See: Reveal Math, Algebra 1, Mod. 3)***

Interdisciplinary Knowledge Transfer (from prior to future courses):

Learners will become effective collaborators, technology users, critical thinkers,and problem solvers. They will develop these skills through the application of argumentative discourse and reasoning to model and solve expressions in contextual situations.

Concepts **Nouns or noun phrases (Need to know)**	**Skills** **Verbs (Able to do at the desired)** Align with **I know** and **I can** statements	Marzano's Taxonomy **Levels and category for learning**
CCSS.Math.Content.8.F.A.1 ***SUPPORTING STANDARD*** ● Relation ● Function ● Input ● Output ● Ordered pairs ● Function notation	● Use the fact that a function may have the same output for two different inputs, but may not have two different outputs for the same inputs. ● Recognize a function by analyzing graphs, tables, and sets of ordered pairs. ● Use the vertical line test to determine if a graph represents a function.	● Level 2: Comprehension ○ Integrating ● Level 1: Retrieval ○ Recognizing ● Level 2: Comprehension ○ Symbolizing
CCSS.Math.Content.8.F.A.2 ***SUPPORTING STANDARD*** ● Function ● Inputs ● Outputs ● Rate of Change ● y-intercept ● Linear	● Determine the properties of a function written in algebraic form (e.g., rate of change, meaning of y-intercept, linear) ● Determine the properties of a function when given the inputs and outputs in a table	● Level 2: Comprehension ○ Integrating ● Level 2: Comprehension ○ Integrating
CCSS.Math.Content.8.F.B.5 ***SUPPORTING STANDARD*** ● Linear ● Non Linear ● Graph ● Increasing	● Create a graph based on a word problem ● Describe differences between graphs (ie. Differences in: relationships between variables, rates of change, initial value)	● Level 2: Comprehension ○ Symbolizing ● Level 2: Comprehension ○ Classifying ● Level 3: Analysis ○ Classifying

● Decreasing	● Match the graph of a function to a given situation ● Write a story that describes the functional relationship between two variables depicted on a graph	● Level 3: Analysis ○ Matching ● Level 3: Analysis ○ Generalizing
CCSS.Math.Content.HSA.REI.D.10 ***SUPPORTING STANDARD*** ● Graph ● Variable ● Set ● Solution ● Coordinate Plane ● Interval ● Axis ● Exponential equation ● Data ● Equation	● Identify an exponential equation ● Create a table of solutions for a given equation in two variables ● Graph a set of solutions for a given equation in two variables ● Given a set of data, determine its equation ● Determine a coordinate is a solution to an equation in two	● Level 1: Retrieval ○ Recognize ● Level 1: Retrieval ○ Executing ● Level 1: Retrieval ○ Executing ● Level 3: Analysis ○ Generalizing ● Level 1: Retrieval ○ Executing

	variables ● Construct a graph on a coordinate plane ● Use proper intervals for my graph ● How to label my axis for a given dataset	● Level 3: Analysis ○ Analyzing errors ● Level 1: Retrieval ○ Executing ● Level 1: Retrieval ○ Executing ● Level 1: Retrieval ○ Executing
CCSS.Math.Content.HSF.IF.A.1 ***PRIORITY STANDARD*** ***SAT ALIGNED*** ● Relation ● Domain ● Range ● Element ● Input ● Output	● Determine whether a relation is a function through the use of comparing ordered pairs, by use of a table, by mapping, or by creating a graph ● Demonstrate how the use of the vertical line test can show whether a particular graph is a function ● Determine the domain and range of a function given a set of ordered pairs, a table, or a graph	● Level 3: Analysis ○ Classifying ● Level 2: Comprehension ○ Integrating ● Level 2: Comprehension ○ Integrating
CCSS.Math.Content.HSF.IF.A.2 ***PRIORITY STANDARD*** ***SAT ALIGNED*** ● Function notation ● Inputs ● Domain	● Use function notation to represent data represented by a given domain and range ● Calculate the output value of a function given an input value ● Determine relevant domain and range for given real-life situation	● Level 2: Comprehension ○ Symbolizing ● Level 1: Retrieval ○ Executing ● Level 3: Analysis ○ Matching
CCSS.Math.Content.HSF.IF.B.4 ***PRIORITY STANDARD***	● Graph a relationship between two quantities using a table	● Level 2: Comprehension ○ Symbolizing

SAT ALIGNED ● Function ● Quantities ● Key features of graphs ● Tables ● Verbal description ● Intercepts ● Intervals ● Increasing ● Decreasing ● Positive ● Negative ● Maximums ● Minimums ● Symmetries ● End behavior ● Periodicity	● Identify the intervals where the function is either positive or negative ● Identify the intervals where the function is either increasing or decreasing ● Determine and interpret the end behavior of the relationship between two quantities ● Determine and interpret the intercepts of the relationship between two quantities ● Determine the maximum or minimum point and explain its relevance ● Determine the axis of symmetry ● Interpret all of the key features of the graph given, a real-world situation that is quadratic (i.e. - path of a thrown ball)	● Level 1: Retrieval ○ Executing ● Level 1: Retrieval ○ Executing ● Level 2: Comprehension ○ Integrating ● Level 2: Comprehension ○ Integrating ● Level 2: Comprehension ○ Integrating ● Level 1: Retrieval ○ Recognizing ● Level 3: Analysis ○ Classifying
CCSS.Math.Content.HSF.IF.B.5 ***SUPPORTING STANDARD*** ● domain ● quantitative relationship	● Relate (match) the domain of a function to a graph ● Relate (match) a graph to its domain ● Determine the quantitative relationship of the function that a domain describes, given a real-world situation (i.e. - the age of a car versus the value of	● Level 3: Analysis ○ Matching ● Level 3: Analysis ○ Matching ● Level 2: Comprehension ○ Integrating

	a car)	
CCSS.MATH.CONTENT.HSF.IF.C.7 ***PRIORITY STANDARD*** ***SAT ALIGNED*** ● Functions ● graph symbolically ● key features ● graph by hand ● using technology	● Draw a graph of a function using a coordinate plane ● Input data into appropriate technology to create a graph of a function originally expressed symbolically ● Circle the maxima or minima of a graph of a quadratic equation	● Level 2: Comprehension ○ Symbolizing ● Level 3: Analysis ○ Matching ● Level 3: Analysis ○ Matching
CCSS.Math.Content.HSF.IF.C.7.b ***PRIORITY STANDARD*** ***SAT ALIGNED*** ● square root ● cube root ● piecewise-defined functions ● including step functions ● absolute value	● Draw a graph of a function using a coordinate plane ● Input data into technology to create a graph of a function originally expressed symbolically ● List the domain of a square root function using its graph ● Distinguish between square root, cube root, absolute value and step functions graphs by explaining their key features	● Level 2: Comprehension ○ Symbolizing ● Level 3: Analysis ○ Matching ● Level 1:Retrieval ○ Recalling ● Level 3: Analysis ○ Classifying ○ Specifying
CCSS.Math.Content.HSF.IF.C.9 ***PRIORITY STANDARD*** ***SAT ALIGNED*** ● Quadratic functions	● Translate given data into another representation for comparison. (i.e. tabular to graphical, algebraically to tabular, etc)	● Level 3: Analysis ○ Matching ● Level 3: Analysis

• Algebraic expression • Graph • Table • Model • Verbal description	• Compare vertices between two functions • Compare translations between two functions • Compare the width of the graphs of two functions • Compare the number of real solutions of two functions • Compare orientation of the graphs of the two functions • Compare domain and range of two functions	○ Classifying • Level 3: Analysis ○ Classifying • Level 3: Analysis ○ Classifying • Level 3: Analysis ○ Classifying • Level 3: Analysis ○ Classifying • Level 3: Analysis ○ Classifying
Refer to the links below: Depth of Knowledge LA Depth of Knowledge Math/Science	**Refer to the links below:** Depth of Knowledge LA Depth of Knowledge Math/Science **Algebra 1 Unpacked Standards-CCSS**	**Refer to the links below:** Depth of Knowledge LA Depth of Knowledge Math/Science

Key vocabulary/terms:
continuous function, decreasing, dependent variable, discrete function, domain, end behavior, extrema, function, function notation, increasing, independent variable, line symmetry, linear equation, linear function, mapping, negative, nonlinear function, positive, range, relation, relative maximum, relative minimum, root, scale, *x*-intercept, *y*-intercept, zero

Evidence of Teaching and Learning
How will we know when students are learning? **What strategies/interventions/modifications/ will be applied for non-mastery?** **How will we enrich students who are proficient?**

Unit Assessments,Performance Indicators, and Scoring Rubrics /Proficiency Scales ***The unit performance indicators are taught and formatively assessed through all units***	
	Unit 3
Assessment Links: **Rubric Links:**	**Module 3: Relations and Functions Summative Assessments** ***(See: Reveal Math, Algebra 1, Mod/Unit 3)*** **Module Test Equations** **On Level Assessments (Form A)** **Differentiated Assessments (Form B=AL "Approaching Level")** **Differentiated Assessments (Form C=BL "Beyond Level")** **Answers: Module Test** ***Teachers Only** **On Level Assessments (Form A)** **Differentiated Assessments (Form B=AL "Approaching Level")** **Differentiated Assessments (Form C=BL "Beyond Level")** **See: Proficiency Scale Alignment**
Performance Task (PT) Links: **PT Rubric Links:**	**Module 3: Performance Task (Relations and Functions)** ***(See: Reveal Math, Algebra 1, Mod/Unit 3)*** **Module 3: Performance Task Rubric (Relations and Functions)** ***Teachers Only*** ***(See: Reveal Math, Algebra 1, Mod/Unit 3)***
	See: Proficiency Scale Alignment

Learning Plan

Students' success at acquisition, meaning, and transfer depends on…

Leveraging instructional lesson plan elements that engage students in interesting and rigorous learning activities that centers on collaboration and argumentative discourse. The latter aligns with an instructional plan that includes the phases of (1) Launching, Exploring and Developing, and Practice and Reflection. Formative evaluations are embedded throughout all three of these phases.

Tech. resources to consider:

Reveal Math, , Smart Board, PowerPoints, Google Suite, Gizmos, Khan Academy, Desmos, TI-84 Calculator, IXL

Code	Learning Events (Engaging students)
Launch:	Provide an opportunity for students to focus on the big concept. Explore patterns, what do they observe and wonder, make predictions and hypotheses. Math talks routines/ (collaborative grouping and sharing out) Formative assessment check- (warm-up check, observations, student discourse and engagement, anecdotal notes)
Exploration and Development:	Apply guided questions and activities for students to dive deep into exploration of their hypothesis. Collaborative or whole class grouping/direct instruction/math workstations are applied. Testing, providing evidence-based writing, and sharing out can be incorporated here as well. Formative assessment check (observations, student discourse and engagement, anecdotal notes, conferencing).
Practice and Reflection:	Group or independent practice opportunities. Can include student reflection on initial question/hypothesis and lesson reflection. Formative assessment check (Exit ticket, observations, student discourse and engagement, anecdotal notes, written argumentative reflection)

	Tech. resources to consider: Reveal Math EdPuzzle.com, Smart Board, PowerPoints, Google Suite, Gizmos,

FRAME Learning Intention (at the end):

I can write and solve equations to solve problems in the real world.

Success Criteria: **I know I am successful because...**	**Significant Tasks/Learning Progressions**
1. I can represent relations with graphs, ordered pairs, tables, and mappings.. **Refer to the following links below:** **FRAME Template Example** **FRAME model Infographic**	**Launch/Ignite task 1: On Trend** ***(See: Reveal Math, Algebra 1, Unit 4)*** **Timeline:** 1 Day (Launch *On Trend*) Teachers present the given information, or have a volunteer read it aloud. **Collaborative Activity Summary** Have students work in pairs or small groups to complete the task. Use this activity at the beginning of the module *Relations and Functions*. This activity is intended to help students use a model to describe reported opinions. DOK 3 **WHY:** ● CCSS Content Standard(s): HSF.IF.A.1 **HOW:** ● Allow students 1-2 minutes to individually think about and record what they notice and what they wonder about the given information. The goal is to spark curiosity before asking them to solve problems ● (Think-pair-share)

	Students will work to study and compare the graph. They will use a graphic organizer to write their observations and what they wonder before sharing with peers in their partner or group. • Question? What do you observe/wonder? What questions can you ask? What do you notice about the questions/observations between you and your peer(s)? • <u>(Whole Class discussion)</u> Using an organizer, generate class questions to address and assumptions to explore. • <u>(Group discussion and written response to the following)</u> How can you answer your question? What strategies can you use? What assumptions, if any, will you make? Why are you making these assumptions? Why are assumptions important in this context? • <u>(Work independently)</u> Apply a strategy to answer the question and explain your reasoning in the provided organizer. • <u>(Group discussion)</u> Share your strategy and answer with others in your group pair of students, or the entire class. Did each pair of students use correct mathematical reasoning to answer their question? How are the strategies similar and different? EXTENSION (**Differentiation)**: You'll note that in the Extension, it illustrates the kind of things that happen in the real world when data are presented as factual, but confusing. Encourage students to realize they can not automatically believe data presented graphically. • **Use these questions to guide you:** What do you notice? What questions can you ask? How can you answer your questions? What assumptions will you make?

	Assessment: Observations, Student Responses, Exit-Ticket, Journal Entry. What did you like/did not like about today's lesson? What experience(s) did you gain about making observations and generating strategies to answer questions. **Material/Resources:** Resource: Reveal Math ● Resource: CT Model Curriculum ● Unit 3 Algebra 1 Lesson Activities ○ Materials
2. I can represent relations with graphs, ordered pairs, tables, and mappings.. **Refer to the following links below:** **FRAME Template Example** **FRAME model Infographic**	**Significant task 3: Relations and Functions** **Approaching Level:** Interpreting Functions **On Level:** Function Carnival **Beyond Level:** Pendulum Experiment **Timeline**: 1 day DOK 2-3 Note 1: "Approaching Level" tasks are for students who are performing below the desired performance level. Note 2: "On Level" tasks are for students who are performing at the desired performance level. Note 3: "Beyond Level" tasks are for students who are performing above the desired performance level. **WHY:** ● CCSS Content Standard(s): HSF.IF.A.1 **HOW:** ● (Group discussion) Students will discuss and assign group members as leader, scribe, time-keeper,...) ● (Think-pair-share) Students will think creatively to create and compare expressions that represent relationships. They can use a graphic organizer to write down their plan, answers to questions, and any challenges they may encounter. They will share and discuss this

	information with their peers. The group will decide on a plan to move forward. • Question? Which plan works best for accomplishing your task and why? • (Group discussion and written response to the following) Did you discuss ideas together? How did you agree on which strategies to apply? How do you know your answers are correct? • (Cooperative Group work) Work together in your group and use your questions to construct your table. • (Whole class sharing and peer evaluation) Share your presentation with the class and collect feedback. (provide a proficiency scale to support feedback) • Question? Did the mathematical model accurately represent the situation? Is the table accurate and correctly aligned with correct domains and ranges? Based on the proficiency scale rating, what rating level would you give to this project. EXTENSION (**Differentiation**): Dive deeper in understanding with the ***Function Carnival*** activity by having students *Apprentice* level tasks add MP3 and MP7 but, because of the guidance within the task, do so at a comparatively modest level. *Expert* tasks aim to cover the full range of practices. Apply similar questions from above to guide student responses. • (Group discussion and write response to the following) How did you answer your questions? What strategies did you use? How do you know your answers are correct?

	Assessment: Observations, Student Responses, Peer Evaluations, Exit-Ticket, Journal Entry. What did you like/did not like about the performance task? What experience(s) did you gain about collecting, organizing, and representing linear relationships? How would you evaluate your contribution to the group? **Material/Resources:** ● Computer/Internet Access/Desmos ● Smart Board ● Calculators CSDE -Algebra 1 Curriculum

Differentiation/Intervention Strategies

Non-mastery (Provide items for struggling learners)	**Enrichment** (Provide items for high performing students)	**ELL** (Provide items to support ELL students)
● Reteach addressing multiple intelligence ● Scaffolding ● Graphic organizers ● Small group or independent direct study ● Varied guided questions ● Tiered assignments ● Daily math review	● Tiered assignments ● Extend or deepen concept learning ● Increased rigor ● More argumentative writing	● Scaffolding (simplify task with structured guidance) ● Connect to primary language and culture ● Create reference charts (picture or word web) ● Increase processing time ● Daily vocabulary review ● Varied guided questions ● Increase repetition

Teacher notes:

- identify specific content or skills which often are misunderstood, confusing, or incorrect assumptions students might have with the content of the course/unit
- explicitly targeted to significant tasks/assessments

- include process standards to reinforce/foster in the instructional practice of the course/unit
- suggested resources/activities to support the course/unit

CTECS Mathematics Curriculum

Algebra 1 Unit 4 (Linear Functions)

Purpose of the Unit:
1) Students graph linear, piecewise-defined, step, and absolute value functions. 2) Students find and interpret the rate of change and slope of lines. 3) Students identify the effects of transformations on the graphs of linear and absolute value functions.

Name of the Unit: Linear Functions	**Length of the Unit:** 3 Weeks

Common Core State Standards Addressed in this unit:		
CCSS (priority (P) and supporting standards (s)**)**	**CELP** (Emphasize standards in **bold)**	**Standards for Mathematical Practice** (Emphasize practices in **bold)**

CCSS.Math.Content.HSA.CED.A.2 • ***SUPPORTING STANDARD*** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. (s)	**1, 2, 3, 4, 5, 6, 7, 8, 9, 10** CELP 1- 10 (see the full description of each standard here)	• **Make sense of problems and persevere in solving them.** • **Reason abstractly and quantitatively.** • **Construct viable arguments and critique the reasoning of others.** • **Model with mathematics.** • **Use appropriate tools strategically.** • **Attend to precision.** • **Look for and make use of structure.** • **Look for and express regularity in repeated reasoning.** MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)
CCSS.Math.Content.HSF.IF.B.6 • ***SUPPORTING STANDARD*** Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.*(s)	**1, 2, 3, 4, 5, 6, 7, 8, 9, 10** CELP 1- 10 (see the full description of each standard here)	• **Make sense of problems and persevere in solving them.** • **Reason abstractly and quantitatively.** • **Construct viable arguments and critique the reasoning of others.** • **Model with mathematics.** • **Use appropriate tools strategically.** • **Attend to precision.** • **Look for and make use of structure.** • **Look for and express regularity in repeated reasoning.** MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)
CCSS.MATH.CONTENT.HSF.IF.C.7	**1, 2, 3, 4, 5, 6, 7, 8, 9,**	• **Make sense of problems and**

• ***PRIORITY STANDARD*** • ***SAT ALIGNED*** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.* **(P)**	**10** CELP 1- 10 (see the full description of each standard here)	**persevere in solving them.** • **Reason abstractly and quantitatively.** • **Construct viable arguments and critique the reasoning of others.** • **Model with mathematics.** • **Use appropriate tools strategically.** • **Attend to precision.** • **Look for and make use of structure.** • **Look for and express regularity in repeated reasoning.** MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)
CCSS.Math.Content.HSF.IF.C.7.a • ***PRIORITY STANDARD*** • ***SAT ALIGNED*** Graph linear and quadratic functions and show intercepts, maxima, and minima. **(P)**	**1, 2, 3, 4, 5, 6, 7, 8, 9, 10** CELP 1- 10 (see the full description of each standard here)	• **Make sense of problems and persevere in solving them.** • **Reason abstractly and quantitatively.** • **Construct viable arguments and critique the reasoning of others.** • **Model with mathematics.** • **Use appropriate tools strategically.** • **Attend to precision.** • **Look for and make use of structure.** • **Look for and express regularity in repeated reasoning.** MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)
CCSS.MATH.CONTENT.HSF.IF.C.8 • ***SUPPORTING STANDARD*** Write a function defined by an expression in different but equivalent	**1, 2, 3, 4, 5, 6, 7, 8, 9, 10**	• **Make sense of problems and persevere in solving them.** • **Reason abstractly and quantitatively.** • **Construct viable arguments and critique the reasoning of others.**

forms to reveal and explain different properties of the function. (s)	CELP 1- 10 (see the full description of each standard here)	• **Model with mathematics.** • **Use appropriate tools strategically.** • **Attend to precision.** • **Look for and make use of structure.** • **Look for and express regularity in repeated reasoning.** MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)
CCSS.Math.Content.HSF.BF.A.1 • ***SUPPORTING STANDARD*** Write a function that describes a relationship between two quantities.* (s)	**1, 2, 3, 4, 5, 6, 7, 8, 9, 10** CELP 1- 10 (see the full description of each standard here)	• **Make sense of problems and persevere in solving them.** • **Reason abstractly and quantitatively.** • **Construct viable arguments and critique the reasoning of others.** • **Model with mathematics.** • **Use appropriate tools strategically.** • **Attend to precision.** • **Look for and make use of structure.** • **Look for and express regularity in repeated reasoning.** MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)

CCSS.Math.Content.HSF.BF.A.1.a • ***SUPPORTING STANDARD*** Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.	**1, 2, 3, 4, 5, 6, 7, 8, 9, 10** CELP 1- 10 (see the full description of each standard here)	• **Make sense of problems and persevere in solving them.** • **Reason abstractly and quantitatively.** • **Construct viable arguments and critique the reasoning of others.** • **Model with mathematics.** • **Use appropriate tools strategically.** • **Attend to precision.** • **Look for and make use of structure.** • **Look for and express regularity in repeated reasoning.** MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)
CCSS.MATH.CONTENT.HSF.LE.A.1.b • ***PRIORITY STANDARD*** • ***SAT ALIGNED*** Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.	**1, 2, 3, 4, 5, 6, 7, 8, 9, 10** CELP 1- 10 (see the full description of each standard here)	• **Make sense of problems and persevere in solving them.** • **Reason abstractly and quantitatively.** • **Construct viable arguments and critique the reasoning of others.** • **Model with mathematics.** • **Use appropriate tools strategically.** • **Attend to precision.** • **Look for and make use of structure.** • **Look for and express regularity in repeated reasoning.** MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)
CCSS.Math.Content.HSF.BF.A.2 • ***SUPPORTING STANDARD***	**1, 2, 3, 4, 5, 6, 7, 8, 9, 10**	• **Make sense of problems and persevere in solving them.** • **Reason abstractly and quantitatively.** • **Construct viable arguments**

Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.*	CELP 1- 10 (see the full description of each standard here)	**and critique the reasoning of others.** • **Model with mathematics.** • **Use appropriate tools strategically.** • **Attend to precision.** • **Look for and make use of structure.** • **Look for and express regularity in repeated reasoning.** MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)
CCSS.Math.Content.HSF.LE.A.1 • ***PRIORITY STANDARD*** • ***SAT ALIGNED*** Distinguish between situations that can be modeled with linear functions and with exponential functions.	**1, 2, 3, 4, 5, 6, 7, 8, 9, 10** CELP 1- 10 (see the full description of each standard here)	• **Make sense of problems and persevere in solving them.** • **Reason abstractly and quantitatively.** • **Construct viable arguments and critique the reasoning of others.** • **Model with mathematics.** • **Use appropriate tools strategically.** • **Attend to precision.** • **Look for and make use of structure.** • **Look for and express regularity in repeated reasoning.** MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)

CCSS.Math.Content.HSF.LE.A.1.a • ***PRIORITY STANDARD*** • ***SAT ALIGNED*** Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.	**1, 2, 3, 4, 5, 6, 7, 8, 9, 10** CELP 1- 10 (see the full description of each standard here)	• **Make sense of problems and persevere in solving them.** • **Reason abstractly and quantitatively.** • **Construct viable arguments and critique the reasoning of others.** • **Model with mathematics.** • **Use appropriate tools strategically.** • **Attend to precision.** • **Look for and make use of structure.** • **Look for and express regularity in repeated reasoning.** MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)
CCSS.MATH.CONTENT.HSF.LE.A.1.b • ***PRIORITY STANDARD*** • ***SAT ALIGNED*** Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.	**1, 2, 3, 4, 5, 6, 7, 8, 9, 10** CELP 1- 10 (see the full description of each standard here)	• **Make sense of problems and persevere in solving them.** • **Reason abstractly and quantitatively.** • **Construct viable arguments and critique the reasoning of others.** • **Model with mathematics.** • **Use appropriate tools strategically.** • **Attend to precision.** • **Look for and make use of structure.** • **Look for and express regularity in repeated reasoning.** MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)

CCSS.Math.Content.HSF.LE.A.2 • ***PRIORITY STANDARD*** • ***SAT ALIGNED*** Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).	**1, 2, 3, 4, 5, 6, 7, 8, 9, 10** CELP 1- 10 (see the full description of each standard here)	• **Make sense of problems and persevere in solving them.** • **Reason abstractly and quantitatively.** • **Construct viable arguments and critique the reasoning of others.** • **Model with mathematics.** • **Use appropriate tools strategically.** • **Attend to precision.** • **Look for and make use of structure.** • **Look for and express regularity in repeated reasoning.** MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)
CCSS.Math.Content.HSF.LE.B.5 • ***PRIORITY STANDARD*** • ***SAT ALIGNED*** Interpret the parameters in a linear or exponential function in terms of a context.	**1, 2, 3, 4, 5, 6, 7, 8, 9, 10** CELP 1- 10 (see the full description of each standard here)	• **Make sense of problems and persevere in solving them.** • **Reason abstractly and quantitatively.** • **Construct viable arguments and critique the reasoning of others.** • **Model with mathematics.** • **Use appropriate tools strategically.** • **Attend to precision.** • **Look for and make use of structure.** • **Look for and express regularity in repeated reasoning.** MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)

CCSS.Math.Content.HSS.ID.C.7 • ***PRIORITY STANDARD*** • ***SAT ALIGNED*** Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.	**1, 2, 3, 4, 5, 6, 7, 8, 9, 10** CELP 1- 10 (see the full description of each standard here)	• **Make sense of problems and persevere in solving them.** • **Reason abstractly and quantitatively.** • **Construct viable arguments and critique the reasoning of others.** • **Model with mathematics.** • **Use appropriate tools strategically.** • **Attend to precision.** • **Look for and make use of structure.** • **Look for and express regularity in repeated reasoning.** MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)

Big Ideas:
(can be broad [interdisciplinary], topical [content focused] or both) **(Big ideas helps students make connections among disciplines or units of study within a content area)** **(What is the value or benefit of learning the concepts in this goal)** • Functions are a mathematical way to describe relationships between two quantities that vary.
Essential Questions:
(engaging, open-ended questions to spark student interest and sharply focus instruction and assessment) • *What can a function tell you about the relationship that it represents?* ***(See: Reveal Math, Algebra 1, Mod.4)***
Interdisciplinary Knowledge Transfer (from prior to future courses):
Learners will become effective collaborators, technology users, critical thinkers, and problem solvers. They will develop these skills through the application of argumentative discourse and reasoning to model and solve expressions in contextual situations.

Concepts	Skills	Marzano's Taxonomy
Nouns or noun phrases (Need to know)	**Verbs (Able to do at the desired)**	**Levels and category for learning**

	Align with **I know** and **I can** statements	
CCSS.Math.Content.HSA.CED.A.2 ***SUPPORTING STANDARD*** ● y-intercept ● constant ● where the graph crosses the y-axis ● slope ● coefficient ● independent variable ● initial value ● rate of change ● exponential equation ● power ● growth factor	● Draw a visual representation of an equation related to a real-life situation complete with appropriate labels. ● Write equations in two or more variables given information in a real-life situation ● Manipulate two or more variable equations to solve for the specified unknown using appropriate steps ● Rewrite an equation to solve for the specified unknown	● Level 2: Comprehension ○ Symbolizing ● Level 3: Analysis ○ Generalizing ● Level 3: Analysis ○ Generalizing ● Level 3: Analysis ○ Generalizing
CCSS.Math.Content.HSF.IF.B.6 ***SUPPORTING STANDARD*** ● Rate of change ● Slope ● Equivalent ● Exponential growth function ● Exponential decay function	● Find the rate of change (slope) ● Determine and explain when a linear function rises or falls, has a positive, negative or zero slope, or has no slope ● Determine and explain when an exponential function is either a growth function or a decay function ● Use a graph to estimate the rate of change within a given interval, given a real-world model of a situation (compound interest; world	● Level 4: Knowledge Utilization ○ Problem Solving ● Level 2: Comprehension ○ Integrating ● Level 2: Comprehension ○ Integrating ● Level 2: Comprehension ○ Symbolizing

	population)	
CCSS.Math.Content.HSF.IF.C.7.a ***PRIORITY STANDARD*** ***SAT ALIGNED*** ● Linear function graph ● Constant increase ● Constant decrease ● Quadratic function graph ● Parabola ● Path of a projectile	● Draw a graph of a function using a coordinate plane ● Input data into technology to create a graph of a function originally expressed symbolically ● Circle the maxima or minima of a graph of a quadratic equation	● Level 2: Comprehension ○ Symbolizing ● Level 2: Comprehension ○ Symbolizing ● Level 2: Comprehension ○ Symbolizing ● Level 2: Comprehension ○ Symbolizing
CCSS.MATH.CONTENT.HSF.IF.C.8 ***SUPPORTING STANDARD*** ● Factor ● Quadratic function ● Complete the square ● Minimum ● Maximum ● Vertex ● Axis of symmetry ● Zeros	● Demonstrate how to solve a quadratic by factoring ● Demonstrate how to solve a quadratic by completing the square ● Visually identify the minimum, maximum, and zeros of the graph of the function ● Find the vertex algebraically	● Level 1: Retrieval ○ Executing ● Level 1: Retrieval ○ Executing ● Level 2: Comprehension ○ Symbolizing ● Level 2: Comprehension ○ Symbolizing

• X-intercepts
• Real solutions
	• Find the axis of symmetry using x = -b / 2a
	
	• Find the axis of symmetry by looking at a graph or table
	
	• Find the axis of symmetry by averaging the x-intercepts
		• Level 2: Comprehension
		  ○ Integrating
		
		• Level 2: Comprehension
		  ○ Symbolizing
		
		• Level 2: Comprehension
		  ○ Integrating

CCSS.Math.Content.HSF.BF.A.1.a
 	
PRIORITY STANDARD
SAT ALIGNED
 	
• Recursive process
• Rate of change
	• Recognize rate of change and explain the meaning
	
	• Create a recursive expression that represents a real world problem
		• Level 2: Comprehension
		  ○ Integrating
		
		• Level 3: Analysis
		  ○ Generalizing

CCSS.MATH.CONTENT.HSF.LE.A.1.b
 	
PRIORITY STANDARD
SAT ALIGNED
 	
• Linear function
• Constant rate of change.
• Straight line
• Rate per unit interval
	• Recognize linear functions grow by constant differences over equal intervals.
	
	• Recognize exponential functions grow by constant factors over equal intervals
		• Level 3: Analysis
		  ○ Generalizing
		
		• Level 3: Analysis
		  ○ Generalizing

CCSS.Math.Content.HSF.BF.A.2
 	
SUPPORTING STANDARD
 	
• Arithmetic sequences
• Geometric sequences
• Recursive expressions
• Explicit formula
	• Given a recursive expression I can create a story to model the expression
	
	• I can combine functions using arithmetic operations. F(h) = g(h) + j(h)
		• Level 3: Analysis
		  ○ Matching
		
		• Level 2: Comprehension
		  ○ Integrating

CCSS.Math.Content.HSF.LE.A.1.a ***PRIORITY STANDARD*** ***SAT ALIGNED*** ● Linear function ● Exponential function ● Interval	● Prove a linear function grows by an equal difference over equal intervals algebraically by constructing a table (rate of change) ● Prove a linear function grows by an equal difference over equal intervals by graphing (slope) ● Prove an exponential function grows by equal factors over equal intervals algebraically by constructing a table ● Prove an exponential function grows by equal factors over equal intervals algebraically by graphing (intervals)	● Level 4: Knowledge Utilization ○ Decision Making ● Level 4: Knowledge Utilization ○ Decision Making ● Level 4: Knowledge Utilization ○ Decision Making ● Level 4: Knowledge Utilization ○ Decision Making
CCSS.Math.Content.HSF.LE.A.2 ***PRIORITY STANDARD*** ***SAT ALIGNED*** ● Linear function ● Exponential function ● Arithmetic sequence ● Geometric sequence ● Inputs ● Outputs	● Write the general form of a linear equation given a table. ● Write the general form of a linear equation given a graph. ● Write the general form of a linear equation given a problem situation. ● Write the general form of an exponential equation given a table. ● Write the general form of an exponential equation given a graph. ● Write the general form of an exponential equation given a problem situation	● Level 3: Analysis ○ Generalizing ● Level 3: Analysis ○ Generalizing ● Level 3: Analysis ○ Generalizing ● Level 3: Analysis ○ Generalizing ● Level 3: Analysis ○ Generalizing ● Level 3: Analysis ○ Generalizing

CCSS.Math.Content.HSF.LE.B.5 ***PRIORITY STANDARD*** ***SAT ALIGNED*** ● Linear function ● Exponential function	● Interpret the parameters of a linear function, given a real-world situation. ● Interpret the parameters of an exponential function, given a real-world situation.	● Level 3: Analysis ○ Generalizing ● Level 3: Analysis ○ Generalizing ● Level 4: Knowledge Utilization ○ Problem Solving
CCSS.Math.Content.HSS.ID.C.7 ***PRIORITY STANDARD*** ***SAT ALIGNED*** ● Slope ● Rate of change ● Intercept ● Constant ● Linear model	● Explain the meaning of the slope and y-intercept in relation to the two variables, given an equation in slope-intercept form and related graph with variables and units	● Level 2: Comprehension ○ Integrating ● Level 3: Analysis ○ Generalizing ● Level 4: Knowledge Utilization ○ Problem Solving
Refer to the links below: Depth of Knowledge LA Depth of Knowledge Math/Science	**Refer to the links below:** Depth of Knowledge LA Depth of Knowledge Math/Science **Algebra 1 Unpacked Standards-CCSS**	**Refer to the links below:** Depth of Knowledge LA Depth of Knowledge Math/Science

Key vocabulary/terms:
absolute value function, arithmetic sequence, common difference, constant function, dilation, family of graphs, greatest integer function, identity function, interval, *n*th term of an arithmetic sequence, parameter, parent function, piecewise-defined function, piecewise-linear function, rate of change, reflection, sequence, slope, step function, term of a sequence, transformation, translation, vertex

Evidence of Teaching and Learning

How will we know when students are learning?
What strategies/interventions/modifications/ will be applied for non-mastery?
How will we enrich students who are proficient?

Unit Assessments, Performance Indicators, and Scoring Rubrics /Proficiency Scales
The unit performance indicators are taught and formatively assessed through all units

	Unit 3
Assessment Links: **Rubric Links:**	**Module 4: Relations and Functions Summative Assessments** ***(See: Reveal Math, Algebra 1, Mod/Unit 4*** **Module Test Equations** **On Level Assessments (Form A)** **Differentiated Assessments (Form B=AL "Approaching Level")** **Differentiated Assessments (Form C=BL "Beyond Level")** **Answers: Module Test** ***Teachers Only** **On Level Assessments (Form A)** **Differentiated Assessments (Form B=AL "Approaching Level")** **Differentiated Assessments (Form C=BL "Beyond Level")** **See: Proficiency Scale Alignment**

Performance Task (PT) Links: **PT Rubric Links:**	**Module 4: Performance Task (Relations and Functions)** ***(See: Reveal Math, Algebra 1, Mod/Unit 4)*** **Module 4: Performance Task Rubric (Relations and Functions)** ****Teachers Only*** ***(See: Reveal Math, Algebra 1, Mod/Unit 4)***
	See: Proficiency Scale Alignment

Learning Plan

Students' success at acquisition, meaning, and transfer depends on…

Leveraging instructional lesson plan elements that engage students in interesting and rigorous learning activities that centers on collaboration and argumentative discourse. The latter aligns with an instructional plan that includes the phases of (1) Launching, Exploring and Developing, and Practice and Reflection. Formative evaluations are embedded throughout all three of these phases.

Tech. resources to consider:

Reveal Math, Smart Board, PowerPoints, Google Suite, Gizmos, Khan Academy, Desmos, TI-84 Calculator,

Code	Learning Events (Engaging students)
Launch:	Provide an opportunity for students to focus on the big concept. Explore patterns, what do they observe and wonder, make predictions and hypotheses. Math talks routines/ (Collaborative grouping and sharing out) Formative assessment check- (warm-up check, observations,

	student discourse and engagement, anecdotal notes)
Exploration and Development:	Apply guided questions and activities for students to dive deep into exploration of their hypothesis. Collaborative or whole class grouping/direct instruction/math workstations are applied. Testing, providing evidence-based writing, and sharing out can be incorporated here as well. Formative assessment check (observations, student discourse and engagement, anecdotal notes, conferencing).
Practice and Reflection:	Group or independent practice opportunities. Can include student reflection on initial question/hypothesis and lesson reflection. Formative assessment check (Exit ticket, observations, student discourse and engagement, anecdotal notes, written argumentative on) **Tech. resources to consider:** Reveal Math, EdPuzzle.com, PowerPoints, Google Suite, Gizmos

FRAME Learning Intention (at the end):

I can determine what a function tells you about the relationship that it represents.

Success Criteria: I know I am successful because...	Significant Tasks/Learning Progressions
1. I can determine what a function tells you about the relationship that it represents.	1. Research-based activities based on effectiveness and ranked from highest to lowest: ● self-reported grades (d = 1.33) ● jigsaw method (d = 1.20) ● scaffolding (d = 0.82) ● reciprocal teaching (d = 0.74) **Launch/Ignite task 1: What's in your Piggy Bank?**

Refer to the following links below: **FRAME Template Example** **FRAME model Infographic**	***(See: Reveal Math, Algebra 1, Unit 4)*** **Timeline:** 1 Day (Launch *On Trend*) Teachers present the given information, or have a volunteer read it aloud. **Collaborative Activity Summary** Have students work in pairs or small groups to complete the task. Use this activity at the beginning of the module *Linear and Nonlinear Functions.* This activity is intended to help students use a model to describe reported opinions. DOK 3 **WHY:** ● CCSS Content Standard(s): HSF.IF.A.1 **HOW:** ● Allow students 1-2 minutes to individually think about and record what they notice and what they wonder about the given information. The goal is to spark curiosity before asking them to solve problems ● (Think-pair-share) Students will work to study and compare the graph. They will use a graphic organizer to write their observations and what they wonder before sharing with peers in their partner or group. ● Question? What do you observe/wonder? What questions can you ask? What do you notice about the questions/observations between you and your peer(s)? ● (Whole Class discussion) Using an organizer, generate class questions to address and assumptions to explore. ● (Group discussion and written response to the following) How can you answer your question? What strategies can you use? What assumptions, if any, will you make?

	Why are you making these assumptions? Why are assumptions important in this context? ● <u>(Work independently)</u> Apply a strategy to answer the question and explain your reasoning in the provided organizer. ● <u>(Group discussion)</u> Share your strategy and answer with others in your group pair of students, or the entire class. Did each pair of students use correct mathematical reasoning to answer their question? How are the strategies similar and different? EXTENSION (**Differentiation**): You'll note that in the Extension, it illustrates the kind of things that happen in the real world when data are presented as factual, but confusing. Encourage students to realize they can not automatically believe data presented graphically. ● **Use these questions to guide you:** What do you notice? What questions can you ask? How can you answer your questions? What assumptions will you make? **Assessment:** Observations, Student Responses, Exit-Ticket, Journal Entry. What did you like/did not like about today's lesson? What experience(s) did you gain about making observations and generating strategies to answer questions. **Material/Resources:** Resource: Reveal Math ● Resource: CT Model Curriculum ● Unit 3 Algebra 1 Lesson Activities ○ Materials
2. I can represent relations with graphs, ordered pairs, tables, and mappings..	**Significant task 3: Linear and Nonlinear Functions** **Approaching Level:** Interpreting Functions **On Level:** Function Carnival **Beyond Level:** Pendulum Experiment

Refer to the following links below: **FRAME Template Example** **FRAME model Infographic**	**Timeline**: 1 day DOK 2-3 Note 1: “Approaching Level” tasks are for students who are performing below the desired performance level. Note 2: “On Level” tasks are for students who are performing at the desired performance level. Note 3: “Beyond Level” tasks are for students who are performing above the desired performance level. **WHY:** ● CCSS Content Standard(s): HSF.IF.A.1 **HOW:** ● (Group discussion) Students will discuss and assign group members as leader, scribe, time-keeper,...) ● (Think-pair-share) Students will think creatively to create and compare expressions that represent relationships. They can use a graphic organizer to write down their plan, answers to questions, and any challenges they may encounter. They will share and discuss this information with their peers. The group will decide on a plan to move forward. ● Question? Which plan works best for accomplishing your task and why? ● (Group discussion and written response to the following) Did you discuss ideas together? How did you agree on which strategies to apply? How do you know your answers are correct? ● (Cooperative Group work) Work together in your group and use your questions to construct your table. ● (Whole class sharing and peer evaluation)

Share your presentation with the class and collect feedback. (provide a proficiency scale to support feedback)

- Question?
  Did the mathematical model accurately represent the situation?
  Is the table accurate and correctly aligned with correct domains and ranges?
  Based on the proficiency scale rating, what rating level would you give to this project.

EXTENSION (**Differentiation**):
Dive deeper in understanding with the ***Function Carnival*** activity by having students *Apprentice* level tasks add MP3 and MP7 but, because of the guidance within the task, do so at a comparatively modest level. *Expert* tasks aim to cover the full range of practices. Apply similar questions from above to guide student responses.

- (Group discussion and write response to the following)
  How did you answer your questions?
  What strategies did you use?
  How do you know your answers are correct?

Assessment: Observations, Student Responses, Peer Evaluations, Exit-Ticket, Journal Entry.

What did you like/did not like about the performance task?
What experience(s) did you gain about collecting, organizing, and representing linear relationships?
How would you evaluate your contribution to the group?

Material/Resources:
- Computer/Internet Access/Desmos
- (OneNote Notebook or Hard Copy activity form)
- Smart Board
- Calculators
- Proficiency Scale Level Rubric

CSDE -Algebra 1 Curriculum

Differentiation/Intervention Strategies		
Non-mastery (Provide items for struggling learners)	**Enrichment** (Provide items for high performing students)	**ELL** (Provide items to support ELL students)
● Reteach addressing multiple intelligence ● Scaffolding ● Graphic organizers ● Small group or independent direct study ● Varied guided questions ● Tiered assignments ● Daily math review	● Tiered assignments ● Extend or deepen concept learning ● Increased rigor ● More argumentative writing	● Scaffolding (simplify task with structured guidance) ● Connect to primary language and culture ● Create reference charts (picture or word web) ● Increase processing time ● Daily vocabulary review ● Varied guided questions ● Increase repetition

Teacher notes:

- identify specific content or skills which often are misunderstood, confusing, or incorrect assumptions students might have with the content of the course/unit
- explicitly targeted to significant tasks/assessments
- include process standards to reinforce/foster in the instructional practice of the course/unit
- suggested resources/activities to support the course/unit

Algebra 1 Unit 5 (Systems of Linear Equations)

Purpose of the Unit:
1. I can solve systems of equations using diverse methods 2. I can solve systems of equations using graphing technology 3. I can represent and graph the solution sets of systems of linear inequalities

Name of the Unit: Systems of Linear Equations	**Length of the Unit:** 3 Weeks

Common Core State Standards Addressed in this unit:		
CCSS (priority (P) and supporting standards (s)**)**	**CELP** (Emphasize standards in **bold)**	**Standards for Mathematical Practice** (Emphasize practices in **bold)**
CCSS.Math.Content.HSA.CED.A.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods*. • ***PRIORITY STANDARD*** • ***SAT ALIGNED***	**1, 2, 3, 4, 5, 6, 7, 8, 9, 10** CELP 1- 10 (see the full description of	• **Make sense of problems and persevere in solving them.** • **Reason abstractly and quantitatively.** • **Construct viable arguments and critique the reasoning of others.** • **Model with mathematics.** • **Use appropriate tools strategically.** • **Attend to precision.**

	each standard here)	• **Look for and make use of structure.** • **Look for and express regularity in repeated reasoning.** MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)
CCSS.Math.Content.HSA.REI.C.5 Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions. • ***SUPPORTING STANDARD***	**1, 2, 3, 4, 5, 6, 7, 8, 9, 10** CELP 1- 10 (see the full description of each standard here)	• **Make sense of problems and persevere in solving them.** • **Reason abstractly and quantitatively.** • **Construct viable arguments and critique the reasoning of others.** • **Model with mathematics.** • **Use appropriate tools strategically.** • **Attend to precision.** • **Look for and make use of structure.** • **Look for and express regularity in repeated reasoning.**

		MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)
CCSS.Math.Content.HSA.REI.C.6 Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. • ***PRIORITY STANDARD*** • ***SAT ALIGNED***	**1, 2, 3, 4, 5, 6, 7, 8, 9, 10** CELP 1- 10 (see the full description of each standard here)	• **Make sense of problems and persevere in solving them.** • **Reason abstractly and quantitatively.** • **Construct viable arguments and critique the reasoning of others.** • **Model with mathematics.** • **Use appropriate tools strategically.** • **Attend to precision.** • **Look for and make use of structure.** • **Look for and express regularity in repeated reasoning.** MP1, MP2, MP3, MP4, MP5, MP6

		(see the full description of each standard here)
CCSS.Math.Content.HSA.REI.D.11 Explain why the *x*-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. * • ***SUPPORTING STANDARD***	**1, 2, 3, 4, 5, 6, 7, 8, 9, 10** CELP 1- 10 (see the full description of each standard here)	• **Make sense of problems and persevere in solving them.** • **Reason abstractly and quantitatively.** • **Construct viable arguments and critique the reasoning of others.** • **Model with mathematics.** • **Use appropriate tools strategically.** • **Attend to precision.** • **Look for and make use of structure.** • **Look for and express regularity in repeated reasoning.** MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)

Big Ideas:
(Can be broad [interdisciplinary], topical [content focused] or both) **(Big ideas helps students make connections among disciplines or units of study within a content area)** **(What is the value or benefit of learning the concepts in this goal)**

- A system of linear equations is an algebraic way to compare two equations that model a situation and find the breakeven point or choose the most efficient or economical plan.

Essential Questions:

(Engaging, open-ended questions to spark student interest and sharply focus instruction and assessment)

- *What does the number of solutions (none, one or infinite) of a system of linear equations represent?*
- *What are the advantages and disadvantages of solving a system of linear equations graphically versus algebraically?*

Interdisciplinary Knowledge Transfer (from prior to future courses):

Learners will become effective collaborators, technology users, critical thinkers, and problem solvers. They will develop these skills through the application of argumentative discourse and reasoning to model and solve expressions in contextual situations.

Concepts	Skills	Marzano's Taxonomy
Nouns or noun phrases (Need to know)	**Verbs (Able to do at the desired)** Align with **I know** and **I can** statements	**Levels and category for learning**

CCSS.Math.Content.HSA.CED.A.3 ***PRIORITY STANDARD*** ***SAT ALIGNED*** • graph of a linear inequality • solutions to a linear inequality cover the half-plane • viable and non-viable solutions. (e.g., can't have negative number of cars, even though the graph may show negative solutions)	• I can list an appropriate set of possible values for the domain, given a real-life situation • I can write a real-life situation, given a set of constraints • I can list appropriate solutions displayed by the graph of an inequality	The New Taxonomy Marzano • Level 1: Retrieval-Recall • Level 1: Retrieval-Ex • Level 1: Retrieval-Recall

CCSS.Math.Content.HSA.REI.C.5
 	
SUPPORTING STANDARD
 	
• Solutions to linear systems:
  ○ one solution
  ○ no solution
  ○ infinitely many solutions
• intersecting lines
• parallel lines
• coinciding lines
	• Solve a system of equations using elimination
	• Solve a system of equations using substitution
	• Write a system of equations to solve a given problem situation
	• Prove that a particular answer is or is not correct
		• Level 2: Comprehend-
		
		• Level 2: Comprehend-
		
		• Level 1: Retrieval-Ex
		
		• Level 3: Analyze-Specify

CCSS.Math.Content.HSA.REI.C.6
 	
PRIORITY STANDARD
SAT ALIGNED
 	
• Solutions to linear systems:
  ○ one solution
  ○ no solution
  ○ infinitely many solutions
	• Solve a system of equations by graphing
	• Solve a system of equations using technology
	• Write a system of equations to solve a given problem situation
	• Prove if a particular answer is correct
		• Level 2: Comprehend-
		
		• Level 2: Comprehend-
		
		• Level 1: Retrieval-Ex

• intersecting lines • parallel lines • coinciding lines		• Level 3: Analyze-Specify
CCSS.Math.Content.HSA.REI.D.11 ***SUPPORTING STANDARD*** • graph lines • polynomial functions • absolute value functions • rational functions • Exponential functions	• Explain why the *x*-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$ • Find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. ○ Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.*	• Level 2: Comprehend- • Level 4: Knowledge Utilization-Problem Solving
Refer to the links below: Depth of Knowledge LA Depth of Knowledge Math/Science	**Refer to the links below:** Depth of Knowledge LA Depth of Knowledge Math/Science **Algebra 1 Unpacked Standards-CCSS**	**Refer to the links below:** Depth of Knowledge LA Depth of Knowledge Math/Science

Key vocabulary/terms:	
• Cost • Multiplication Property of Equality • Profit • Revenue • Solution of Addition Property of Equality • Breakeven Point • Elimination Method for Solving Systems of Equations	• Substitution Method for Solving Systems • Substitution Property of Equality • System of Linear Equations • Total Cost • Transitive Property of Equality • Variable Cost

Evidence of Teaching and Learning

How will we know when students are learning?
What strategies/interventions/modifications/ will be applied for non-mastery?
How will we enrich students who are proficient?

Unit Assessments, Performance Indicators, and Scoring Rubrics /Proficiency Scales
The unit performance indicators are taught and formatively assessed through all units

	Unit 5
Assessment Links:	**See Reveal, Module 7: Systems of Linear Equations and Inequalities** **See Reveal, Module 7, On-Level Assessments** • On Level Assessments (Forms A1- A3) • Differentiated Assessments (Form B=AL "Approaching Level") • Differentiated Assessments (Form C=BL "Beyond Level") **Note:** See "Answers" for solutions to any abovementioned assessments **See:** Proficiency Scale Alignment
Performance Task (PT) Links: **PT Rubric Links:**	**See Reveal, Module 7, Review and Assess:** • Performance Task **Note:** See "Performance Task Rubric" for solutions to the Performance Task **See:** Proficiency Scale Alignment

Learning Plan

Students' success at acquisition, meaning, and transfer depends on…

Leveraging instructional lesson plan elements that engage students in interesting and rigorous learning activities that centers on collaboration and argumentative discourse. The latter aligns with an instructional plan that includes the phases of (1) Launching, Exploring and Developing, and Practice and Reflection. Formative evaluations are embedded throughout all three of these phases.

Tech. resources to consider:

Reveal Math. ,Smart Board, PowerPoints, Peer Deck, Nearpod, Google Suite, Gizmos, Khan Academy, Desmos, TI-84 Calculator,

Code	Learning Events (Engaging students)
Launch:	Provide an opportunity for students to focus on the big concept. Explore patterns, what do they observe and wonder, make predictions and hypotheses. Math talks routines/ (Collaborative grouping and sharing out) Formative assessment check- (warm-up check, observations, student discourse and engagement, anecdotal notes)
Exploration and Development:	Apply guided questions and activities for students to dive deep into exploration of their hypothesis. Collaborative or whole class grouping/direct instruction/math workstations are applied. Testing, providing evidence-based writing, and sharing out can be incorporated here as well. Formative assessment check (observations, student discourse and engagement, anecdotal notes, conferencing).
Practice and Reflection:	Group or independent practice opportunities. Can include student reflection on initial question/hypothesis and lesson reflection. Formative assessment check (Exit ticket, observations, student discourse and engagement, anecdotal notes, written argumentative reflection) **Tech. resources to consider:** Reveal Math, EdPuzzle.com, Smart Board, PowerPoints, Pear Deck, Nearpod, Google Suite, Gizmos,

FRAME Learning Intention (at the end):

I can write and solve equations to solve problems in the real world.

Success Criteria: I know I am successful because...	Significant Tasks/Learning Progressions

1. I can solve a system of equations with the elimination method using addition and subtraction. **Refer to the following links below:** **FRAME Template Example** **FRAME model Infographic**	1. Module 7, Lesson 3 1. Warm up: see Launch 2. Guided practice: see "Explore and Develop" 3. Independent practice: See "Reflect and Practice" 4. Exit Ticket: see reflect and practice 5. Differentiation: see "Additional Resources" Research-based activities based on potential to considerably accelerate student achievement (ranked from highest to lowest). • self-reported grades (d = 1.33) • jigsaw method (d = 1.20) • scaffolding (d = 0.82) • reciprocal teaching (d = 0.74) Note: click on a teaching strategy above to learn how to use it

Differentiation/Intervention Strategies

Non-mastery (Provide items for struggling learners)	**Enrichment** (Provide items for high performing students)	**ELL** (Provide items to support ELL students)
• Reteach addressing multiple intelligence • Scaffolding • Graphic organizers • Small group or independent direct study • Varied guided questions • Tiered assignments • Daily math review	• Tiered assignments • Extend or deepen concept learning • Increased rigor • More argumentative writing	• Scaffolding (simplify task with structured guidance) • Connect to primary language and culture • Create reference charts (picture or word web) • Increase processing time • Daily vocabulary review • Varied guided questions • Increase repetition

Teacher notes:
• identify specific content or skills which often are misunderstood, confusing, or incorrect assumptions students might have with the content of the course/unit • explicitly targeted to significant tasks/assessments • include process standards to reinforce/foster in the instructional practice of the course/unit • suggested resources/activities to support the course/unit

CTECS Mathematics Curriculum

Algebra 1 Unit 6 (Working with Polynomials)

Purpose of the Unit:
• ***I can add, subtract, and multiply polynomials.*** • ***I can explain and demonstrate how polynomials are related to special products.***

Name of the Unit: Working with Polynomials	***Length of the Unit: 1 Weeks***

Common Core State Standards Addressed in this unit:		
CCSS (priority (P) and supporting standards (s))	***CELP (Emphasize standards in bold)***	***Standards for Mathematical Practice (Emphasize practices in bold)***

CCSS.Math.Content.8.EE.A.2 • ***PRIORITY STANDARD*** ***Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and x3 = p, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.*** ***Worksheet, Workbooks, Lesson Plans and Games***	***1, 2, 3, 4, 5, 6, 7, 8, 9, 10*** ***CELP 1- 10 (see the full description of each standard here)***	• ***Make sense of problems and persevere in solving them.*** • ***Reason abstractly and quantitatively.*** • ***Construct viable arguments and critique the reasoning of others.*** • ***Model with mathematics.*** • ***Use appropriate tools strategically.*** • ***Attend to precision.*** • ***Look for and make use of structure.*** • ***Look for and express regularity in repeated reasoning.*** ***MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)***
CCSS.Math.Content.HSA.APR.A.1 • ***PRIORITY STANDARD*** ***Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.***	***1, 2, 3, 4, 5, 6, 7, 8, 9, 10*** ***CELP 1- 10 (see the full description of***	• ***Make sense of problems and persevere in solving them.*** • ***Reason abstractly and quantitatively.*** • ***Construct viable arguments and critique the reasoning of others.*** • ***Model with mathematics.***

	each standard here)	• ***Use appropriate tools strategically.*** • ***Attend to precision.*** • ***Look for and make use of structure.*** • ***Look for and express regularity in repeated reasoning.*** ***MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)***

Big Ideas:
(can be broad [interdisciplinary], topical [content focused] or both) ***(Big ideas helps students make connections among disciplines or units of study within a content area)*** ***(What is the value or benefit of learning the concepts in this goal)*** • ***Performing operations on polynomials allow us to better understand and interpret real-world situations.*** • ***Polynomials are closed under addition, subtraction, and multiplication.***
Essential Questions:
(engaging, open-ended questions to spark student interest and sharply focus instruction and assessment) • ***How is the polynomial system analogous to the system of integers?***
Interdisciplinary Knowledge Transfer (from prior to future courses):

Learners will become effective collaborators, technology users, critical thinkers, and problem solvers. They will develop these skills through the application of argumentative discourse and reasoning to model and solve problems in contextual situations.		
Concepts	***Skills***	***Marzano's Taxonomy***
Nouns or noun phrases (Need to know)	***Verbs (Able to do at the desired) Align with I know and I can statements***	***Levels and category for learning***
CCSS.Math.Content.8.EE.A.2 • ***PRIORITY STANDARD*** • ***SAT ALIGNED*** • ***apply properties of integer exponents*** • ***Evaluate square roots***	• ***Determine the square root of a perfect square*** • ***Determine the cube root of a perfect cube*** • ***Use the appropriate symbols to find solutions to power equations*** • ***Demonstrate and explain how to simplify radicals of perfect squares***	***The New Taxonomy Marzano*** • ***Level 1: Retrieval*** ○ ***Recognizing*** • ***Level 1: Retrieval*** ○ ***Recognizing*** • ***Level 1: Retrieval*** ○ ***Executing*** • ***Level 2: Comprehension*** ○ ***Integrating***
CCSS.Math.Content.HSA.APR.A.1 • ***PRIORITY STANDARD*** • ***Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.***	• ***Simplify an expression by combining like terms*** • ***Circle terms that are alike*** • ***Use the distributive, associative, and/or***	• ***Level 4:Knowledge Utilization*** ○ ***Decision Making*** • ***Level 2:Comprehension*** ○ ***Symbolizing*** • ***Level 2:Comprehension*** ○ ***Integrating***

	commutative properties to explain combining the like terms of a polynomial expression
	
	• ***Explain and demonstrate how to add two or more polynomial expressions***
	• ***Explain and demonstrate how to subtract two polynomial expressions***
	• ***Explain and demonstrate how multiply two or more polynomial expressions***
		• ***Level 2:Comprehension***
		  ○ ***Integrating***
		
		• ***Level 2:Comprehension***
		  ○ ***Integrating***
		
		• ***Level 2:Comprehension***
		  ○ ***Integrating***

Refer to the links below: ***Depth of Knowledge LA*** ***Depth of Knowledge Math/Science***	***Refer to the links below:*** ***Depth of Knowledge LA*** ***Depth of Knowledge Math/Science*** ***Algebra 1 Unpacked Standards-CCSS***	***Refer to the links below:*** ***Depth of Knowledge LA*** ***Depth of Knowledge Math/Science***

Key vocabulary/terms:
binomial, degree of a monomial, degree of a polynomial, difference of two squares, leading coefficient, polynomial, prime polynomial, quadratic expression and equations, standard form of a polynomial, trinomial,

Evidence of Teaching and Learning

How will we know when students are learning?
What strategies/interventions/modifications/ will be applied for non-mastery?
How will we enrich students who are proficient?

Unit Assessments, Performance Indicators, and Scoring Rubrics /Proficiency Scales ***The unit performance indicators are taught and formatively assessed through all units***	
	Reveal Module 10
Assessment Links:	***See Reveal, Module 10: Polynomials*** ***See Reveal, Module 10, On-Level Assessments*** • ***On Level Assessments (Forms A1- A3)*** • ***Differentiated Assessments (Form B=AL "Approaching Level")*** • ***Differentiated Assessments (Form C=BL "Beyond Level")*** ***Note: See "Answers" for solutions to any abovementioned assessments*** ***See: Proficiency Scale Alignment***
Performance Task (PT) Links: ***PT Rubric Links:***	***See Reveal, Module 10, Review and Assess:*** • ***Performance Task*** ***Note: See "Performance Task Rubric" for solutions to the Performance Task*** ***See: Proficiency Scale Alignment***

Learning Plan

Students' success at acquisition, meaning, and transfer depends on…

Leveraging instructional lesson plan elements that engage students in interesting and rigorous learning activities that centers on collaboration and argumentative discourse. The latter aligns with an instructional plan that includes the phases of (1) Launching, Exploring

and Developing, and Practice and Reflection. Formative evaluations are embedded throughout all three of these phases.

<u>Tech. resources to consider:</u>

Reveal Math, Smart Board, PowerPoints, Google Suite, Gizmos, Khan Academy, Desmos, TI-84 Calculator,

Code	*Learning Events (Engaging students)*
<u>Launch:</u>	***Provide an opportunity for students to focus on the big concept. Explore patterns, what do they observe and wonder, make predictions and hypotheses. Math talks routines/*** ***(collaborative grouping and sharing out)*** ***Formative assessment check- (warm-up check, observations, student discourse and engagement, anecdotal notes)***
<u>Exploration and Development:</u>	***Apply guided questions and activities for students to dive deep into exploration of their hypothesis. Collaborative or whole class grouping/direct instruction/math workstations are applied. Testing, providing evidence-based writing, and sharing out can be incorporated here as well.*** ***Formative assessment check (observations, student discourse and engagement, anecdotal notes, conferencing).***
<u>Practice and Reflection:</u>	***Group or independent practice opportunities.*** ***Can include student reflection on initial question/hypothesis and lesson reflection.*** ***Formative assessment check (Exit ticket, observations, student discourse and engagement, anecdotal notes, written argumentative reflection)*** ***Tech. resources to consider:*** ***Reveal Math, EdPuzzle.com, Smart Board, PowerPoints, Pear Deck, Nearpod, Google Suite, Gizmos,***

<u>FRAME Learning Intention (at the end):</u>

I can perform operations on polynomials to understand, interpret and solve real-world problems.

Success Criteria: I know I am successful because...	*Significant Tasks/Learning Progressions*
1. I can add, subtract and multiply polynomials.. *Refer to the following links below:* *FRAME Template* *Example* *FRAME model* *Infographic*	*Launch/Ignite task: Fixer Upper?* *(See: Reveal Math, Algebra 1, Unit/Module 10)* *Timeline: 1 Day (Launch to stimulate engagement)* *DOK 3* *Teachers present the given information, or have a volunteer read it aloud.* ***Collaborative Activity Summary*** *Have students work in pairs or small groups to complete the task. Use this activity at the beginning of the module Polynomials. This activity will help students gain experience in making observations and generating their own strategies to answer questions. Students will reason to determine diverse models to describe the dimensions and area of a floor plan.* ***WHY:*** • *CCSS Content Standard(s): HSA.APR. A.1* ***HOW:*** • *(Think-pair-share)* *Students will work to determine how much hardwood is required for a floor plan. Students will study a floor plan and generate algebraic models to determine how many square feet of hardwood are needed. They will use a graphic organizer to write their observations and what they wonder before sharing with peers.* • *Question?* *What do you observe/wonder? What questions can you ask? What do you notice about the questions/observations between you and your peer(s)?* • *(Whole-Class discussion)* *Using an organizer, generate class questions to address and assumptions to explore.* • *(Group discussion and written response to the following)* *How can you answer your question?* *What strategies can you use?*

	What assumptions, if any, will you make? ***Why are you making these assumptions?*** ***Why are assumptions important in this context?*** • ***<u>(Work independently)</u>*** ***Apply a strategy to answer the question and explain your reasoning in the provided organizer.*** • ***<u>(Group discussion)</u>*** ***Share your strategy and answer with others in your group pair of students, or the entire class. Did each pair of students use correct mathematical reasoning to answer their question? How are the strategies similar and different?*** ***EXTENSION (Differentiation):*** ***Provide an example for students to research hardwood prices that have been adjusted for inflation and construct a model to approximate the adjusted values. What adjustments (if any) can be made to account for inflation?*** • ***Use these questions to guide you:*** ***What do you notice?*** ***What questions can you ask?*** ***How can you answer your questions?*** ***What assumptions will you make?*** • ***Write responses to the following questions in the provided organizer:*** ***Describe the relationship.*** ***How do you know that is the right answer?*** ***Compare and contrast the applied strategies of the group.*** ***What strategy was most effective and why?*** ***Assessment: Observations, Student Responses, Exit-Ticket, Journal Entry.*** ***What did you like/did not like about today's lesson?*** ***What experience(s) did you gain about making observations and generating strategies to answer questions.***

	Material/Resources: • ***Reveal Math M10 Launch activity and teacher notes*** • ***(Google Docs, or Hard Copy activity form)*** • ***Smart Board***
2. I can explain and demonstrate how polynomials are related to special products. ***Refer to the following links below:*** ***FRAME Template Example*** ***FRAME model Infographic***	***SDE Math Site:*** *Activity 3.1.4 The Open Box Problem* ***Timeline: 1-2 days*** ***Collaborative Activity Summary:*** ***Have students work in pairs, small groups, or individually to complete the task. Use this activity as a possible task for students to demonstrate their understanding of Polynomials. Students will gain experience in constructing reasonable questions related to trends and solutions to problems and generate strategies to answer the questions.*** ***WHY:*** • ***CCSS Content Standard(s): HSA.APR.A.1*** ***HOW:*** • ***(Group discussion)*** ***Students will discuss and assign group members as leader, scribe, time-keeper,)*** • ***(Think-pair-share)*** ***Students will think of creative ways to craft their plan. They can use a graphic organizer to write down their plan and any challenges they may encounter, then share it with their peers. The group will decide on a plan to move forward.*** • ***Question?*** ***Which plan works best for accomplishing your task and why?*** • ***(Work independently)*** ***Using an organizer, generate at least 3 different questions that reflect your understanding of the use of the line of fit. Then calculate, write, and check the answers to your questions.*** • ***(Group discussion and written response to the following)***

	How did you answer your question? ***What strategies did you use?*** ***How do you know your answers are correct?*** • ***<u>(Cooperative Group work)</u>*** ***Work together in your group and use your questions to construct your solutions.*** • ***<u>(Whole class sharing and peer evaluation)</u>*** ***Share your findings with the class for discussion*** • ***Question?*** ***Did you enjoy solving this problem?*** ***How would you rate this activity (easy, moderate, or difficult)?*** ***Based on the proficiency scale rating, what rating level would you give your performance?*** ***EXTENSION (Differentiation):*** ***Dive deeper in understanding and have students create problems relating to different random phenomena. Apply similar questions from above to guide student responses.*** • ***<u>(Group discussion and write response to the following)</u>*** ***How did you answer your questions?*** ***What strategies did you use?*** ***How do you know your answers are correct?*** ***Assessment: Observations, Student Responses, Peer Evaluations, Exit-Ticket, Journal Entry.*** ***What did you like/did not like about this activity/task?*** ***What experience(s) did you gain about generating questions and answers for the activity/task?*** ***How would you evaluate your contribution to the group?*** ***Material/Resources:*** • ***Computer/Internet Access*** • ***Desmos graphing calculator*** • ***(OneNote Notebook or Hard Copy activity form)*** • ***Smart Board*** • ***Poster Paper/Chart Paper (Optional)***

	• ***Calculators***

Differentiation/Intervention Strategies

Non-mastery *(Provide items for struggling learners)*	***Enrichment*** *(Provide items for high performing students)*	***ELL*** *(Provide items to support ELL students)*
• ***Reteach addressing multiple intelligence*** • ***Scaffolding*** • ***Graphic organizers*** • ***Small group or independent direct study*** • ***Varied guided questions*** • ***Tiered assignments*** • ***Daily math review***	• ***Tiered assignments*** • ***Extend or deepen concept learning*** • ***Increased rigor*** • ***More argumentative writing***	• ***Scaffolding (simplify task with structured guidance)*** • ***Connect to primary language and culture*** • ***Create reference charts (picture or word web)*** • ***Increase processing time*** • ***Daily vocabulary review*** • ***Varied guided questions*** • ***Increase repetition***

Teacher notes:

- ***identify specific content or skills which often are misunderstood, confusing, or incorrect assumptions students might have with the content of the course/unit***
- ***explicitly targeted to significant tasks/assessments***
- ***include process standards to reinforce/foster in the instructional practice of the course/unit***
- ***suggested resources/activities to support the course/unit***

Algebra 1 Unit 7 (Quadratic Functions and Equations)

Name of the Unit: Quadratic Functions and Equations	***Length of the Unit: 3 Weeks***

Purpose of the Unit:
• ***I can graph quadratic functions and their transformations.***
• ***I can solve quadratic equations using a variety of methods.***
• ***I can solve systems of linear and quadratic equations.***

Common Core State Standards Addressed in this unit:		
CCSS (priority (P) and supporting standards (s))	***CELP (Emphasize standards in bold)***	***Standards for Mathematical Practice (Emphasize practices in bold)***

CCSS.Math.Content.8.EE.A.2 • ***SUPPORTING STANDARD*** ***Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and x3 = p, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.*** ***Worksheet, Workbooks, Lesson Plans and Games***	***1, 2, 3, 4, 5, 6, 7, 8, 9, 10*** ***CELP 1- 10 (see the full description of each standard here)***	• ***Make sense of problems and persevere in solving them.*** • ***Reason abstractly and quantitatively.*** • ***Construct viable arguments and critique the reasoning of others.*** • ***Model with mathematics.*** • ***Use appropriate tools strategically.*** • ***Attend to precision.*** • ***Look for and make use of structure.*** • ***Look for and express regularity in repeated reasoning.*** ***MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)***
CCSS.Math.Content.HSA.SSE.B.3 • ***PRIORITY STANDARD*** ***Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.****	***1, 2, 3, 4, 5, 6, 7, 8, 9, 10***	• ***Make sense of problems and persevere in solving them.*** • ***Reason abstractly and quantitatively.*** • ***Construct viable arguments and critique the reasoning of others.*** • ***Model with mathematics.***

	CELP 1- 10 (see the full description of each standard here)	• ***Use appropriate tools strategically.*** • ***Attend to precision.*** • ***Look for and make use of structure.*** • ***Look for and express regularity in repeated reasoning.*** ***MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)***
CCSS.Math.Content.HSA.SSE.B.3.a • ***PRIORITY STANDARD*** ***Factor a quadratic expression to reveal the zeros of the function it defines.***	***1, 2, 3, 4, 5, 6, 7, 8, 9, 10*** ***CELP 1- 10 (see the full description of each standard here)***	• ***Make sense of problems and persevere in solving them.*** • ***Reason abstractly and quantitatively.*** • ***Construct viable arguments and critique the reasoning of others.*** • ***Model with mathematics.*** • ***Use appropriate tools strategically.*** • ***Attend to precision.*** • ***Look for and make use of structure.*** • ***Look for and express regularity in repeated reasoning.***

		MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)
CCSS.Math.Content.HSA.SSE.B.3.b • ***PRIORITY STANDARD*** ***Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.***	***1, 2, 3, 4, 5, 6, 7, 8, 9, 10*** ***CELP 1- 10 (see the full description of each standard here)***	• ***Make sense of problems and persevere in solving them.*** • ***Reason abstractly and quantitatively.*** • ***Construct viable arguments and critique the reasoning of others.*** • ***Model with mathematics.*** • ***Use appropriate tools strategically.*** • ***Attend to precision.*** • ***Look for and make use of structure.*** • ***Look for and express regularity in repeated reasoning.*** ***MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)***
CCSS.Math.Content.HSA.REI.B.4.a • ***PRIORITY STANDARD*** ***Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.***	***1, 2, 3, 4, 5, 6, 7, 8, 9, 10***	• ***Make sense of problems and persevere in solving them.*** • ***Reason abstractly and quantitatively.*** • ***Construct viable arguments and critique the***

	CELP 1- 10 (see the full description of each standard here)	***reasoning of others.*** • ***Model with mathematics.*** • ***Use appropriate tools strategically.*** • ***Attend to precision.*** • ***Look for and make use of structure.*** • ***Look for and express regularity in repeated reasoning.*** ***MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)***
CCSS.Math.Content.HSA.CED.A.1 • ***PRIORITY STANDARD*** • ***SAT ALIGNED*** ***Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.***	***1, 2, 3, 4, 5, 6, 7, 8, 9, 10*** ***CELP 1- 10 (see the full description of each standard here)***	• ***Make sense of problems and persevere in solving them.*** • ***Reason abstractly and quantitatively.*** • ***Construct viable arguments and critique the reasoning of others.*** • ***Model with mathematics.*** • ***Use appropriate tools strategically.*** • ***Attend to precision.*** • ***Look for and make use of structure.*** • ***Look for and express***

		regularity in repeated reasoning. ***MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)***
CCSS.Math.Content.HSA.CED.A.2 • ***PRIORITY STANDARD*** • ***SAT ALIGNED*** ***Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.***	***1, 2, 3, 4, 5, 6, 7, 8, 9, 10*** ***CELP 1- 10 (see the full description of each standard here)***	• ***Make sense of problems and persevere in solving them.*** • ***Reason abstractly and quantitatively.*** • ***Construct viable arguments and critique the reasoning of others.*** • ***Model with mathematics.*** • ***Use appropriate tools strategically.*** • ***Attend to precision.*** • ***Look for and make use of structure.*** • ***Look for and express regularity in repeated reasoning.*** ***MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)***
CCSS.Math.Content.HSF.IF.B.4 • ***PRIORITY STANDARD*** • ***SAT ALIGNED***	***1, 2, 3, 4, 5, 6, 7, 8, 9, 10***	• ***Make sense of problems and persevere in solving them.***

For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.	***CELP 1- 10 (see the full description of each standard here)***	• ***Reason abstractly and quantitatively.*** • ***Construct viable arguments and critique the reasoning of others.*** • ***Model with mathematics.*** • ***Use appropriate tools strategically.*** • ***Attend to precision.*** • ***Look for and make use of structure.*** • ***Look for and express regularity in repeated reasoning.*** ***MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)***
CCSS.Math.Content.HSF.IF.C.7.a • ***PRIORITY STANDARD*** • ***SAT ALIGNED*** ***Graph linear and quadratic functions and show intercepts, maxima, and minima.***	***1, 2, 3, 4, 5, 6, 7, 8, 9, 10*** ***CELP 1- 10 (see the full description of each***	• ***Make sense of problems and persevere in solving them.*** • ***Reason abstractly and quantitatively.*** • ***Construct viable arguments and critique the reasoning of others.*** • ***Model with mathematics.*** • ***Use appropriate tools strategically.***

	standard here)	• ***Attend to precision.*** • ***Look for and make use of structure.*** • ***Look for and express regularity in repeated reasoning.*** ***MP1, MP2, MP3, MP4, MP5, MP6 (see the full description of each standard here)***

Big Ideas:
(can be broad [interdisciplinary], topical [content focused] or both) ***(Big ideas helps students make connections among disciplines or units of study within a content area)*** ***(What is the value or benefit of learning the concepts in this goal)*** • ***Quadratic functions can be used to model real world relationships and the key points in quadratic functions have meaning in the real-world context.*** • ***Dynamic software, graphing calculators, and other technology can be used to explore and deepen our understanding of mathematics.***
Essential Questions:
(engaging, open-ended questions to spark student interest and sharply focus instruction and assessment) • ***What can the zeros, intercepts, vertex, maximum, minimum and other features of a quadratic function tell you about real world relationships?*** • ***How can technology support investigation and experimentation of the way that parameters affect functions?***
Interdisciplinary Knowledge Transfer (from prior to future courses):

Learners will become effective collaborators, technology users, critical thinkers, and problem solvers. They will develop these skills through the application of argumentative discourse and reasoning to model and solve problems in contextual situations.		
Concepts	***Skills***	***Marzano's Taxonomy***
Nouns or noun phrases (Need to know)	***Verbs (Able to do at the desired) Align with I know and I can statements***	***Levels and category for learning***
CCSS.Math.Content.8.EE.A.2 • ***SUPPORTING STANDARD*** • ***SAT ALIGNED*** • ***apply properties of integer exponents*** • ***Evaluate square roots***	• ***Determine the square root of a perfect square*** • ***Determine the cube root of a perfect cube*** • ***Use the appropriate symbols to find solutions to power equations*** • ***Demonstrate and explain how to simplify radicals of perfect squares***	***The New Taxonomy Marzano*** • ***Level 1: Retrieval*** ○ ***Recognizing*** • ***Level 1: Retrieval*** ○ ***Recognizing*** • ***Level 1: Retrieval*** ○ ***Executing*** • ***Level 2: Comprehension*** ○ ***Integrating***
CCSS.Math.Content.HSA.SSE.B.3 • ***PRIORITY STANDARD*** • ***Write expressions in equivalent forms to solve problems***	• ***Compare and contrast the standard, vertex and factored forms of quadratic functions and determine relationships between the quantities.***	• ***Level 2: Comprehension*** ○ ***Symbolizing and*** • ***Level 3:Analysis*** ○ ***Generalizing***
CCSS.Math.Content.HSA.SSE.B.3.a • ***PRIORITY STANDARD***	• ***Factor a quadratic expression***	• ***Level 1:Retrieval*** ○ ***Executing*** • ***Level 3:Analysis*** ○ ***Generalizing***

• *Produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.*
• *Factor a quadratic expression to reveal the zeros of the function it defines.*
	• *Determine the zeros of the function*
	• *Explain why the function has zero, one, or two zeros of the function*
	• *Write a quadratic function, given a problem situation, and determine the "zeros" to find the values of the function*
	• *Write a quadratic function given the zeros of the function*
		• *Level 2: Comprehension*
		  ○ *Integrating*
		• *Level 2: Comprehension*
		  ○ *Symbolizing and*
		• *Level 3:Analysis*
		  ○ *Generalizing*
		• *Level 2: Comprehension*
		  ○ *Integrating*

CCSS.Math.Content.HSA.SSE.B.3.b
• *PRIORITY STANDARD*
  • *Produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.*
  • *Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.*
	• *Interpret the graph of a quadratic function and explain how the vertex is a maximum or minimum value*
	• *Complete the square to factor a quadratic function to determine the maximum or minimum value*
		• *Level 3: Analysis*
		  ○ *Generalizing and*
		• *Level 3:Analysis*
		  ○ *Matching*
		• *Level 1:Retrieval*
		  ○ *Executing*

CCSS.Math.Content.HSA.CED.A.1 • *PRIORITY STANDARD* • *SAT ALIGNED*	• *Write linear and exponential equations in one variable given information in a real-life situation*	• *Level 4:Knowledge Utilization* ○ *Decision Making*

• *Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.*	• *Write linear inequalities in one variable given information of a real-life situation* • *Manipulate the one variable equation to solve for the unknown using appropriate steps* • *Explain the solution set for a one variable inequality*	• *Level 4:Knowledge Utilization* ○ *Decision Making* • *Level 4:Knowledge Utilization* ○ *Decision Making* • *Level 2:Comprehension* ○ *Integrating*
CCSS.Math.Content.HSA.CED.A.2 • *PRIORITY STANDARD* • *SAT ALIGNED* • *Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.*	• *Draw a visual representation of an equation related to a real-life situation complete with appropriate labels.* • *Write equation in two or more variables given information in a real-life situation* • *Manipulate the two or more variable equation to solve for the specified unknown using appropriate steps* • *Rewrite an equation to solve for the specified unknown*	• *Level 2: Comprehension* ○ *Symbolizing* • *Level 4:Knowledge Utilization* ○ *Decision Making* • *Level 4:Knowledge Utilization* ○ *Decision Making* • *Level 4:Knowledge Utilization* ○ *Decision Making*

CCSS.Math.Content.HSF.IF.B.4 • ***PRIORITY STANDARD*** • ***SAT ALIGNED*** • ***For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.******	• ***Find the equation of the inverse of a linear function***	• ***Level 2: Comprehension*** ○ ***Symbolizing***

CCSS.Math.Content.HSF.IF.C.7.a
 	
• ***PRIORITY STANDARD***
• ***SAT ALIGNED***
 	
• ***Graph linear and quadratic functions and show intercepts, maxima, and minima.***
	• ***Draw a graph of a function using a coordinate plane***
	• ***Input data into appropriate technology to create a graph of a function originally expressed symbolically***
	• ***Circle the maxima or minima of a graph of a quadratic equation***
		• ***Level 2: Comprehension***
		  ○ ***Symbolizing***
		
		• ***Level 2: Comprehension***
		  ○ ***Symbolizing***
		
		• ***Level 1: Retrieval***
		  ○ ***Recalling***

Refer to the links below: ***Depth of Knowledge LA*** ***Depth of Knowledge Math/Science***	***Refer to the links below:*** ***Depth of Knowledge LA*** ***Depth of Knowledge Math/Science*** ***Algebra 1 Unpacked Standards-CCSS***	***Refer to the links below:*** ***Depth of Knowledge LA*** ***Depth of Knowledge Math/Science***

Key vocabulary/terms:

axis of symmetry, coefficient of determination, completing the square, curve fitting, discriminant, double root, maximum, minimum, parabola, quadratic equation, quadratic function, standard form of a quadratic function, vertex form

Evidence of Teaching and Learning

How will we know when students are learning?
What strategies/interventions/modifications/ will be applied for non-mastery?
How will we enrich students who are proficient?

Unit Assessments, Performance Indicators, and Scoring Rubrics /Proficiency Scales
The unit performance indicators are taught and formatively assessed through all units

	Unit 11
Assessment Links:	***See Reveal, Module 11: Quadratic Functions*** ***See Reveal, Module 11, On-Level Assessments*** • ***On Level Assessments (Forms A1- A3)*** • ***Differentiated Assessments (Form B=AL "Approaching Level")*** • ***Differentiated Assessments (Form C=BL "Beyond Level")*** ***Note: See "Answers" for solutions to any abovementioned assessments*** ***See: Proficiency Scale Alignment***
Performance Task (PT) Links: ***PT Rubric Links:***	***See Reveal, Module 11, Review and Assess:*** • ***Performance Task*** ***Note: See "Performance Task Rubric" for solutions to the Performance Task*** ***See: Proficiency Scale Alignment***

Learning Plan

Students' success at acquisition, meaning, and transfer depends on…

Leveraging instructional lesson plan elements that engage students in interesting and rigorous learning activities that centers on collaboration and argumentative discourse. The latter aligns with an instructional plan that includes the phases of (1) Launching, Exploring and Developing, and Practice and Reflection. Formative evaluations are embedded throughout all three of these phases.

Tech. resources to consider:

Reveal Math, , Padlet, Smart Board, PowerPoints, Peer Deck, Nearpod, Google Suite, CGizmos, Khan Academy, Desmos, TI-84 Calculator

Code	*Learning Events (Engaging students)*
Launch:	***Provide an opportunity for students to focus on the big concept. Explore patterns, what do they observe and wonder, make predictions and hypotheses. Math talks routines/*** ***(Collaborative grouping and sharing out)*** ***Formative assessment check- (warm-up check, observations, student discourse and engagement, anecdotal notes)***
Exploration and Development:	***Apply guided questions and activities for students to dive deep into exploration of their hypothesis. Collaborative or whole class grouping/direct instruction/math workstations are applied. Testing, providing evidence-based writing, and sharing out can be incorporated here as well.*** ***Formative assessment check (observations, student discourse and engagement, anecdotal notes, conferencing).***
Practice and Reflection:	***Group or independent practice opportunities.*** ***Can include student reflection on initial question/hypothesis and lesson reflection.*** ***Formative assessment check (Exit ticket, observations, student discourse and engagement, anecdotal notes, written argumentative reflection)*** ***Tech. resources to consider:***

	Reveal Math, Padlet, EdPuzzle.com, Smart Board, PowerPoints, Pear Deck, Nearpod, Google Suite, Gizmos,

FRAME Learning Intention (at the end):

I can write and solve equations to solve problems in the real world.

Success Criteria: I know I am successful because...	***Significant Tasks/Learning Progressions***
1. I can Interpret and solve quadratic equations using a variety of methods.. ***Refer to the following links below:*** ***FRAME Template Example*** ***FRAME model Infographic***	***Launch/Ignite task: What's Playing?*** ***(See: Reveal Math, Algebra 1, Unit/Module 11)*** ***Timeline: 1 Day (Launch to stimulate engagement)*** ***DOK 3*** ***Teachers present the given information, or have a volunteer read it aloud.*** ***Collaborative Activity Summary*** ***Have students work in pairs or small groups to complete the task. Use this activity at the beginning of the module Quadratic Functions and Equations. This activity will help students gain experience in making observations and generating their own strategies to answer questions. Students will reason to determine diverse models to describe the change in movie ticket prices and analyze their progress along the way.*** ***WHY:*** • ***CCSS Content Standard(s): HSF.IF.B.4, HSF.IF.C.7.a*** ***HOW:*** • ***(Think-pair-share)*** ***Students will work to help describe changes in movie ticket prices. Students will study tables and trends to determine the average price of movie tickets 2027. They will use a graphic organizer to write their observations and what they wonder before sharing with peers.*** • ***Question?***

	What do you observe/wonder? What questions can you ask? What do you notice about the questions/observations between you and your peer(s)? • ***<u>(Whole-Class discussion)</u>*** ***Using an organizer, generate class questions to address and assumptions to explore.*** • ***<u>(Group discussion and written response to the following)</u>*** ***How can you answer your question?*** ***What strategies can you use?*** ***What assumptions, if any, will you make?*** ***Why are you making these assumptions?*** ***Why are assumptions important in this context?*** • ***<u>(Work independently)</u>*** ***Apply a strategy to answer the question and explain your reasoning in the provided organizer.*** • ***<u>(Group discussion)</u>*** ***Share your strategy and answer with others in your group pair of students, or the entire class. Did each pair of students use correct mathematical reasoning to answer their question? How are the strategies similar and different?*** ***EXTENSION (Differentiation):*** ***Provide an example for students to consider whether they could use different functions to model certain intervals of years, for a piecewise approach. Another extension you might choose to use is to have students research ticket prices that have been adjusted for inflation and construct a model to approximate the adjusted values. Will the data still indicate exponential growth when prices are accounted for inflation?*** • ***Use these questions to guide you:*** ***What do you notice?*** ***What questions can you ask?*** ***How can you answer your questions?***

	What assumptions will you make? • ***Write responses to the following questions in the provided organizer:*** ***Describe the relationship.*** ***How do you know that is the right answer?*** ***Compare and contrast the applied strategies of the group.*** ***What strategy was most effective and why?*** ***Assessment: Observations, Student Responses, Exit-Ticket, Journal Entry.*** ***What did you like/did not like about today's lesson?*** ***What experience(s) did you gain about making observations and generating strategies to answer questions.*** ***Material/Resources:*** • ***Reveal Math M11 Launch activity and teacher notes*** • ***(OneNote Notebook or Hard Copy activity form)*** • ***Smart Board***
2. I can model, interpret and solve systems of quadratic equations using a variety of methods to analyze and determine solutions to resolve contextual issues. ***Refer to the following links below:*** ***FRAME Template Example*** ***FRAME model Infographic***	***Reveal Performance Task Mod 11 : Building a Bridge*** ***(See Reveal Module/Unit 11*** ***Timeline: 1-2 days*** ***Collaborative Activity Summary:*** ***Have students work in pairs, small groups, or individually to complete the task. Use this activity as a possible task for students to demonstrate their understanding of Quadratic Functions. Students will gain experience in constructing reasonable questions related to trends and solutions to systems of functions and generate strategies to answer the questions.*** ***WHY:*** • ***CCSS Content Standard(s): A.SSE.3b, A.CED.2, A.REI.4, A.REI.7, F.IF.4, F.IF.7*** ***HOW:*** • ***(Group discussion)*** ***Students will discuss and assign group members as leader, scribe, time-keeper,...)***

	• ***<u>(Think-pair-share)</u>*** ***Students will think of creative ways to craft their plan. They can use a graphic organizer to write down their plan and any challenges they may encounter, then share it with their peers. The group will decide on a plan to move forward.*** • ***Question?*** ***Which plan works best for accomplishing your task and why?*** • ***<u>(Work independently)</u>*** ***Using an organizer, generate at least 3 different questions that reflect your understanding of the use of the line of fit. Then calculate, write, and check the answers to your questions.*** • ***<u>(Group discussion and written response to the following)</u>*** ***How did you answer your question?*** ***What strategies did you use?*** ***How do you know your answers are correct?*** • ***<u>(Cooperative Group work)</u>*** ***Work together in your group and use your questions to construct your solutions.*** • ***<u>(Whole class sharing and peer evaluation)</u>*** ***Share your findings with the class for discussion*** • ***Question?*** ***Did you enjoy solving this problem?*** ***How would you rate this activity (easy, moderate, or difficult)?*** ***Based on the proficiency scale rating, what rating level would you give your performance?*** ***EXTENSION (Differentiation):***

	Dive deeper in understanding and have students create problems relating to different random phenomena. Apply similar questions from above to guide student responses. • ***(Group discussion and write response to the following)*** ***How did you answer your questions?*** ***What strategies did you use?*** ***How do you know your answers are correct?*** ***Assessment: Observations, Student Responses, Peer Evaluations, Exit-Ticket, Journal Entry.*** ***What did you like/did not like about this activity/task?*** ***What experience(s) did you gain about generating questions and answers for the activity/task?*** ***How would you evaluate your contribution to the group?*** ***Material/Resources:*** • ***Computer/Internet Access*** • ***Desmos graphing calculator*** • ***(OneNote Notebook or Hard Copy activity form)*** • ***Smart Board*** • ***Poster Paper/Chart Paper (Optional)*** • ***Calculators***

Differentiation/Intervention Strategies

Non-mastery (Provide items for struggling learners)	***Enrichment*** (Provide items for high performing students)	***ELL*** (Provide items to support ELL students)
• ***Reteach addressing multiple intelligence*** • ***Scaffolding*** • ***Graphic organizers*** • ***Small group or independent direct study*** • ***Varied guided questions***	• ***Tiered assignments*** • ***Extend or deepen concept learning*** • ***Increased rigor*** • ***More argumentative writing***	• ***Scaffolding (simplify task with structured guidance)*** • ***Connect to primary language and culture*** • ***Create reference charts (picture or word web)*** • ***Increase processing time***

• *Tiered assignments* • *Daily math review*		• *Daily vocabulary review* • *Varied guided questions* • *Increase repetition*

Teacher notes:

- *identify specific content or skills which often are misunderstood, confusing, or incorrect assumptions students might have with the content of the course/unit*
- *explicitly targeted to significant tasks/assessments*
- *include process standards to reinforce/foster in the instructional practice of the course/unit*
- *suggested resources/activities to support the course/unit*