

# ROBERTSON COUNTY SCHOOLS

## State Standards – Mathematics

## Learning Progressions

Kindergarten	1	2	3	4	5	6	7	8	HS
<u>Counting and Cardinality</u>									Number and Quantity
<u>Number and Operations in Base Ten</u>					<u>Ratios and Proportional Relationships</u>				
			<u>Number and Operations - Fractions</u>		<u>The Number System</u>				
<u>Operations and Algebraic Thinking</u>					<u>Expressions and Equations</u>				Algebra
								<u>Functions</u>	Functions
<u>Geometry</u>					<u>Geometry</u>				Geometry
<u>Measurement and Data</u>					<u>Statistics and Probability</u>				Statistics and Probability

2023-2024

### Eighth GRADE ALGEBRA 1 PACING GUIDE

2023-2024

# EIGHTH GRADE ALGEBRA 1 PACING GUIDE

## Newly Revised Tennessee Math Standards Grade 8 \*Update with ALG 1\*

### The Number System

This is the culminating area for the number system from 6th and 7th grade with the introduction of irrational numbers. Students learn that there are numbers that are not rational, called irrational numbers, and they approximate irrational numbers by rational numbers, locating them on a number line. Students estimate the value of irrational expressions

### Expressions and Equations

Students work with radicals and integer exponents. Students understand the connections between proportional relationships, lines, and linear equations. Students advance their knowledge developed in 7th grade about equations to analyze and solve linear equations and pairs of simultaneous linear equations. Students use linear equations and systems of linear equations to represent, analyze, and solve a variety of problems. Students recognize equations for proportions ( $y/x = m$  or  $y = mx$ ) as special linear equations ( $y = mx + b$ ), understanding that the constant of proportionality ( $m$ ) is the slope, and the graphs are lines through the origin. They understand that the slope,  $m$ , of a line is a constant rate of change. They understand that if the input or  $x$ -coordinate changes then the output or  $y$ -coordinate changes as well with respect to the slope. Students will solve systems of two linear equation in two variables and relate the systems to pairs of lines in the plane. They learn that these lines will either intersect, be parallel, or are actually the same line, corresponding to a single solution, no solution, or infinite solutions. Students use linear equation, systems of linear equations, linear functions, and their understanding of slope of a line to analyze situations and solve real-world and mathematical problems.

### Functions

8th grade begins the formal study of functions, a mathematical concept that for the student will continue throughout high school. Students grasp the concept of a function as a rule that assigns to each input exactly one output. They understand that functions describe situations where one quantity determines another. They can translate among representations and partial representations of functions (noting that tabular and graphical representations may be partial representations), and they describe how aspects of the function are reflected in the different representations. They do not have to learn function notation at this point but they do know and interpret the equation  $y = mx + b$  as defining a linear function.

### Geometry

Students informally explore translations, rotations, reflections, and dilations, laying groundwork for a deeper study of these in high school mathematics. Students use informal arguments to establish facts about the angle sum and exterior angle of triangles. Students explain and model the Pythagorean Theorem and its converse. They apply the Pythagorean Theorem to find distances between points on the coordinate plane and to find side lengths in right triangles. Students work with volume by solving problems involving cones, cylinders, and spheres.

### Statistics and Probability

Students extend their knowledge from 7th grade by working with scatter plots for bivariate measurement data and understand linear associations and the use of linear models to solve problems interpreting the slope and intercept. Students will assess models by informally fitting a straight line and judging the closeness of the data points to the line. Students continue their work with probability from 6th and 7th grade by finding probability of compound events and represent the data using organized lists, tables, and tree diagrams.

## **Standards for Mathematical Practice**

Being successful in mathematics requires the development of approaches, practices, and habits of mind that need to be in place as one strives to develop mathematical fluency, procedural skills, and conceptual understanding. The Standards for Mathematical Practice are meant to address these areas of expertise that teachers should seek to develop in their students. These approaches, practices, and habits of mind can be summarized as “processes and proficiencies” that successful mathematicians have as a part of their work in mathematics. Additional explanations are included in the main introduction of these standards.

<b>Standards for Mathematical Practice</b>
<ol style="list-style-type: none"><li>1. Make sense of problems and persevere in solving them.</li><li>2. Reason abstractly and quantitatively.</li><li>3. Construct viable arguments and critique the reasoning of others.</li><li>4. Model with mathematics.</li><li>5. Use appropriate tools strategically.</li><li>6. Attend to precision.</li><li>7. Look for and make use of structure.</li><li>8. Look for and express regularity in repeated reasoning.</li></ol>

## **Literacy Standards for Mathematics**

Communication in mathematics employs literacy skills in reading, vocabulary, speaking and listening, and writing. Mathematically proficient students communicate using precise terminology and multiple representations including graphs, tables, charts, and diagrams. By describing and contextualizing mathematics, students create arguments and support conclusions. They evaluate and critique the reasoning of others, analyze, and reflect on their own thought processes. Mathematically proficient students have the capacity to engage fully with mathematics in context by posing questions, choosing appropriate problem-solving approaches, and justifying solutions. Further explanations are included in the main introduction.

<b>Literacy Skills for Mathematical Proficiency</b>
<ol style="list-style-type: none"><li>1. Use multiple reading strategies.</li><li>2. Understand and use correct mathematical vocabulary.</li><li>3. Discuss and articulate mathematical ideas.</li><li>4. Write mathematical arguments.</li></ol>

# 2023-2024 Eighth Grade ALGEBRA 1

## A Year-at-a-Glance

1 <sup>st</sup> Nine Weeks	2 <sup>nd</sup> Nine Weeks								
<p><b>Topic 1: Solving Equations and Inequalities (3 weeks)</b> <i>A1.A.REI.A.1, A1.A.REI.B.2.a, A1.A.REI.B.2.b, A1.A.CED.A.1, A1.CED.A.3, A1.CED.A.4, A1.N.Q.A.1.c, MP 1-4,7,8</i></p> <p><b>Topic 2: Linear Equations (3 weeks)</b> <i>A1.F.LE.A.2, A1.S.ID.C.5, A1.A.CED.A.1, A1.A.CED.A.2, A1.A.CED.A.3, MP 1-4, 6, 7</i></p> <p><b>Topic 3: Linear Functions (3 weeks)</b> <i>A1.N.Q.A.1.b, A1.F.IF.A.1, A1.F.IF.A.2.a, A1.F.IF.A.2.b, A1.F.IF.A.3, A1.F.IF.B.5, A1.F.LE.A.1.b, A1.F.LE.A.2, A1.F.LE.B.3, A1.F.IF.C.7, A1.F.BF.A.1, A1.F.BF.A.1.a, A1.F.BF.B.2, A1.S.ID.B.4, A1.S.ID.C.5, A1.S.ID.C.6, A1.S.ID.C.7, MP 1-8</i></p>	<p><b>Topic 4: Systems of Linear Equations and Inequalities (3 weeks)</b> <i>A1.REI.C.4, A1.A.REI.D.5, A1.A.CED.A.3, A1.A.REI.D.7, A1.A.CED.A.2, MP 1-5,7,8</i></p> <p><b>Topic 5: Piecewise Functions (2 weeks)</b> <i>A1.F.IF.B.4, A1.F.IF.B.5, A1.F.IF.B.6, A1.F.IF.C.7, A1.F.IF.C.9.b, A1.F.BF.B.2, MP 2,4-8</i></p> <p><b>Topic 6: Exponents and Exponential Functions (3 weeks)</b> <i>A1.N.Q.A.1.a, A1.F.IF.B.4, A1.F.IF.B.5, A1.F.IF.C.9.a, A1.F.IF.C.9.b, A1.F.LE.A.1, A1.F.LE.A.1.a, A1.A.SSE.A.1.a, A1.A.SSE.A.1.b, A1.A.CED.A.2, A1.A.REI.D.6, A1.F.IF.B.6, A1.F.LE.A.1.c, A1.F.LE.A.2, A1.F.LE.B.3, A1.N.Q.A.1.d, A1.F.BF.A.1.a, A1.F.IF.B.4, MP 1-4, 7,8</i></p> <p><b>Topic 7: Polynomials and Factoring (1 week)</b> <b>(Focus on 7-1 – 7-3)</b> <i>A1.A.APR.A.1, MP 1-3, 7,8</i></p>								
<p><b>Mathematical Practices (MP)</b></p> <table border="0"><tr><td>1. Make sense of problems and persevere in solving them.</td><td>5. Use appropriate tools strategically.</td></tr><tr><td>2. Reason abstractly and quantitatively.</td><td>6. Attend to precision.</td></tr><tr><td>3. Construct viable arguments and critique the reasoning of others.</td><td>7. Look for and make use of structure.</td></tr><tr><td>4. Model with mathematics.</td><td>8. Look for and express regularity in repeated reasoning.</td></tr></table>		1. Make sense of problems and persevere in solving them.	5. Use appropriate tools strategically.	2. Reason abstractly and quantitatively.	6. Attend to precision.	3. Construct viable arguments and critique the reasoning of others.	7. Look for and make use of structure.	4. Model with mathematics.	8. Look for and express regularity in repeated reasoning.
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<p style="text-align: center;"><b>3<sup>rd</sup> Nine Weeks</b></p> <p><b>Topic 7: Polynomials and Factoring (2 weeks)</b> <b>(Focus on 7-4 – 7-7)</b> <i>A1.A.APR.A.1, A1.A.SSE.A.1.a, MP 1-5, 7,8</i></p> <p><b>Topic 8: Quadratic Functions (2 weeks)</b> <i>A1.A.CED.A.2, A1.F.BF.A.1, A1.F.BF.B.2, A1.F.IF.A.2.a, A1.F.IF.B.4, A1.F.IF.B.6, A1.F.IF.C.7, A1.F.IF.C.8.a, A1.F.IF.C.9.a, A1.F.IF.C.9.b, A1.S.ID.B.4, A1.F.LE.A.1.a, MP 1-8</i></p> <p><b>Topic 9: Solving Quadratic Equations (3 weeks)</b> <i>A1.A.REI.B.3, A1.A.REI.B.3.a, A1.A.REI.B.3.b, A1.A.REI.D.6, A1.F.IF.C.8.a, A1.A.SSE.A.1.a, A1.A.SSE.A.1.b, A1.A.CED.A.1, A1.A.CED.A.3, MP 1-7</i></p> <p><b>Topic 10: Working with Functions (3 weeks)</b> <i>A1.F.IF.B.4, A1.F.BF.B.2, A1.F.IF.C.7, A1.F.BF.A.1, MP 2-8</i></p>	<p style="text-align: center;"><b>4<sup>th</sup> Nine Weeks</b></p> <p><b>Topic 11: Statistics (3 weeks)</b> <i>A1.S.ID.A.1, A1.S.ID.A.2, A1.S.ID.A.3, A1.S.ID.B.4, MP2-8</i></p> <p><b>TNREADY BLITZ &amp; Testing ( weeks)</b></p> <p><b>Culminating Projects ( weeks)</b></p>								
<p><b>Literacy Skills for Mathematical Proficiency</b></p> <table border="0"><tr><td>1. Use multiple reading strategies.</td><td>3. Discuss and articulate mathematical ideas.</td></tr><tr><td>2. Understand and use correct mathematical vocabulary.</td><td>4. Write mathematical argument.</td></tr></table>		1. Use multiple reading strategies.	3. Discuss and articulate mathematical ideas.	2. Understand and use correct mathematical vocabulary.	4. Write mathematical argument.				
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**\*\*The suggested pacing for each lesson is 2 days for a 45 minute math class and 1 day for a 90 minute math class.\*\***

# 1<sup>st</sup> Quarter - Topic 1: Solving Equations and Inequalities

(Suggested Time = 3 weeks)

[IFD\\_G8\\_Binder\\_0.pdf \(tnedu.gov\)](#)

[IFD\\_A1\\_Binder.pdf \(tnedu.gov\)](#)

**Essential Question:** *What general strategies can you use to solve simple equations?*

**Standards**

**8.NS.A.1** - Know that real numbers that are not rational are called irrational (e.g.,  $\pi$ ,  $\sqrt{2}$ , etc.). Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually or terminates and convert a decimal expansion which repeats eventually or terminates into a rational number.

**8.NS.A.2** - Use rational approximations of irrational numbers to compare the size of irrational numbers by locating them approximately on a number line diagram. Estimate the value of irrational expressions (such as  $\pi^2$ ). For example, by truncating the decimal expansion of  $\sqrt{2}$ , show that  $\sqrt{2}$  is between 1 and 2, then between 1.4 and 1.5, and explain how to continue to get better approximations.

**8.EE.A.1** - Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example,  $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$

**8.EE.A.2** - Use square root and cube root symbols to represent solutions to equations of the form  $x^2 = p$  and  $x^3 = p$ , where  $p$  is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes.

**A1.N.Q.A.1.c** – Define and justify appropriate quantities within a context for the purpose of modeling. \*

**A1.A.CED.A.1** – Create equations and inequalities in one variable and use them to solve problems in a real-world context. \*

**A1.A.CED.A.3** – Create individual and systems of equations and/or inequalities to represent constraints in a contextual situation and interpret solutions as viable or non-viable. \*

**A1.A.CED.A.4** – Rearrange formulas to isolate a quantity of interest using algebraic reasoning. \*

**A1.REI.A.1** – Understand solving equations as a process of reasoning and explain the reasoning. Construct a viable argument to justify a solution method.

**A1.REI.B.2.a** – Solve linear equations and inequalities, including compound inequalities, in one variable. Represent solutions algebraically and graphically.

**A1.A.REI.B.2.b** – Solve absolute value equations and inequalities in one variable. Represent solutions algebraically and graphically.

Vocabulary	Mathematical Practices	Textbook Correlations
rational number, percent, decimal, fraction, mixed number, estimate, irrational number, real number, repeating decimal, terminating decimal, element of a set, subset, base, cube root, exponent, irrational number, monomial, perfect cube, perfect square, power, radical	<b>MP1, MP2, MP 3, MP 4, MP7, MP8</b>	Topic 1: Lessons 1-1 - 1-7  <ul style="list-style-type: none"> <li>Modeling in 3 Acts – 1 day between Lessons 1-5 and 1-6</li> </ul>

sign, rational number, scientific notation, square root, principal square root, identity property, equality property, formula, literal equation, compound inequality

### The Eight Mathematical Practices

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

#### Learning Targets

- Determine if a decimal expansion of a fraction will terminate or repeat.
- Classify a real number as rational or irrational, including square and cube roots.
- Explain how irrational numbers differ from rational numbers.
- Approximate square roots by using perfect squares
- Compare and order real numbers.
- Find the sum or product of two rational numbers and explain why the sum or product is rational.
- Find the sum or product of a rational or irrational number and explain when the sum or product is irrational.
- Explain that each step in solving a linear equation follows from the equality in the previous step.
- Create and solve linear equations with one variable using the properties of equality.
- Use the properties of equality to solve linear equations with a variable on both sides.
- Identify whether linear equations have one solution, no solution, or infinitely many solutions.
- Rearrange formulas and equations to highlight a quantity of interest by isolating the variable using the same reasoning used to solve equations.
- Use formulas and equations to solve problems.
- Create and solve inequalities in one variable.
- Interpret solutions to inequalities with the context.
- Identify inequalities as true or false based on the number of solutions.
- Create and solve a system of inequalities.
- Interpret the solution to a compound inequality within a model context.
- Solve absolute value equations and inequalities.
- Use absolute value equations and inequalities to solve problems.

# 1<sup>st</sup> Quarter - Topic 2: Linear Equations (Suggested Time = 3 weeks)

[IFD\\_G8\\_Binder\\_0.pdf \(tnedu.gov\)](#)

[IFD\\_A1\\_Binder.pdf \(tnedu.gov\)](#)

Essential Question: <i>Why is it useful to have different forms of linear equations?</i>		
Standards		
<p><b>A1.A.CED.A.1</b> – Create equations and inequalities in one variable and use them to solve problems in a real-world context.</p> <p><b>A1.A.CED.A.2</b> – Create equations and inequalities in two variables to represent relationships between quantities and use them to solve problems in a real-world context. Graph equations with two variables on coordinate axes with labels and scales, and scales and use the graphs to make predictions.*</p> <p><b>A1.A.CED.A.3</b> – Create individual and systems of equations and/or inequalities to represent constraints in a contextual situation and interpret solutions as viable or non-viable.</p> <p><b>A1.F.LE.A.2</b> – Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a table, a description of a relationship, or input-output pairs. *</p> <p><b>A1.S.ID.C.5</b> – Interpret the rate of change and the constant term of a linear model in the context of data. *</p>		
Vocabulary	Mathematical Practices	Textbook Correlations
Slope, x-intercept, y-intercept, Slope-intercept form, point-slope form, standard form of an equation, parallel lines, perpendicular lines, reciprocal	<p>MP1, MP2, MP3, MP4, MP6, MP7</p> <div style="background-color: #e0e0e0; padding: 10px; text-align: center;"> <p><b>The Eight Mathematical Practices</b></p> <ol style="list-style-type: none"> <li>1. Make sense of problems and persevere in solving them.</li> <li>2. Reason abstractly and quantitatively.</li> <li>3. Construct viable arguments and critique the reasoning of others.</li> <li>4. Model with mathematics.</li> <li>5. Use appropriate tools strategically.</li> <li>6. Attend to precision.</li> <li>7. Look for and make use of structure.</li> <li>8. Look for and express regularity in repeated reasoning.</li> </ol> </div>	<p>Topic 2: Lessons 2-1 – 2-4</p> <ul style="list-style-type: none"> <li>• Mathematical Modeling in 3 Acts: “How Tall is Tall?” – 1 day between 2-3 and 2-4</li> </ul>
Learning Targets		
<ul style="list-style-type: none"> <li>• Write linear equations in two variables using slope-intercept form to represent the relationships between two quantities.</li> </ul>		

- Interpret the slope and the intercept of a linear model.
- Write and graph linear equations in point-slope form.
- Analyze different forms of a line to interpret the slope and y-intercept of a linear model in the context of data.
- Write and graph linear equations in standard form.
- Use linear equations in standard form to interpret both the x- and y-intercepts in the context of given data.
- Create equations to represent lines that are parallel or perpendicular to a given line.
- Graph lines to show an understanding of the relationship between the slopes of parallel and perpendicular lines.
- Solve real-world problems with parallel or perpendicular lines.



# 1<sup>st</sup> Quarter - Topic 3: Linear Functions (Suggested Time = 3 weeks)

[IFD\\_G8\\_Binder\\_0.pdf \(tnedu.gov\)](#)

[IFD\\_A1\\_Binder.pdf \(tnedu.gov\)](#)

**Essential Question:** *How can linear functions be used to model situations and solve problems?*

**Standards:**

**A1. N.Q.A.1.b** – Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

**A1. F.IF.A.1** – 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  $y = f(x)$ .

**A1. F.IF.A.2.a** – Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

**A1. F.IF.A.2.b** – Interpret statements that use function notation in terms of a context. \*

**A2. F.IF.A.3** – Understand geometric formulas as functions. \*

**A1. F.IF.B.5** – 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.

**A1. F.IF.C.7** – Graph functions expressed algebraically and show key features of the graph by hand and using technology. \*

**A1. F.BF.A.1** – Build a function that describes a relationship between two quantities. \*

**A1. F.BF.A.1a** – Determine steps for calculation, a recursive process, or an explicit expression from a context. \*

**A1.F.BF.B.2** –2 Identify the effect on the graph of replacing  $f(x)$  by  $f(x) + k$ ,  $k f(x)$ ,  $f(kx)$ , and  $f(x + k)$  for specific values of  $k$  (both positive and negative); find the value of  $k$  when given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology.

**A1. F.LE.A.1b** – Distinguish between situations that can be modeled with linear functions and with exponential functions. b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.

**A1. F.LE.A.2** – Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a table, a description of a relationship, or input-output pairs

**A1. F.LE.B.3** – Interpret the parameters in a linear or exponential function in terms of a context. \*

**A1.S.ID.B.4** – Represent data on two quantitative variables on a scatter plot and describe how the variables are related. (Formerly S-ID.B.6) a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. b. Fit a linear function for a scatter plot that suggests a linear association.

**A1.S.ID.C.5** – Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.

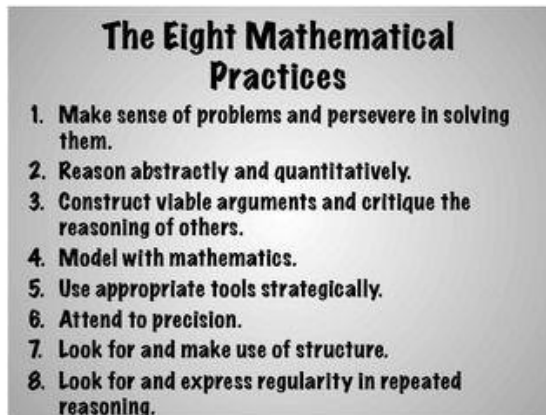
**Vocabulary**

**Mathematical Practices**

**Textbook Correlations**

continuous, discrete, domain, function, one-to-one, range, relation, function notations, linear functions, nonlinear functions, rate of change, transformation, translation, arithmetic sequence, common difference, explicit formula, recursive formula, sequence, term of a sequence, positive correlation, positive association, negative correlation, negative association, no association, trend line, causation, correlation coefficient, extrapolation, interpolation, line of best fit, linear regression, residual

**MP1, MP2, MP3, MP4, MP6, MP7, MP8**



Topic 3: Lessons 3-1 – 3-6, TN – 1, TN – 2

- TN – 1 and TN – 2 need to be taught after lesson 3-2
- Math Modeling in 3 Acts: “The Express Line” – 1 day between 3-3 and 3-4

### Learning Targets

- Understand that a relation is a function if each element of the domain is assigned to exactly one element in the range.
- Determine a reasonable domain and identify constraints on the domain.
- Write and evaluate linear functions using function notation.
- Graph a linear function and relate the domain of a function to its graph.
- Interpret functions in terms of a context.
- Use function notation to evaluate the function of two variables.
- Define functions symbolically.
- Write geometric formulas using function notation.
- Graph transformations of linear functions by identifying the effect of multiplying or adding specific values of  $k$  to the input or output.
- Interpret the key features of the graph of a transformation of a linear function.
- Write arithmetic and geometric sequences both recursively and with an explicit formula.
- Use explicit formulas and recursive formulas to model real-world situations.
- Fit a function to a linear data shown in a scatter plot and use fitted functions to solve problems in the context of the data.
- Interpret the slope of a trend line within the context of data.
- Compute and interpret the correlation coefficient of linear data.
- Plot and analyze residuals to assess the fit of a function.
- Distinguish between correlation and causation.

# 2<sup>nd</sup> Quarter - Topic 4: Systems of Linear Equations and Inequalities

## (Suggested Time = 3 weeks)

[IFD\\_G8\\_Binder\\_0.pdf \(tnedu.gov\)](#)

[IFD\\_A1\\_Binder.pdf \(tnedu.gov\)](#)

<b>Essential Question:</b> <i>How do you use systems of linear equations and inequalities to model situations and solve problems?</i>		
<p><b>Standards:</b></p> <p><b>A1.A.CED.A.2</b> – Create equations in two or more variables to represent relationships between quantities; graph equations with two variables on coordinate axes with labels and scales.</p> <p><b>A1.A.CED.A.3</b> – 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.</p> <p><b>A1.A.REI.C.4</b> – Write and solve a system of linear equations in context.</p> <p><b>A1.A.REI.D.5</b> – 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).</p> <p><b>A1.A.REI.D.7</b> – Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality) and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.</p>		
Vocabulary	Mathematical Practices	Textbook Correlations
<p>Linear inequality in two variables, solution of an inequality in two variables, solution of a system of linear inequalities, system of linear inequalities.</p>	<p>MP1, MP2, MP3, MP4, MP5, MP7, MP8</p> <div style="text-align: center; background-color: #f0f0f0; padding: 10px; border: 1px solid #ccc;"> <p><b>The Eight Mathematical Practices</b></p> <ol style="list-style-type: none"> <li>1. <b>Make sense of problems and persevere in solving them.</b></li> <li>2. <b>Reason abstractly and quantitatively.</b></li> <li>3. <b>Construct viable arguments and critique the reasoning of others.</b></li> <li>4. <b>Model with mathematics.</b></li> <li>5. <b>Use appropriate tools strategically.</b></li> <li>6. <b>Attend to precision.</b></li> <li>7. <b>Look for and make use of structure.</b></li> <li>8. <b>Look for and express regularity in repeated reasoning.</b></li> </ol> </div>	<p>Topic 4: Lessons 4-1 – 4-5</p> <ul style="list-style-type: none"> <li>Mathematical Modeling in 3 Acts: “Get Up There!” – 1 day between 4-4 and 4-5</li> </ul>
Learning Targets		
<ul style="list-style-type: none"> <li>Graph systems of linear equations in two variables to find an approximate solution.</li> <li>Write a system of linear equations in two variables to represent real-world problems.</li> <li>Use substitution method to solve systems of equations.</li> </ul>		

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| <ul style="list-style-type: none"><li>• Represent situations as a system of equations and interpret solutions as viable/nonviable options for the situation.</li><li>• Solve systems of linear equations and prove that the sum of one equation and a multiple of the other produces a system with the same solutions as the original system.</li><li>• Represent constraints with a system of equations in a modeling context.</li><li>• Graph solutions to linear inequalities in two variables.</li><li>• Represent constraints with inequalities and interpret solutions as viable or nonviable options in a modeling context.</li><li>• Graph the solution set of a system of linear inequalities in two variables.</li><li>• Interpret solutions of linear inequalities in a modeling context.</li></ul> |  |
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# 2<sup>nd</sup> Quarter - Topic 5: Piecewise Functions (Suggested Time = 2 weeks)

[IFD\\_G8\\_Binder\\_0.pdf \(tnedu.gov\)](#)

[IFD\\_A1\\_Binder.pdf \(tnedu.gov\)](#)

<b>Essential Question:</b> <i>How do you use piecewise functions to model situations and solve problems?</i>		
<p><b>Standards:</b></p> <p><b>A1. F.IF.B.4</b> – Interpret the parameters in a linear or exponential function in terms of a context. *</p> <p><b>A1. F.IF.B.5</b> – Relate the domain of a function to its graph and, where applicable, to the context of the function it models. *</p> <p><b>A1. F.IF.B.6</b> – Calculate and interpret the average rate of change of a function (presented algebraically or as a table) over a specified interval. Estimate and interpret the rate of change from a graph. *</p> <p><b>A1. F.IF.C.7</b> – Graph functions expressed algebraically and show key features of the graph by hand and using technology. *</p> <p><b>A1. F.IF.C.9b</b> – Compare properties of the same function on two different intervals or represented in two different ways. *</p> <p><b>A1. F.BF.B.2</b> – Identify the effect on the graph of replacing <math>f(x)</math> by <math>f(x) + k</math>, <math>k f(x)</math>, <math>f(kx)</math>, and <math>f(x + k)</math> for specific values of <math>k</math> (both positive and negative); find the value of <math>k</math> given graphs.</p>		
Vocabulary	Mathematical Practices	Textbook Correlations
<p>Absolute value function, axis of symmetry, vertex, piecewise-defined function, ceiling function, floor function, step function, interval</p> <p>Review transformations, linear functions, slope-intercept form, domain, and range.</p>	<p>MP2, MP4, MP5, MP6, MP7, MP8</p> <div style="border: 1px solid black; padding: 5px; background-color: #f0f0f0; text-align: center;"> <p><b>The Eight Mathematical Practices</b></p> <ol style="list-style-type: none"> <li>1. Make sense of problems and persevere in solving them.</li> <li>2. Reason abstractly and quantitatively.</li> <li>3. Construct viable arguments and critique the reasoning of others.</li> <li>4. Model with mathematics.</li> <li>5. Use appropriate tools strategically.</li> <li>6. Attend to precision.</li> <li>7. Look for and make use of structure.</li> <li>8. Look for and express regularity in repeated reasoning.</li> </ol> </div>	<p>Topic 5: Lessons 5-1 – 5-4</p> <ul style="list-style-type: none"> <li>• Mathematical Modeling in 3 Acts: “The Mad Runner” – 1 day between 5-1 and 5-2</li> </ul>
<b>Learning Targets</b>		
<ul style="list-style-type: none"> <li>• Graph an absolute value function and identify the key features of the graph.</li> <li>• Calculate and interpret the rate of change of an absolute value function over a specified interval.</li> <li>• Understand and graph piecewise-defined functions.</li> <li>• Analyze the key features of the graph of a piecewise defined function.</li> <li>• Write and interpret a piecewise-defined function to solve application problems.</li> </ul>		

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| <ul style="list-style-type: none"><li>• Graph step functions including ceiling and floor functions.</li><li>• Calculate and interpret the average rate of change of step functions.</li><li>• Graph transformations of piecewise-defined functions.</li><li>• Identify the effect of changing constants and coefficients of absolute value functions on their graph.</li></ul> |  |
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## 2<sup>nd</sup> Quarter - Topic 6: Exponents and Exponential Functions (Suggested Time = 3 weeks)

[IFD\\_G8\\_Binder\\_0.pdf \(tnedu.gov\)](#)

[IFD\\_A1\\_Binder.pdf \(tnedu.gov\)](#)

**Essential Question:** *How do you use exponential functions to model situations and solve problems?*

**Standards:**

**8.EE.A.1** - Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example,  $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$ .

**(Prepares for A2.N.RN.A.1** – Extend the properties of integer exponents to rational exponents.)

**A1. N.Q.A.1a** – Choose and interpret the scale and the origin in graphs and data displays. \*

**A1. F.IF.B.4** – For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. \*

**A1. F.IF.B.5** – Relate the domain of a function to its graph and, where applicable, to the context of the function it models. \*

**A1. F.IF.C.9a** – Compare properties of two different functions. Functions may be of different types and/or represented in different ways. \*

**A1. F.IF.C.9b** – Compare properties of the same function on two different intervals or represented in two different ways. \*

**A1.F.BF.A.1** – Build a function that describes a relationship between two quantities. \*

**A1.F.BF. A.1a** – Determine steps for calculation, a recursive process, or an explicit expression from a context. \*

**A1. F.LE.A.1** – Distinguish between situations that can be modeled with linear functions and with exponential functions. \*

**A1. F.LE.A.1b** – Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. \*

**A1. F.LE.A.2** – Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a table, a description of a relationship, or input-output pairs. \*

Vocabulary	Mathematical Practices	Textbook Correlations
Radical, rational exponent, asymptote, constant ratio, exponential function, compound interest, decay factor, exponential	MP1, MP2, MP3, MP4, MP7, MP8	Topic 6: Lessons 6-1 – 6-5

decay, exponential growth, growth factor, geometric sequence

### The Eight Mathematical Practices

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

- Mathematical Modeling in 3 Acts: “Big Time Pay Back” – 1 day after 6-5

#### Learning Targets

- Extend the properties of integer exponents to rational exponents to rewrite radical expressions using rational exponents.
- Solve equations with rational exponents using the properties of exponents.
- Sketch graphs showing key features of exponential functions.
- Write exponential functions using tables and graphs.
- Compare linear and exponential functions.
- Construct exponential growth and decay functions given a description of a relationship.
- Recognize if a situation can be modeled with an exponential growth or decay and interpret the parameters of the model in context.
- Find explicit and recursive formulas for geometric sequences.
- Translate between recursive and explicit formulas for geometric sequences.
- Construct exponential functions to represent geometric sequences.
- Translate the graph of an exponential function vertically and horizontally, identifying the effect of different values of  $h$  and  $k$  have on the graph of the function.



# 2<sup>nd</sup>/3<sup>rd</sup> Quarter - Topic 7: Polynomials and Factoring (Suggested Time = 3 weeks)

[IFD\\_G8\\_Binder\\_0.pdf \(tnedu.gov\)](#)

[IFD\\_A1\\_Binder.pdf \(tnedu.gov\)](#)

<b>Essential Question:</b> <i>How do you work with polynomials to rewrite expressions and solve problems?</i>		
<p><b>Standards:</b></p> <p><b>A1. A.APR.A.1</b> – Add, subtract, and multiply polynomials. Use these operations to demonstrate that polynomials form a closed system that adhere to the same properties of operations as the integers</p> <p><b>A1. A.SSE. A.1a</b> – Interpret parts of an expression, such as terms, factors, and coefficients. *</p>		
Vocabulary	Mathematical Practices	Textbook Correlations
Closure Property, degree of a monomial, degree of a polynomial, monomial, polynomial, standard form of a polynomial, difference of two squares, perfect-square trinomial	<p>MP1, MP2, MP3, MP4, MP5, MP7, MP8</p> <div style="background-color: #d3d3d3; padding: 10px; border: 1px solid black; text-align: center;"> <p><b>The Eight Mathematical Practices</b></p> <ol style="list-style-type: none"> <li>1. Make sense of problems and persevere in solving them.</li> <li>2. Reason abstractly and quantitatively.</li> <li>3. Construct viable arguments and critique the reasoning of others.</li> <li>4. Model with mathematics.</li> <li>5. Use appropriate tools strategically.</li> <li>6. Attend to precision.</li> <li>7. Look for and make use of structure.</li> <li>8. Look for and express regularity in repeated reasoning.</li> </ol> </div>	<p>Topic 7: Lessons 7-1 – 7-7</p> <ul style="list-style-type: none"> <li>Mathematical Modeling in 3 Acts: “Who’s Right?” – 1 day between 7-5 and 7-6</li> </ul>
Learning Targets		
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# 3<sup>rd</sup> Quarter - Topic 8 : Quadratic Functions (Suggested Time = 2 weeks)

[IFD\\_G8\\_Binder\\_0.pdf \(tnedu.gov\)](#)

[IFD\\_A1\\_Binder.pdf \(tnedu.gov\)](#)

**Essential Question:** *How can you use sketches and equations of quadratic functions to model situations and make predictions?*

## Standards:

**A1.A.CED.A.2** – Create equations and inequalities in two variables to represent relationships between quantities and use them to solve problems in a real-world context. Graph equations with two variables on coordinate axes with labels and scales and use the graphs to make predictions.\*

**A1.F.BF.A.1** – Build a function that describes a relationship between two quantities.\*

**A1.F.BF.B.2** – Identify the effect on the graph of replacing  $f(x)$  by  $f(x) + k$ ,  $k f(x)$ ,  $f(kx)$ , and  $f(x + k)$  for specific values of  $k$  (both positive and negative); find the value of  $k$  given graphs.

**A1.F.IF.A.2a** – Use function notation to evaluate functions for inputs in their domains, including functions of two variables.\*

**A1.F.IF.B.6** – Calculate and interpret the average rate of change of a function (presented algebraically or as a table) over a specified interval. Estimate and interpret the rate of change from a graph.\*

**A1.F.IF.C.7** – Graph functions expressed algebraically and show key features of the graph by hand and using technology.\*

**A1.F.IF.C.9a** – Compare properties of two different functions. Functions may be of different types and/or represented in different ways.

**A1.F.IF.C.9b** – Compare properties of the same function on two different intervals or represented in two different ways.\*

**A1.F.IF.B.4** – For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.\*

**A1.F.IF.C.8a** – Rewrite quadratic functions to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a real-world context

**A1.F.LE.A.1a** – Know that linear functions grow by equal differences over equal intervals and that exponential functions grow by equal factors over equal intervals.\*

**A1.S.ID.B.4** – Represent data from two quantitative variables on a scatter plot and describe how the variables are related. Fit a function to the data; use functions fitted to data to solve problems in the context of the data.\*

Vocabulary

Mathematical Practices

Textbook Correlations

Parabola, quadratic parent function, vertex form of a quadratic function, standard form of a quadratic function, quadratic regression, vertical motion model

MP1, MP2, MP3, MP4, MP5, MP6, MP7, MP8

**The Eight Mathematical Practices**

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Topic 8: Lessons 8-1 – 8-5

- Mathematical Modeling in 3 Acts: “The Long Shot” – 1 day between 8-4 and 8-5

**Learning Targets**

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# 3<sup>rd</sup> Quarter - Topic 9: Solving Quadratic Functions (Suggested Time = 3 weeks)

[IFD\\_G8\\_Binder\\_0.pdf \(tnedu.gov\)](#)

[IFD\\_A1\\_Binder.pdf \(tnedu.gov\)](#)

**Essential Question:** *How do you use quadratic equations to model situations and solve problems?*

**Standards:**

**A1.A.REI.B.3** – Solve quadratic equations and inequalities in one variable

**A1.A.REI.B.3a** – Solve quadratic equations by inspection (e.g., for  $x^2 = 49$ ), taking square roots, knowing and applying the quadratic formula, and factoring, as appropriate to the initial form of the equation. Recognize when a quadratic equation has solutions that are not real numbers

**A1.A.REI.B.3b** – Solve quadratic inequalities using the graph of the related quadratic equation

**A1.A.REI.D.6** – 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 approximate solutions by graphing the functions or making a table of values, using technology when appropriate.\*

**A1.F.IF.C.8a** – Rewrite quadratic functions to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a real-world context

**A1.A.SSE.A.1a** – Interpret parts of an expression, such as terms, factors, and coefficients.\*

**A1.A.SSE.A.1b** – Interpret complicated expressions by viewing one or more of their parts as a single entity.\*

**A1.A.CED.A.1** – Create equations and inequalities in one variable and use them to solve problems in a real-world context.\*

**A1.A.CED.A.3** – Create individual and systems of equations and/or inequalities to represent constraints in a contextual situation and interpret solutions as viable or non-viable.\*

Vocabulary	Mathematical Practices	Textbook Correlations
Quadratic equation, zeros of a function, standard form of a quadratic equation, Zero-Product Property, Product Property of Square Roots, completing the square, discriminant, quadratic formula, root, linear-quadratic system	<b>MP1, MP2, MP3, MP4, MP5, MP6, MP7</b>	Topic 9: Lessons 9-1 – 9-7, TN - 3 <ul style="list-style-type: none"> <li>Mathematical Modeling in 3 Acts: “Unwrapping Challenge” – 1 day between 9-6 and 9-7</li> </ul>

## The Eight Mathematical Practices

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

### Learning Targets

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# 3<sup>rd</sup> Quarter - Topic 10 : Working with Functions (Suggested Time = 3 weeks)

[IFD\\_G8\\_Binder\\_0.pdf \(tnedu.gov\)](#)

[IFD\\_A1\\_Binder.pdf \(tnedu.gov\)](#)

Essential Question:		
<b>Standards:</b>  <b>A1.F.IF.B.4</b> – 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.*  <b>A1.F.BF.A.1</b> – Build a function that describes a relationship between two quantities.*  <b>A1.F.BF.B.2</b> – Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$ , $k f(x)$ , $f(kx)$ , and $f(x + k)$ for specific values of $k$ (both positive and negative); find the value of $k$ given graphs.  <b>A1.F.IF.C.7</b> – Graph functions expressed algebraically and show key features of the graph by hand and using technology.*  <b>A1.F.BF.B.2</b> – Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$ , $k f(x)$ , $f(kx)$ , and $f(x + k)$ for specific values of $k$ (both positive and negative); find the value of $k$ given graphs		
Vocabulary	Mathematical Practices	Textbook Correlations
Square root function, cube root function, inverse of a function	MP1, MP2, MP3, MP4, MP5, MP6, MP7, MP8  <div style="border: 1px solid black; padding: 5px; background-color: #f0f0f0;"> <p style="text-align: center;"><b>The Eight Mathematical Practices</b></p> <ol style="list-style-type: none"> <li>1. Make sense of problems and persevere in solving them.</li> <li>2. Reason abstractly and quantitatively.</li> <li>3. Construct viable arguments and critique the reasoning of others.</li> <li>4. Model with mathematics.</li> <li>5. Use appropriate tools strategically.</li> <li>6. Attend to precision.</li> <li>7. Look for and make use of structure.</li> <li>8. Look for and express regularity in repeated reasoning.</li> </ol> </div>	Topic 10: Lessons 10-1 – 10-7 <ul style="list-style-type: none"> <li>• Mathematical Modeling in 3 Acts: “Edgy Tiles” – 1 day between 10-5 and 10-6</li> </ul>
Learning Targets		
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# 4<sup>th</sup> Quarter - Topic 11 : Statistics (Suggested Time = 3 weeks)

[IFD\\_G8\\_Binder\\_0.pdf \(tnedu.gov\)](#)

[IFD\\_A1\\_Binder.pdf \(tnedu.gov\)](#)

Essential Question:		
<p><b>Standards:</b></p> <p><b>A1.S.ID.A.1</b> – Use measures of center to solve real world and mathematical problems.*</p> <p><b>A1.S.ID.A.2</b> – Use statistics appropriate to the shape of the data distribution to compare center (mean, median, and/or mode) and spread (range, interquartile range) of two or more different data sets.*</p> <p><b>A1.S.ID.A.3</b> – Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points.*</p> <p><b>A1.S.ID.B.4</b> – Represent data from two quantitative variables on a scatter plot and describe how the variables are related. Fit a function to the data; use functions fitted to data to solve problems in the context of the data.*</p>		
Vocabulary	Mathematical Practices	Textbook Correlations
<p>Normal distribution, standard deviation, variance, conditional relative frequency, joint frequency, joint relative frequency, marginal frequency, marginal relative frequency</p>	<p>MP2, MP3, MP4, MP5, MP6, MP7, MP8</p> <div style="border: 1px solid black; padding: 5px; background-color: #f0f0f0;"> <p style="text-align: center;"><b>The Eight Mathematical Practices</b></p> <ol style="list-style-type: none"> <li>1. Make sense of problems and persevere in solving them.</li> <li>2. Reason abstractly and quantitatively.</li> <li>3. Construct viable arguments and critique the reasoning of others.</li> <li>4. Model with mathematics.</li> <li>5. Use appropriate tools strategically.</li> <li>6. Attend to precision.</li> <li>7. Look for and make use of structure.</li> <li>8. Look for and express regularity in repeated reasoning.</li> </ol> </div>	<p>Topic 11: Lessons 11-1 – 11-5</p> <ul style="list-style-type: none"> <li>• Mathematical Modeling in 3 Acts: “Text Message” – 1 day after 11-5</li> </ul>
Learning Targets		
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## 4<sup>th</sup> Quarter - Topic 12: Review and Culminating Projects

Essential Question:

<b>Vocabulary</b>	<b>Mathematical Practices</b>	<b>Textbook Correlations</b>